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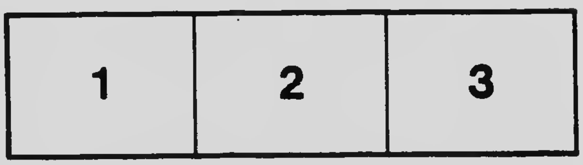

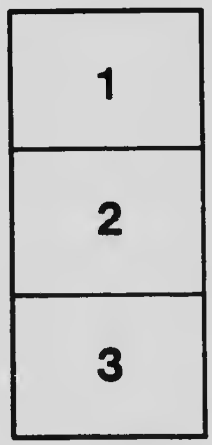

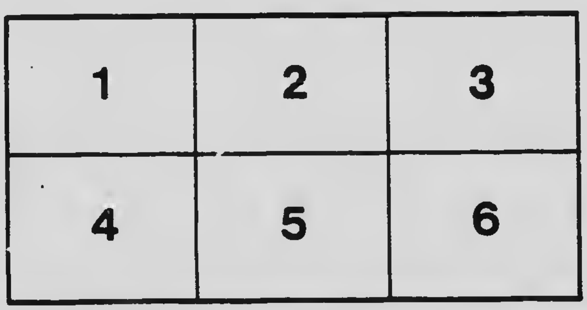

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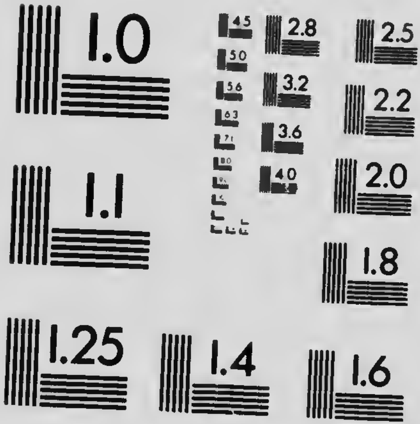

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A COURSE OF
LECTURES ON MEDICINE TO NURSES

BY

HERBERT E. CUFF, M.D., F.R.C.S.
Medical Officer for General Purposes to the Metropolitan Asylums Board
Late Medical Superintendent, North Eastern Fever Hospital,
Tottenham, London.

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PREFACE TO THE FIRST EDITION

I FEEL that I ought to give some explanation of the purpose of these lectures, since they go so much more fully into the details of disease and its treatment than has hitherto been attempted in books which have been written for nurses. It is possible that some will therefore question their usefulness, while others may go a step farther, and say, "Is it wise to tell nurses so much?" With the second of these two objections I am quite unable to agree; as regards the first, time alone can show.

No one who has taken part in the instruction of nurses can have failed to notice their desire for more information about the patients they tend than is to be obtained from their manuals. It is unreasonable to expect a nurse to be satisfied with the mere mechanical performance of her duties. If she is interested in her patients, she naturally wishes to learn something about the diseases from which they are suffering; the explanation of their symptoms, and the object of the treatment. Her own books are either silent on these points, or give but a very slight sketch of them. She therefore turns to one or other of the students' text-books of medicine in search of the information she desires. The result of her reading must be to a great extent unsatisfactory, owing to the technical language in which such books are written. Yet, how frequently one finds nurses seeking knowledge in this way. In my experience, these are the women who most clearly recognise the line which exists between the duties of a nurse and those of the medical attendant

In these lectures I have sought in some degree to supply this want, avoiding as far as possible the use of technical expressions. My plan has been to start with a short account of the anatomy and physiology of the affected organ, explaining briefly the changes produced in it by the disease; then to describe such symptoms as can be observed by a nurse, pointing out those features in the case which bear upon the patient's chances of recovery; and finally, to give reasons for the various steps in the treatment and nursing. One cannot explain symptoms without some reference to pathology, nor can the latter be understood without the assistance of anatomy and physiology.

I, of course, do not think that nurses ought to remember all the facts I have stated in these pages. My object is, rather. to provide them with a work of reference which will enable them intelligently to follow the progress of their cases; to grasp the meaning of symptoms; to understand some of the reasons which influence the physician in his adoption of different methods of treatment, and the results to be expected therefrom. At the same time, I have elaborated and emphasised, whenever possible, any points that could be of practical help to them in their work. If it only serves to increase their interest in that work, this book will have justified its existence.

In preparing it, I have derived much useful information from Dr. Hale White's article on "Massage" in "A Text-Book of General Therapeutics"; from Dr. Cheadle's writings on the "Feeding of Infants"; and from Dr. Ringer's article on "The Pulse" in his "Handbook of Therapeutics."

The illustrations have been drawn for me by Miss Ethel Porter, for the most part from rough diagrams of my own. Any anatomical eccentricities detected in them must, therefore, be charged to my account. Finally, I have to thank Miss Kingsford, Matron of the Metropolitan Hospital, for much kind help and many useful suggestions.

H. C.

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LECTURES ON MEDICINE TO NURSES

I

GERMS AND INFECTION

To-day I wish to give you some idea of the life-history of germs, together with the way in which they cause disease. A slight knowledge of the elements of bacteriology will be useful to you in more than one branch of your work; indeed, without it you would be quite unable to appreciate the meaning and importance of surgical cleanliness.

At the present time most of us believe that all forms of infectious disease, both in men and animals, have their origin in extremely minute living bodies called "germs." These germs are the contagion of each disease, and by means of them it spreads. We also believe that just as each plant has its own particular seed, so *each disease has its own special germ*, which can produce that disease and no other.

For some diseases, as, for instance, tuberculosis and diphtheria, this has been proved; in others, a germ has been discovered, but at present it is a disputed point whether it is the right one; while in a third class, of which small-pox and measles are examples, special germs have up to the present not been found.

It is not enough merely to find germs; that is no difficult matter. What is necessary is to prove that a special germ is the cause of a particular disease. To do this, that germ must be constantly found in patients who are suffering from the disease; when injected into animals, it must reproduce the same disease: and in those animals that particular germ must again be found. Having fulfilled these conditions, it is accepted as the cause of the disease.

The first question is: **What are Germs?**

Germs, or microbes as they are called, are the smallest living organisms with which we are acquainted. They are not animals, but *plants*, and belong to the order of *fungi*, of which the common mildew is an example. As regards their shape, the vast majority of them are either tiny round bodies or else very small rods. Here are some examples of each magnified many hundreds of times (Fig. 1). So minute are they that the highest powers of the microscope are needed for their detection. There are some so small that you would have to place 250,000 of them in a row to make a line one inch long.

FIG. 1.

There are a large number of separate species or varieties of germs, many of which are quite harmless, while others, under appropriate conditions, produce certain diseases.

Rate of Growth.—They multiply with amazing rapidity. In some instances a germ produces other and similar germs in from ten to twenty minutes. These repeat the process equally quickly, so that a single microbe may in twenty-four hours give rise to several millions of its kind.

The rate of growth varies considerably among the different forms of germs, and is absolutely controlled by the favourable or unfavourable nature of their surroundings.

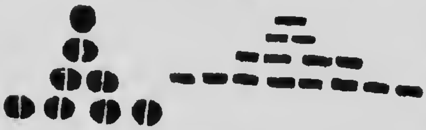
Just as some of the more delicate hothouse plants must have a certain temperature and a particular kind of soil before they will grow, so microbes are equally exacting in their requirements, which is fortunate for us, or we should stand but a very poor chance of escaping from them. Suppose, for instance, that a patient who was suffering from diphtheria coughed up a piece of membrane, which fell upon the floor and dried there. That piece of membrane would be full of the germs of diphtheria, but they could not continue to grow on the floor, because the temperature surrounding them would be too low, and they would suffer from want of food. If, however, that piece of membrane were put into a flask of broth, which was kept constantly at about the same temperature a that of the human body, those germs would very quickly commence to multiply: because now the conditions surrounding them are favourable to their growth. They have a suitable temperature and plenty of food.

The same rule applies, more or less, to every sort of germ; so that you will understand now what I meant when I said that the growth of these organisms is directly dependent upon the character of their surroundings.

As regards their method of growing, a microbe gives rise to other microbes in one of two ways.

Mode of Reproduction.—(*a*) *By division.*—This diagram (Fig. 2) will illustrate what I mean. The original germ first enlarges somewhat beyond the usual size, and then a crack appears in the centre of it, which gradually increases until at last the parent germ is divided into two distinct and separate portions, each of which now constitutes a germ. These two halves in a very short time divide in a similar manner, and thus you have four germs; these grow for a short time, and then similarly split up, producing eight germs, and so on. From this you will understand what a very simple and easy process the multiplication of germs is, and how readily it lends itself to an extremely rapid increase in their numbers.

FIG. 2.



Germs increasing in number by division.

(*b*) *By producing seeds*, or spores, as they are called.—This takes very much more time than simple division. The spore is produced in the interior of the microbe. When it has reached its full size, it is set free by the death of the parent germ. Spores are much more difficult to destroy than are the germs which gave rise to them. They can exist for months or years under the most unfavourable conditions, and then finally, when taken into the body, reproduce the original disease and its germs. This, as you know, is true for the seeds of all plants. They can stand a degree of heat, cold or drought that would very quickly kill the parent plants.

The next question is .

Where do germs come from? Where are they to be found?

They are present—

(1) *In air.*—Their numbers will vary very much according to the place from which the air has been taken. Where there are many human beings there will be a correspondingly large number of germs because of the amount of dust that is stirred up. We therefore find many more in town than in country air.

Germs which are present in the air of a room settle with the dust upon the walls, floor, and furniture. When the dust is disturbed, the germs rise up and are again carried about by the air. When therefore, an operation is about to be performed, no dusting, brushing or moving of furniture should be allowed for some hours previous to the time of operating. Thus, fewer germs will have a chance of settling upon the wound.

There are more germs in damp, low-lying valleys than on the hills. On the tops of high mountains the air is quite free from them, as is also that which blows in from the sea. In hospitals, on the other hand, they necessarily abound. That is the reason why thorough ventilation is so absolutely essential in these institutions in order that the microbes floating about may be swept out of the wards by the currents of fresh air.

Milk sours, not because the weather is warm, but from a particular germ having found its way into it, and there started a process of fermentation. The warm weather of summer is favourable to the growth of this germ, which is the reason why milk turns during that season of the year more easily than in the winter. In the same way, germs are responsible for the putrefaction of meat by the changes they produce when growing in it. Either meat or milk may be preserved almost indefinitely if air and consequently germs, be carefully excluded by sealing it up in an air-tight vessel. Eggs, too, may be protected from germs by giving them a coating of varnish.

All things in contact with air—trees, plants, the bodies of human beings and animals, &c., have germs deposited upon them.

(2) *In water.*—As you would expect, they are much more numerous in stagnant pools and sluggish streams than in rapidly flowing rivers. The only water that is free from them is that drawn from very deep wells. Drinking-water of doubtful purity should always be boiled, as by doing this any microbes which it contains are certainly killed. With very few exceptions, all the filters which are sold are useless, since germs are so small that they pass through them with the water.

(3) *In earth.*—Microbes are invariably found in soil.

(4) *In the human body.*—The skin contains a large number of germs, as do also the mouth and intestines. The deeper tissues are free from them; otherwise it would be impossible to prevent their entering wounds.

Though we constantly inhale microbes, they do not escape again in the breath, but remain in the nose and back of the throat. The air that we expire is free from germs.

To recapitulate—

Germs are exceedingly minute plants, present everywhere in varying numbers, and able, under favourable conditions for themselves, to multiply with the most amazing rapidity.

Some of you may perhaps be wondering why, if germs surround us in such numbers, we do not more often show signs of their presence: in other words, *why are we not constantly suffering from a succession of diseases set up by these germs?* Now, in the first place, a large number of microbes are not, for human beings, disease-producing germs: that is to say, they are able to grow in the human body, but cannot harm us; in the same way, some plants are poisonous, others are not. Secondly, if germs which can produce disease do effect an entrance into the tissues, it does not follow that they will be able to start the particular illness of which they are the cause. For it has been proved by experiment that both blood and lymph possess in a marked degree the power of killing germs, a property which is also possessed by the acid of the gastric juice. If, therefore, an individual is in good health, and only a small number of microbes invade his system, they will be destroyed by the blood, and thus prevented from doing harm. Should, however, a large number of germs gain admittance, or his general health be poor, so that his powers of resistance are lowered, the microbes will gain the upper hand.

It is possible that this germicidal property of the blood varies in degree in different persons. This may afford an explanation of the fact that some contract infectious diseases so much more easily than others do.

The next question is:

When the microbes of a particular disease have established themselves in the tissues and com-

menced to grow, how do they produce the symptoms of that disease?

This they do by forming a substance called the *toxin*,* which entering the circulation poisons the system and so gives rise to symptoms. It is this toxin which does all the harm, and may ultimately cause the death of the patient.

A certain period of time always elapses between the arrival of the germs in the tissues and the commencement of the illness. This period is called the *time of incubation*. It varies considerably in length in different diseases. During it the germs are busy multiplying and producing their poison, until at last sufficient of the latter is present in the system to give rise to symptoms, whereupon the illness commences. The rash, fever, wasting, &c., all result from the injurious effect which the toxin has upon the system.

A parallel to this may be found in the case of a man who has gradually increasing doses of arsenic, or any other poison, administered to him with his daily food. At first no symptoms would follow; then, as more and more of the poison accumulated in his system, he would begin to feel unwell, and finally, unmistakable evidence of the particular poison which was being used would show itself.

We must now consider the **means by which the germs are checked in their growth and finally killed**; so that the system is relieved of their presence and the illness comes to an end. This is supposed to happen in the following way:

While the germs are growing and producing the

* *Toxin* is a Greek word meaning "poison."

toxin, wherewith to poison the individual who is acting as their host, his tissues are at the same time defending themselves by giving rise to certain substances, one of which tends to neutralise the effects of the toxin. This substance we therefore call the *antitoxin*. When a sufficient quantity of the antitoxin has been produced, the germs are overpowered by the tissues, cease to grow, and finally die. The system thus becoming freed from their presence, convalescence commences. On the other hand, the patient may die before sufficient antitoxin has been produced to save him from the germs.

After the disappearance of the germs, the antitoxin which caused their departure remains in the system, and so long as it does so, the microbes of that particular disease will not be able to grow in the patient's tissues. That is the reason why people who have had one attack of an illness, such as scarlatina or small-pox, are so much less likely to catch it again, when exposed to infection, than are those who have never had it. They are protected by the antitoxin in their systems, which is left as the result of their former illness. These antitoxins only protect the individual from infection by the particular germ with which they are connected. That which is left after an attack of measles cannot prevent the germs of diphtheria or typhoid fever from invading the system. It is the same with drugs. That which is an antidote for opium is of no use in a case of poisoning by arsenic.

The length of time during which these antitoxins remain in the system—that is to say, the length of time during which the individual is protected from a second attack—varies very much in different diseases. In some, as for instance small-pox, it is very rare for a patient to have a second attack ; in others, as diphtheria and pneumonia, such an occurrence is by no means uncommon.

From this we conclude that the antitoxin which is left after small-pox remains in the blood for a great length of time, whereas that formed by the tissues when fighting against the microbe of diphtheria soon disappears, and thus leaves the patient open to a second attack of that disease.

Antitoxin, as I have already mentioned, is but one of several important protective substances which are made in self-defence by the tissues when the system is invaded by the microbes of an infectious disease like diphtheria. Antitoxin has no effect upon the germs themselves. Its one function is to unite with and so render harmless any toxin which may be circulating in the body. There are other substances formed which have a direct action upon the invaders and render it more easy for certain of the body cells to absorb and digest them. These cells are called "phagocytes," or cell devourers; it is their duty to attack and remove from the system any harmful elements which have gained admittance.

Invasion of Wounds by Germs.—In all that I have hitherto said I have been referring more especially to the infectious fevers. I must now say a word with regard to the invasion of wounds by microbes.

When the discharge from an abscess becomes foul, or a wound which should have healed by primary union suppurates, we know that in each case germs have effected an entrance into the part, and there started certain unhealthy processes.

Knowing, as you now do, how microbes abound in the atmosphere, and also in the human skin, you can understand the extreme care which is necessary if a wound is to be kept sweet—that is, free from germs.

There is this difference between the causation of the specific infectious fevers and that of unhealthy wounds. Each fever has its own germ, which alone can produce that disease: while in the case of wounds there are several kinds of germs which can set up suppuration. In wounds, too, the process is not brought to a termination by means of antitoxins, but rather by the help of antiseptics and free drainage, as thus we both hinder the growth of the microbes, and at the same time remove them from the tissues.

How we fight against Germs.—Before concluding this lecture on Infection, I must say a few words upon the way in which we fight against germs. The harmless ones, such as are constantly found in the mouth and intestines, we do not trouble about, nor could we keep them out of the body even if we would. With regard to those microbes which are able to start hurtful processes when once established in the body—

(1) We endeavour by every means in our power to *prevent their entrance* into the tissues.

(*a*) In the case of wounds or suppurating cavities, by absolute cleanliness of the adjacent parts, as well as of everything, including the surgeon's and nurse's hands, that may be used in the treatment. Secondly, by the careful application of antiseptic dressings, we guard against infection from the air.

(*b*) In the case of infectious fevers, by isolation of those who are ill, together with abundant ventilation of the wards and apartments in which they may be confined, so as to diminish, as far as possible, the risk of their communicating the disease to their attendants. By providing plenty of fresh air the poison given off by such patients is considerably diluted, and therefore not so likely to produce a harmful effect upon those who are compelled to inhale it. Moreover, sunlight and fresh air are both germicides.

(2) When the microbes have effected an entrance into the body, we aim at *counteracting, as far as possible, the injurious effects* produced by their presence.

In the case of wounds, we endeavour to accomplish this by means of antiseptics and free drainage ; while in the infectious fevers, where the germs are out of reach, our object is rather to keep up the patient's strength, and thus enable him to fight successfully against the toxin with which the microbes are poisoning him.

In a limited number of diseases or diseased conditions we are able to take a more active part in the fight by the use of an antitoxin or a bacterial vaccine.

A Bacterial Vaccine consists of many millions of germs similar to those growing in the patient's tissues—if possible it is prepared directly from them—which have been killed by heat and are suspended in a small quantity of sterile saline solution. This is injected subcutaneously with aseptic precautions. The effect of injecting these dead bacteria is to stimulate the patient's tissues to manufacture a larger quantity of those substances which are inimical to the continued existence of the germs which are causing the illness.

These substances are therefore called "antibodies." One of them, the antitoxin, neutralises any toxin which is circulating in the blood; others act upon the germs themselves and render it easier for certain of the body cells to absorb and digest them.

II

THE USE OF STIMULANTS IN CASES OF ACUTE ILLNESS

To-day we are going to consider the position which stimulants occupy in the treatment of acute illnesses, such as pneumonia, enteric fever, &c. In doing so, we shall devote our attention almost exclusively to alcohol, since that is the stimulant which is most commonly used in these cases. At the same time, I must tell you that it is not now prescribed to anything like the extent that it was a few years ago; indeed, many physicians think that patients do better without it, and decline to use it at all in acute illnesses.

The first thing which I wish to impress upon you is that *alcohol is a drug*, and, like other drugs, becomes a poison if it be administered in improper quantities.

Before we can discuss its use in disease we must find out what effect it has upon the body of a healthy individual.

(1) **As a Food.**—Alcohol is not a food in the same way that bread and meat are, and is therefore unable to repair the different tissues of the body and assist in making good the loss they have suffered in the performance of their various functions. It acts, rather,

in the same way that fat does, and by being burnt up in the tissues, produces vital force and heat. Both alcohol and fat produce light and heat when put into a fire. They do not, however, help to build up the fire; they cannot take the place of coal. Exactly the same thing is true of the human fire. When it is getting low, alcohol can, for a time, make it burn more brightly. But the effect soon passes off, and the fire expires, unless it is supplied with its proper fuel—viz. some nourishing food.

(2) **As an Antipyretic.**—Alcohol lowers the temperature slightly in two ways

(*a*) By dilating the vessels of the skin, and so bringing a large quantity of blood into relation with the cooling influence of the external atmosphere.

(*b*) By increasing perspiration.

(3) **As a Stimulant.**—Alcohol acts upon the heart as a stimulant in two ways :

(*a*) *Directly*, by irritating the nerves and muscle of the heart after absorption into the circulation.

(*b*) *Indirectly*, by its irritating effect upon the nerves of the stomach. These pass the irritation on to the heart through the central nervous system. "Irritating" is used here in the same sense as stimulating.

Suppose you have three people called A, B, and C, seated in a row. A pinches B, who passes the pinch on to C. Thus A, by means of B, has indirectly pinched C. So alcohol, by means of the stomach, indirectly irritates or stimulates the heart. Ammonia, when smelt, stimulates the heart in a similar manner, by irritating the nerves which supply the interior of the nose, this explaining its usefulness in cases of fainting.

The second, or indirect, is probably the chief way in which alcohol acts as a stimulant.

(4) In small doses considerably diluted, it mildly stimulates the mucous membrane of the stomach, improving appetite and digestion.

The above effects are said by Dr. Mitchell Bruce to follow the internal administration of alcohol in a healthy individual.

The next question is : *Which of these effects do we wish to produce in cases such as we are considering?*

Now, alcohol is one of our most important drugs in the treatment of these cases, and therefore must not be carelessly or thoughtlessly used. For instance, we should not give it merely for the sake of its antipyretic qualities, its action in that way being very slight. Besides, there are other and much more efficient methods of lowering a high temperature.

Nor should we give it for (4), unless the patient were old and feeble and taking food badly. Then, as to (1) it seems a very proper thing to use a remedy that will develop vital force, especially in a long and wasting illness such as enteric fever. The objection raised by some to its use for such a purpose is that the system may become so accustomed to the drug, that later on in the illness when we wish to use it as a stimulant we may, to produce any effect, have to give it in very large doses—doses that will have an injurious effect upon the patient if kept up for more than a very short time.

Stimulation of the heart is without doubt the most valuable property of alcohol in cases of acute illness. Let us consider for a moment its effect upon the circulatory apparatus when given for this purpose.

Effect of Alcohol upon the Heart.—The pulse is improved, because the heart is stimulated. But, though the pulse is strengthened, the heart is not. That organ is being forced to work harder by the alcohol, and therefore it fills the arteries better than it previously did, and consequently you have a stronger pulse. Alcohol affects the heart in the same way as the whip or spur does a horse. Now, just as a too liberal use of the whip or spur, by compelling a horse to work its hardest, finally wears the animal out, so an excessive stimulation of the heart by alcohol may end in that organ collapsing.

Again, suppose that a man had a long distance to ride, and it was just a question whether his horse would be able to carry him to his destination in time. Surely that man would not begin to use his whip and spur directly he mounted. He would rather keep such little encouragements till he was nearing the end of his journey, and his horse showed signs of tiring, so that stimulation of the beast became a necessity if he was to arrive in time.

In the same way, in a case of acute illness, such as enteric fever, we wait till the heart shows signs of flagging and weakness, and then give stimulants to keep it up to the mark and prevent it stopping altogether. For just as the man in the above illustration depends entirely upon his horse to carry him to his journey's end, so our one aim is to keep the heart going until the temperature descends and convalescence commences.

Effect of Alcohol upon the Nervous System.—You all know that in too large doses it is a strong poison to the nervous system, as is shown by intoxication, delirium tremens, and those cases of rapid coma and death following upon the swallowing of a large quantity of raw spirit. Though we do not expect to see such effects as these produced by the administration of alcohol in illness, yet some patients, notably women and children, are easily brought under its influence, and in a mild way poisoned by it. The evidence of such poisoning frequently consists in an intensifying of the symptoms for which the drug was given, an increase in the drowsiness, tremor and delirium, which may be wrongly put down to the disease. In giving alcohol the physician has, then, to beware of :

(1) *Over-stimulation of the heart.*—By giving large doses for too long a time.

(2) *Poisoning the nervous system.*—By giving more than the patient can tolerate.

These are the two dangers attending the use of alcohol against which we have to be on our guard. As you would expect, they frequently go together.

Indications for commencing the Use of Stimulants. What, then, are the indications for commencing the use of stimulants in cases of acute illness? They are :

(1) *Exhaustion of the heart.*—The clearest and most certain evidence of this condition is given, when, in the absence of a rising temperature, we find the *pulse increasing in frequency day by day* ; also, when we feel it becoming smaller and weaker.

(2) *Exhaustion of the nervous system.*—The signs of this condition are a dry, tremulous tongue, and low muttering delirium.

(3) *Exhaustion of the digestive system.*—This is shown

by marked loss of appetite and inability to take sufficient food.

To these we may add:

(4) *Age of patient.*—Old people generally require some stimulant from the beginning of the illness.

(5) *Condition of patient at commencement of illness.*—Patient may be so weak or pulled down by previous ill-health as to require stimulation at once.

A patient does not need stimulants because he is *going to have* a hard fight to pull through. A child might come in with the back of its throat covered with diphtheritic membrane, or with a large part of one lung solid from acute pneumonia, so that we feel the chances are against its recovery. We should not, however, necessarily put it at once upon alcohol, but if, on examining its pulse, we found that the heart was so far doing its work satisfactorily, we should keep our stimulants in reserve. Giving alcohol to a patient merely because he is suffering from a severe illness, comes to much the same thing as beating a horse because it has a heavy load to carry. So long as heart and horse are doing their work satisfactorily we let well alone. When they show signs of tiring, then is the time for stimulating them.

Method of giving Alcohol when we wish to use it as a stimulant.

(1) *We must not dilute it too much,* since we have come to the conclusion that it stimulates the heart principally by its irritating effect upon the nerves of the stomach, and dilution will diminish that effect. If possible, there should not be more than two parts of water to one of brandy. It is better to dilute alcohol

with water rather than milk. By so doing you cleanse and freshen the palate, which renders it easier for a patient to take his milk.

(2) *We must give it frequently*, for after the stimulating effect of a dose of alcohol has passed off there is a period of reaction, with depression of the vital powers, which is injurious to the patient. This we must aim at preventing by a fresh dose of alcohol.

(3) *We must give it in small quantities* if we give it often, otherwise we shall overdose our patient.

Our *rule*, then, should be—

Give alcohol frequently, in small doses, and but slightly diluted with water.

Remember that stimulants are especially needed in the small hours of the morning, for that is the time when the human fire burns lowest. They should be drunk slowly, as in that way they produce a more marked stimulation of the heart that when gulped down.

Quantity to be given depends on

(1) *Age of patient.*—Babies are easily brought under the influence of alcohol, and to them it must be given with caution.

(2) *Previous habits of patient.*—A man who has been in the habit of taking a certain amount of alcohol daily will stand, and will also need, larger doses than one who has been practically a teetotaller.

(3) *Stage of illness at which stimulants are commenced.* —Suppose that a man is ill with pneumonia, and on the fifth day of his illness shows signs of needing some stimulant. Alcohol, if necessary, can then be given to him with a comparatively free hand, since pneumonia

lasts on the average only about one week, so that in two or three days at the most, if he is going to pull through, the crisis should arrive, when the stimulant can be gradually withdrawn.

Take, on the other hand, the case of a man suffering from enteric fever who requires stimulating at the end of the second week of his illness. Here we have to be much more careful in the quantity we give, since his temperature may keep up for another ten days or a fortnight, during which time he will still need the alcohol, perhaps in increased doses, so that, if we are to avoid poisoning him, we must begin with a very moderate allowance.

In deciding how much alcohol to give in a case of acute illness, the physician has, then, to take into consideration *the age and previous habits of the patient, together with the length of time that he will probably continue to need the stimulant.*

The amount generally given to an adult in the twenty-four hours varies from two to eight ounces, but the larger quantities must not be given for many days together, otherwise they are very apt to keep up and even exaggerate the quick pulse and condition of low, muttering delirium, to correct which they are often administered.

The next question is: *Having given alcohol, how are we to know whether it is doing good*, or having the reverse effect upon the patient? In other words, whether it is advisable to continue its administration or not.

Broadly speaking, it is doing good if it tends to bring the patient nearer to his normal condition. Thus:

(1) If it slows and strengthens the too frequent pulse, or quickens the abnormally slow pulse.

(2) If it slows the hurried respiration.

(3) If it moistens the dry tongue.

(4) If it cools and moistens the hot, dry skin.

(5) If it lessens delirium and induces sleep,

then, as Sir Lauder Brunton points out, it is doing good and may be continued.

If it has the contrary effect and seems to add to instead of diminishing the above five conditions, it is harmful. We should, therefore, carefully watch the effect of the first doses of alcohol.

There are various other stimulants besides alcohol. Such, for instance, are ammonia, ether, caffeine, strychnine, beef-tea, and the various patent meat juices and essences. These are useful when we wish to give a patient more stimulant, and yet do not like to increase the dose of brandy which he is taking; indeed, some physicians use them in preference to alcohol.

I have spoken to you on this subject to-day, because I feel certain that you will all like to know something of the reasons which guide your medical officers in the ordering of alcohol for cases of acute illness.

III

THE FEEDING OF INFANTS

This is a most important subject, with regard to which much ignorance prevails, and consequently many children have their constitutions seriously damaged by wrong methods of feeding.

As hospital nurses you are responsible for the proper feeding of all babies that come under your care, and it is, therefore, highly important that you should be well informed in this matter.

I shall, to begin with, briefly indicate the way in which infants should be fed, and then go on to mention some of the ways in which they should not be fed.

(*a*) When a baby is **breast-fed,** it should have nothing but its mother's milk till it is about nine months old, that is supposing that the mother is able to give it sufficient nourishment. Should such not be the case, its diet must be supplemented by properly prepared cow's milk. This point I shall refer to later on, when speaking o[illegible]d-fed babies. When nine months old the child shou[illegible]e gradually weaned, cow's milk, which has been boiled or pasteurised and suitably diluted, being by degrees substituted for the mother's milk. Starchy foods should now be gradually introduced into the diet. To begin with they should consist principally of rusks and biscuits, since these are easy of digestion and give exercise to the teeth and muscles of the jaws.

From the tenth to the twelfth month its diet should chiefly consist of good fresh cow's milk, which has been pasteurised, with which the yolk of an egg may be occasionally beaten up. A cupful of good beef-tea, veal, or chicken-broth, may be given once a day, and at one or two of the meals a teaspoonful of some patent food may be mixed with the milk.

The following is a suitable diet for a child ten months old:

7 A.M.—A teacupful of warm milk thickened with a teaspoonful of Nestlé's food, entire flour, or other food.

10.30 A.M.—A breakfast-cupful of warm milk and a buttered rusk, or the yolk of an egg well beaten up in a teacupful of milk, or a teacupful of veal broth or beef tea.

1.30 P.M.—A breakfast-cupful of warm milk.

5 P.M.—A teacupful of warm milk with a teaspoonful of some patent food or baked flour or a biscuit.

9 P.M.—Teacupful of warm milk.

The child should sleep through the night, but there is no objection to a night meal of a teacupful of milk about 3 A.M. if it be wakeful.

When twelve months old the child may have bread-and-butter, a lightly boiled egg, or oatmeal for its breakfast; for dinner, a little mashed potato or well-cooked cauliflower soaked in gravy, and some custard or plain milk pudding. These are in addition to the still all-important milk. At eighteen months of age, when the double teeth commence to appear, the child may begin to take meat with its midday meal.

(*b*) We have now to turn to the case of the baby whose mother is either unwilling or unable to nurse it so that it has to be brought up entirely by hand. It is more especially in the case of these **hand-fed** babies that mistakes are apt to arise.

If a mother's milk is not available, the child must be put on a diet which shall resemble that as closely as possible.

Cow's milk differs considerably in composition from human milk, as it contains more proteid and in a less digestible form. As a result it is less easy of digestion, since it forms large hard curds in the stomach, whereas those formed by human milk are small and soft. Another reason for its indigestibility is the very much larger size of its fat globules.

We must, therefore, take cow's milk; remove from it a portion of those substances of which it has too much, and add to it those in which it is deficient, thus rendering its composition as nearly as possible the same as human milk.

Milk thus prepared is called "artificial human milk." It is, however, expensive, and, consequently, not within the reach of every one.

If this cannot be obtained, we must fall back upon ordinary cow's milk, which should be pasteurised, diluted with boiled water, and slightly sweetened with sugar. Sugar of milk, when obtainable, is preferable to the ordinary white sugar, since the latter sometimes causes fermentation in the intestine.

A little cream should be added to each meal, otherwise there will be a deficiency of fat in the food. Such a deficiency is one of the chief causes of rickets. On the other hand, it is important that the mixture should not contain more fat than human milk. A safe rule is to add not more than *half a drachm of centrifugal cream for each ounce of diluent.* For example, a mixture consisting of eight ounces of milk and twelve ounces of water requires the addition of six drachms of cream. Cream separated from milk by a centrifugal machine contains 48 per cent. of fat; gravity cream 20 to 24 per cent. If the child vomits curds or passes them in the stools, the milk must be still further diluted with water, or barley-water may form part of the mixture. Under these circumstances (extreme dilution of milk) it is very essential that cream and meat-juice should form part of the diet. But again I must impress on you the importance of not making the food too rich. Always measure the cream, for a teaspoonful is [illegible] two drachms than one. If you use that which [illegible] been skimmed from milk after standing for some hours you will need twice as much as if it were machine separated.

If the food still disagrees, the milk must be wholly or partially peptonised before use (it is always wise to do this for new-born infants), or a diet of cream, sugar, raw meat-juice* and whey may be tried. This last diet forms a very good food for hand-fed babies during the

* *Raw-meat juice*, according to Dr. Cheadle, should be made by finely mincing fresh rumpsteak, adding 1 oz. of cold water for every 4 oz. of meat, and, after mixing, letting it stand for half an hour. The juice is then expressed by means of muslin or, if obtainable, by means of a Hercules meat press. The resulting fluid is highly nourishing, and easy of digestion. It does not keep well, and should, therefore, be placed in a refrigerator and made at least twice a day.

first week of life. In some cases condensed milk succeeds when everything else has failed. To begin with, three teaspoonsful should be mixed with three ounces of hot water, to which should be added two teaspoonsful of cream. An unsweetened brand of condensed milk should be chosen, and extract of malt or sugar of milk used as a sweetener.

These last three diets, peptonised milk, cream and whey, and condensed milk, are *only to be used temporarily*, while the child's stomach is gaining strength for the work of digestion.

At the first opportunity we must gradually return to the boiled cow's milk and water—that, in default of the mother's, being the proper food. As the child grows older, and its digestion becomes stronger, the amount of water which is added to the milk should be slowly diminished. After the tenth month, if it is progressing satisfactorily, it may have its diet increased in the same way as the breast-fed baby.

I do not pretend that the above sketch of the way in which a child should be fed during the first eighteen months of its existence will suffice for every case. It is impossible to draw up a rigid diet, and say that every baby shall be brought up on it. There are infants that nothing seems to suit, others need a special dietary of their own, while some thrive on anything. Yet it will, I hope, teach you something of the way to feed very young children, and will probably answer in the majority of such cases. The next question is:

How much ought a Baby to have at each Meal, and how often ought it to be Fed?—Probably few of you have any idea how small the stomach of a new-born baby is. It is said that the stomach of an infant five days old can only hold about one ounce of fluid, and at the end of the fourth week hardly two ounces.

The following table will give you some idea of the amount which ought to be given, and also the interval there should be between each feeding. The first meal of the day should be at 5 A.M., the last at 11 P.M. while the baby is being fed two-hourly. During the night hours the child's stomach is rested, and also disinfected by the acid of the gastric juice.

General Rules for feeding.

Age.	Frequency of Feeds.	Average Quantity at each Meal.	Number of Meals in the 24 hours.	Average Amount in the 24 hours.
1st week	2 hours	1 oz.	10	10 oz.
2nd ,,	2 ,,	$1\frac{1}{4}$,,	10	$12\frac{1}{2}$,,
3rd and 4th ,,	2 ,,	$1\frac{1}{2}$,,	10	15 ,,
5th and 6th ,,	$2\frac{1}{2}$,,	2 ,,	8	16 ,,
7th and 8th ,,	$2\frac{1}{2}$,,	$2\frac{1}{2}$,,	8	20 ,,
3rd, 4th, and 5th months	3 ,,	3–5 ,,	7	24 ,, increasing to 35 oz.
6th month and onwards	4 ,,	6–7 ,,	6	40 oz.

After the sixth month it is better to increase the strength of the food, replacing some of the water by milk, rather than to increase the total quantity given.

Some children will want more, others less, than I have written down here, the amounts given being rather under than over an average allowance; but, so long as the infant grows and thrives, we need not worry ourselves because it is taking a little more or less than we should have expected it to do. The quantities in the above table do not represent milk, but a suitable mixture of milk and water which it has been found that the child can most easily digest. The relative proportion of these two ingredients is gradually altered from three of water and one of milk at birth to two of milk and one of water at the end of six months.

A point of which you must take particular notice is that *every change in an infant's diet must be made gradually*, to avoid the risk of upsetting its stomach. As the child grows older, for instance, we slowly increase the quantity of milk in each meal and lessen the amount of water; or if it has been breast-fed and we wish to wean it, we do so by gradually introducing cow's milk into its diet, so that its stomach may become accustomed to it before we entirely deprive it of the more easily digested human milk.

We can now consider some of the mistakes which are most commonly made in the feeding of infants.

(1) **Giving an excessive Quantity of Food at each Meal.**—Few people realise how small a new-born baby's stomach is, consequently they frequently put into it more than it can comfortably hold. As a result of this the child is caused a certain amount of pain, and probably soon relieves itself by returning a portion of the meal. If four ounces of fluid are crammed into a stomach that can comfortably accommodate only two, some of it must be returned. Such an occurrence need cause no alarm if the regurgitation of food comes on soon after a meal, and is small in amount, while the child's health continues good. Regurgitation is also favoured by allowing a baby to empty its bottle while lying in a horizontal position. When feeding, its head and shoulders should be slightly raised.

(2) **Indiscriminate Feeding.**—I am here referring to the bad habit some mothers have of giving their babies the breast or the bottle every time they cry. Instead of putting up with this for a time, and so teaching the little ones to learn their proper meal-times, they encourage them to make a noise, by feeding them every time they lift up their voices. Now, a child's stomach needs rest just as much as a grown-up person's does, and if, as in these cases of indiscriminate feeding, it is kept constantly at work, it in time becomes worn out and the seat of dyspepsia, with its attendant vomiting and pain. As a result of this the child cries still more, but the mother, not realising the cause of its fretfulness, makes matters worse by giving it more food. The more it cries the more it is fed; and the more it is fed the more pain it has, the more it vomits, and the thinner it grows. Finally, the mother takes the wasted, whining little creature to the hospital—these cases occur as a rule among the lower classes—and tells the doctor that it has "consumption of the bowels," whereas it is simply suffering from the effects of wrong feeding.

(3) **Giving unboiled Cow's Milk.**—There is a great objection to giving an infant cow's milk which has been neither boiled nor pasteurised, since it is a fluid in which germs thrive and multiply. In a very short space of time after leaving the cow it contains large numbers of these organisms. Many diseases, we know, are spread by means of milk. In the case of children the tubercle bacillus is a very real danger, as are also in the hot weather those germs which are the cause of summer diarrhœa. Boiling it destroys at once

every germ that milk contains, and thus renders it much safer as a food. It also keeps longer, since souring is set up by a particular form of germ which, if present, is killed by the boiling. Consequently, when taken into an infant's stomach, it will not be so likely to ferment and set up indigestion. Remember that, if milk is at all stale or tainted, no amount of boiling can make it a proper food for an infant.

Many babies, it is true, take unboiled cow's milk and water, and seem to thrive upon it; but to feed a child on raw milk is to expose it to a needless risk.

(4) **Giving a Diet which does not contain a sufficient amount of Nourishment.**—Take as an instance of this mistake the case of a child three months old whose stomach is so weak that it cannot retain a stronger mixture than one part of milk to three of water. If it has twenty-four ounces of this fluid given to it in the twenty-four hours, it will only get six ounces of milk each day. Now, no child of that age can live properly on such a small quantity of food.

And yet, if you increase the amount of milk in the mixture, it will vomit; so the parents go on giving this very poor diet, and wonder why it grows thinner instead of fatter.

The proper thing to do under such circumstances is either to peptonise the milk and give more of it, or else to increase the strength of the food by adding to each meal a dessert-spoonful of cream, and occasionally giving some good gravy or a little raw meat juice.

These are all very digestible, and as the child improves under their influence its powers of digestion will increase, so that its stomach will soon be able to deal with a stronger mixture of milk and water than it previously could.

(5) **Keeping a Child upon a Diet which contains no fresh Milk.**—Boiled milk and water have been tried and failed, or it may be that only unboiled milk has been used. Anyhow, the child is taken off fresh milk altogether, and put upon condensed milk, or an artificial food such as Liebig's, Benger's, &c. These it is able to digest, and so is brought up on them. The result is that it becomes very fat, but at the same time markedly flabby and anæmic. There would be no objection to these prepared foods were they given in milk, or, if they form the whole of the diet, were used only temporarily while the child's powers of digestion are improving. To allow them to displace fresh milk permanently is, however, to do a very foolish thing. Dr. Goodhart, in his work on "Diseases of Children," says with regard to these patent infant foods—

"I prefer to use such as can be *added* to good fresh milk, and not such as are to be used as substitutes. As a general rule let it be understood that, in some proportion, good fresh milk should form part of every food. With milk in the food we know where we are. With a prepared food only it is impossible to feel so safe."

The two principal reasons against keeping a child upon nothing but an artificial food are—

(*a*) These forms of nourishment are, as a rule, seriously *deficient in fat*, which is a most essential article of diet for babies.

(*b*) There is a *risk of scurvy* being produced, if they are persisted in for too long a time.

Sailors, as you know, used to be very liable to scurvy owing to their living for several weeks at a time on nothing but preserved meats and vegetables. Fresh food of all kinds, meat, milk, fruit, or vegetables, will prevent the appearance of scurvy, but anybody who is deprived for a lengthened period of such food is liable to an attack of this disease. *All prepared infants' foods lack the peculiar scurvy-preventing property of fresh food,* which is the reason why every infant's diet should contain a certain amount of new milk. Boiling milk lessens its anti-scorbutic properties, but at the same time it destroys germs. This difficulty is now overcome by heating milk in a closed vessel to a temperature of 160°. This process, which is called pasteurisation, destroys the more important germs, and does not alter the composition of the milk in the same way that boiling it does. Raw meat juice and orange juice are very useful, both for preventing and curing scurvy.

(6) **The prolonged Use of artificially digested Milk.**—Some infants' stomachs are so weak that they cannot digest boiled cow's milk, even when largely diluted with water or barley-water. It still produces pain and vomiting. The proper treatment for such a case is to digest the milk before giving it to the child, or else to put it temporarily on a diet of cream and whey. Milk which has been digested cannot clot when taken into the stomach, because the substance which forms curds has been changed by the peptonising of the milk. The stomach has therefore no work to do; it has merely to absorb the food which has been thus prepared for it. It is wrong, however, to keep a child

for months at a time on nothing but peptonised milk. The consequence is that its stomach gets out of the way of doing any work for itself, and so loses the power of digesting curd.

Having put an infant upon peptonised milk, and given its stomach time to get stronger, the proper course is gradually to reduce the extent to which the milk is digested. Thus, to begin with, it is digested for twenty minutes; a little later, it is digested for fifteen minutes; later still, it is only digested for ten minutes; that is to say, you stop the process of peptonisation by boiling the milk at the end of twenty, fifteen, or ten minutes as the case may be. In this way, by gradually increasing the amount of work which the child's stomach has to do, you slowly lead it back again to the ordinary boiled milk and water.

(7) **The too early administration of Starchy Foods.**—I am here referring, as many of you know, to such articles of diet as cornflour, arrowroot, bread, and potatoes. These consist almost entirely of starch, which is changed into s[illegible] during the process of digestion. Were it not so changed, it could not be absorbed into the blood, and would, therefore, be useless as a food. Now starch is not a natural diet for a young infant; and unless it is digested it may do harm by irritating the intestine. Indeed, it is better to wait until a child is nine months old before asking it to digest starch, and then it should begin with biscuits and rusks, the starch in which has been rendered easier of digestion by baking. The too early administration of starchy foods is a mistake which is of very common occurrence among the lower classes.

The above are some of the principal errors which are made in the feeding of babies. There are others, mostly of a very common kind, such as want of care in keeping the feeding-bottles clean, they should be immersed in a solution of boracic acid or salicylate of soda when not in use; giving the milk at too low a temperature, it should be about the same heat as the body; allowing the child to go on sucking its bottle after it is empty, thus filling its stomach with air, a not infrequent cause of pain and vomiting; letting the child empty its bottle too quickly, and thus, by bolting its food, give itself indigestion.

IV

THE FORCED FEEDING OF SICK CHILDREN

THE proper feeding of all sick children is a matter of the very highest importance, and not infrequently one of considerable difficulty. I propose, therefore, to describe and explain to you the various methods by which food may be introduced into the stomach of a child that is refusing to take sufficient nourishment.

This difficulty in feeding most often arises in cases of diphtheria and scarlet fever, because in those diseases the throat being inflamed, it hurts the child to swallow. At other times the objection to food arises from a distaste for it. There is no feeling of hunger, and hence no desire to eat. To these objections you must never give way. It is one of your most important duties as nurses to see that all patients under your care take a sufficient quantity of nourishment in the twenty-four hours. Directly you find that one of them is not doing so, you must report the fact to the medical officer in charge of the case, who will then direct what steps are to be taken.

Sometimes, no doubt, the fault lies to a certain extent with the nurse. She is not the fortunate possessor of that large stock of patience which is so necessary when a child has to be coaxed into drinking the milk which it does not want. Hence, in some wards the nasal tube is used more frequently than in others.

When feeding a young child, do not try to make it eat by first putting the spoon into your own mouth. Do not blow upon the food to cool it; the breath is often impure, and may make the food injurious to the child.

Never be afraid to tell the doctor that a child is not taking enough food. He will not consider such an admission a reflection upon your ability as a nurse, but will be far more likely to think poorly of you if he comes round and finds it out for himself. In such a case, always be in a position to tell him exactly how much the patient has taken, so that he may know what the deficiency is. If a small, measured quantity of milk is administered by means of a teaspoon, it should not be difficult to form a fairly accurate idea of the amount that has been retained. If the greater part of it is lost, tell the medical officer so at once.

When a child objects to being fed, never hold its head down on the pillow, and force food into its mouth; otherwise it collects at the back of the throat, and during the patient's struggles some of it may be drawn into the lungs, and set up a fatal pneumonia. Always raise the child's head and support it on your arm, and then the milk can more easily run out of its mouth if it refuses to swallow. Coaxing, not force, is essential for success in such cases. To see a nurse holding a coughing, spluttering child down on the bed, with the end of a feeder forced between the teeth, is to know at once that she is ignorant of the first principles of her profession. There is no justification for such behaviour, since the patient can easily be fed by one of the methods which I am about to describe.

Sometimes young children are very obstinate. They clench their teeth, spit out whatever is put into the mouth, and absolutely refuse to swallow anything. Under these circumstances we must administer the food in such a way that a child is unable to prevent its passage into the stomach. We therefore either inject it into the pharynx, when the child is obliged to swallow, or else pass a tube into the stomach and down that pour the food.

Nutrient enemata are not as a rule used in these cases, but are kept for cases of persistent vomiting, since the amount of nourishment that can be administered in this way is very limited. If nutrient enemata are tried, give them very slowly by means of a soft rubber catheter and the barrel of a glass syringe. Never use a ball syringe, always wash out the bowel before each enema, and for a short time after giving it keep a folded towel pressed against the anus. Should there be a tendency to return the injections, raise the end of the cot by means of blocks, or place a small pillow beneath the hips. By doing this you cause the fluid to run higher up the bowel, and so prevent it pressing upon the anal aperture.

It is important that you should be acquainted with these methods of forced feeding, since at any time you may be called upon to use one of them. The practice. I know, varies at different hospitals. In some, a nurse is never allowed to pass the nasal tube, except under the direct supervision of the doctor; in others, this form of treatment is left in her hands provided the medical officer is satisfied of her ability to properly carry it out.

Of these methods the following is one of the simplest; in many cases it answers very well.

(1) A sheet is wrapped round the child, so as to confine its arms. One nurse then places it on its back in her lap, with its head towards her, and putting the first finger of each hand just within the corner of the mouth grasps each cheek between the finger and thumb, and draws it gently forwards and outwards away from the teeth. There is now a considerable space between the cheeks and the teeth. Into this space, the head being held slightly on one side, a second nurse, who sits opposite to the first and supports the patient's legs, very slowly pours the food, which runs down behind the clenched teeth into the back of the throat. The child is now obliged to swallow, since, owing to the way in which its lips are separated, it cannot spit anything out. It is hardly necessary for me to tell you that one lot of milk must always be swallowed before another is poured into the mouth. This method can be employed in private nursing if you have no syringe or rubber tubing, though I have known nurses in hospital who preferred it to any other method of forced feeding. It is applicable rather to cases that are not seriously ill, and is also useful for giving medicines, as was pointed out by its introducer.

(2) Another, and more common method of feeding these patients is to inject food into the pharynx, either

through the nose, or by the mouth, the former being the easier of the two. For this purpose a glass syringe is used, with about two inches of rubber tubing attached to the nozzle.

(*a*) The child is placed in the recumbent position, and the end of the drainage-tube inserted just within the nostril. The syringe is now very slowly emptied, the food running along the floor of the nose until it reaches the pharynx, when it is perforce swallowed. Gently pinching the two nostrils keeps the tube from slipping out. and also prevents the escape of food.

(*b*) If the nose is blocked. the food must be injected through the mouth, the head being held on one side so that the fluid may run round the side of the mouth and thus have a better chance of escaping the larynx. This method is useful in bad cases of thrush when the mouth is too sore to suck, and also after the operation for harelip has been performed For such patients the end of the tube need only be placed just within the lips, or the teat from a feeding-bottle can be put on to the syringe instead of the tubing.

Injecting food into the mouth by means of a syringe and rubber tubing is also recommended by Dr. Scott Battams for use in the case of adults suffering from extreme prostration. Though it does not concern the feeding of sick children, I cannot do better than quote to you what he says on this point :

" It is equally useful in the case of adults. A patient can thus be fed without the least change in his position, whatever that may be. Take, for instance, a heavy man prostrated by some painful illness ; in such a case any movement may be as injurious to the patient as it is painful. What is the not uncommon process of feeding in such cases? A heavy, helpless patient is raised by some fragile nurse, with pain to the one and discomfort to both, to a more or less constrained position; beef-tea is presented to him in a feeding cup or open glass; he gulps down a portion, and the remainder probably runs over him; he falls back, thankful the operation is over, and neither party looks forward to its repetition with pleasure. Now, with a syringe and tube, the same amount of fluid can be gently syringed into the patient's mouth without the least change of position on his part; he need not even trouble himself to suck."

(3) Lastly, we have feeding by means of a tube which is passed into the stomach. This is by far the best method, and should, when possible, always be employed.

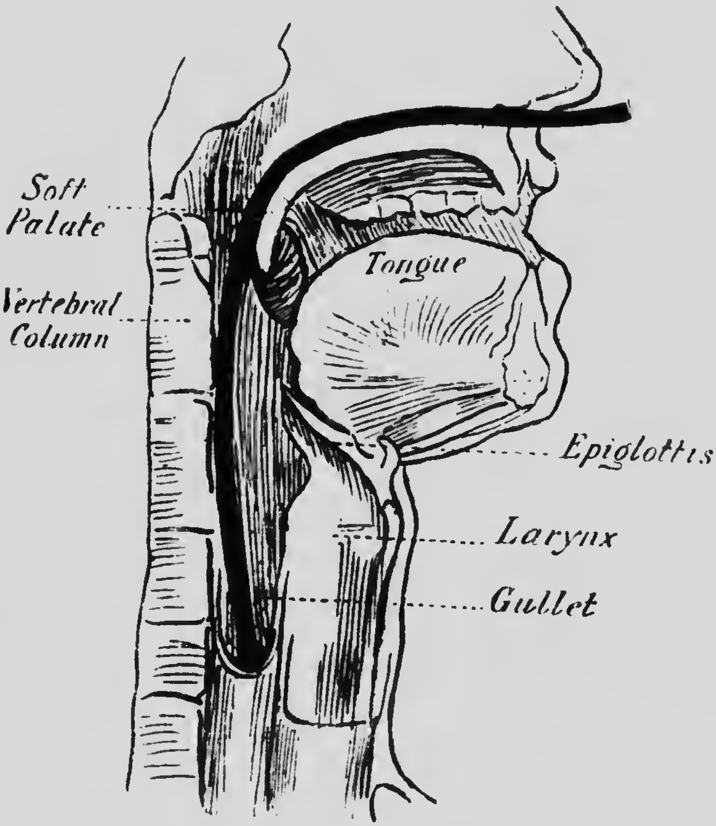
(*a*) It is usually introduced through the nose rather than the mouth, the former method being easier, and less likely to produce vomiting. It is especially useful in a form of paralysis which sometimes follows diphtheria, as the result of which the patient is unable to swallow properly. This applies, rather, to liquids, though occasionally it is equally true of solids. The food gets into the larynx, and causes violent fits of coughing. At the same time there is a risk of it reaching the lungs and setting up pneumonia. Thickening the milk with arrowroot, cornflour, or isinglass will in many cases be all that is required. In others, however, the trouble still persists. We then fall back upon the nasal tube.

For this purpose a soft, flexible india-rubber catheter (about No. 6 size) is used, to which the barrel of a two-ounce glass syringe is attached by means of drainage tubing and a glass connection. The end of the tube should be well greased with olive oil or vaseline, so as to facilitate its passage through the nose. Occasionally a patient will not allow it to pass down the gullet, but directs the end forward into the mouth. A stiffer tube is then required.

FIG. 3.

When introducing a nasal tube for the first time, a nurse very often fails, because she points it upwards instead of directly backwards—consequently, the end of it is at once stopped by the roof of the nose. In this diagram (Fig. 3) the line *A* represents a tube pointing in the right direction, while *B* indicates the wrong. To pass it easily, you must keep the point of the tube in contact with the floor of the nose. When the tube reaches the posterior wall of the pharynx, it turns downwards and enters the gullet. The windpipe, as you know, lies immediately in front of the gullet, and the only accident that can happen is for the tube to enter the former instead of the latter. The accompanying diagram (Fig. 4) shows how readily this might occur. It is the bugbear of nurses when they first begin this method of feeding: very properly, too, since it is the only risk attached to the operation. Perhaps I should say that it is not so much the fear of passing the tube into the larynx, as the uncertainty whether it is there or not, when it has been passed. This doubt generally arises from the fact that air can be heard coming from the tube. That need not worry you, if

FIG. 4.



Section through head and neck, showing a nasal tube in position.

the child is breathing quietly. It is only gas escaping from the stomach. If air bubbles up in a steady stream during both inspiration and expiration, and if pressure with the hand on the upper part of the abdomen increases the escape of gas, the tube must be in the stomach. If it had entered the larynx, the child would be in a condition of urgent dyspnœa, and if you placed your finger over the end of the tube, you would feel it suck in every time the patient attempted to draw breath. Moreover the tube would soon come to a standstill, since the windpipe is much shorter than the gullet. These points should enable you easily to determine whether you are in the food or the air passage. If you cannot feel sure which the tube has entered, pour a few drops of water into it and watch the result. Should the water enter the lungs, the patient, if conscious, will cough violently, while if it enters the stomach, nothing will happen, and the feed may safely proceed. In rare cases it persists time after time in entering the windpipe. As a last resource, we then have to pass it through the mouth. You must also remember that it occasionally has a knack of curling up at the back of the throat instead of sliding down the gullet. In such a case, you should withdraw it and start again. By opening the child's mouth, you can easily see whether this has happened. When the tube has reached the stomach, pause for a moment, if the child is struggling or coughing, until it has become quiet.

Very often the first lot of milk that you pour in does not run down, or there may be a block when you are half-way through the feeding. In such a case you can force the contents onwards and clear the way by squeezing the catheter between the thumb and forefinger and gradually working down it; or if this fails, by introducing the piston into the barrel of the syringe and forcing it down.

If the patient begins to cough in the middle of the feed, nip the catheter between two fingers, otherwise the food will be coughed out. When pouring the milk in, do so in a continuous and steady stream, so as to keep the tube full until you have finished the feed. Do not let one lot of milk completely disappear down the tube before you add some more, because each time you do that you force air into the stomach, which may give rise to pain or even produce vomiting.

At the end of the operation, withdraw the tube quietly, not jerkily; at the same time, pinch the catheter between your thumb and finger. The object of these precautions is to prevent food escaping out of the tube as the end of it is withdrawn. Carefully cleanse the tube after use, and always wash your hands before giving another nasal feed.

(*b*) In rare cases the tube has to be passed through the mouth into the stomach. This is rendered necessary by complete obstruction of the nasal passages, or from the catheter in exceptional cases persisting in entering the windpipe instead of the gullet. This operation is usually performed by a medical man, though sometimes a nurse is called upon to carry it out. An assistant is necessary to hold a gag between the child's teeth to prevent it biting the tube.

The child having been wrapped in a sheet, the assistant takes her place on the left side of the patient. With her left hand she holds the gag in position, so that the child's mouth is kept widely open, while with the right she makes firm pressure on the forehead so as to keep its head steady. The other nurse takes the tube in her right hand and dips the end of it in glycerine. She then places the first two fingers of her left hand well on to the back of the patient's tongue, pulling that organ forwards, while at the same time she rapidly passes the tube along the groove between her two fingers towards the back of the throat. Speed is very essential in these cases, as any fumbling with the tube at the back of the throat will almost certainly result in the patient retching. A larger tube should be used than for nasal feeding, its increased size making it stiffer and consequently easier to pass. When withdrawing it, use the same precautions as with the nasal tube.

We have now considered the various methods by which food may be introduced into the stomach of a patient who is unable or unwilling to swallow. The particular method to be employed, and the quantity to be given, will be determined by the medical officer in charge of the case. Your duty is faithfully and intelligently to carry out his instructions.

V

THE PULSE

In choosing the pulse as my subject for to-day's lecture I am introducing you to an old friend, but, at the same time, to one whom it is no easy matter properly to appreciate and understand. I intend, therefore, to explain in detail the causation and meaning of the principal varieties of pulse, so that in future, when counting it, you may learn something more than the mere number of beats per minute.

There are, of course, many points in connection with the pulse which it is quite unnecessary for you to attempt to learn. Practically all that you need is a sufficient knowledge of the pulse to be able to tell by it whether your patient is gaining or losing strength. You must in other words be acquainted with the meaning of certain changes which may take place in a pulse.

The pulse informs us of what the heart is doing. When that organ is working well, we have a good pulse; when it becomes weak, we have a feeble pulse. Since death almost invariably results from heart failure, it is of the utmost importance that we should understand the meaning of the different changes which may take place in a pulse; for when we are feeling it, we practically have our finger on the heart.

Structure of Wall of an Artery.—An artery is, as you know, elastic, and is thus enabled to dilate, and so to accommodate the increased amount of blood which is forced into it by each contraction of the heart. Its wall is generally described as consisting of three coats or layers. Of these the only one that I am going to mention is the *middle or muscular layer*, the fibres of which run in a circular direction round the artery, so that when they contract the vessel is diminished in size, and when they relax, it is rendered larger. This muscular coat has two duties to perform.

(1) To support the vessel wall against the pressure of the blood within, and so maintain its shape. To do this, it is always in a state of slight contraction.

(2) To regulate the supply of blood to different parts of the body.

When an organ, such as the brain, is working, it needs an increased supply of blood. To give it this, the muscular tissue in the walls of its arteries relaxes, and so these vessels increase in size, and more blood passes through them. When the brain is at rest, the opposite effect takes place—viz., contraction of its arteries, and, consequently, a diminished supply of blood.

In feeling a pulse always place three fingers upon the artery, the radial at the wrist being the one generally chosen. The reason for this is that you can estimate better with three fingers than with one the amount of force necessary to stop the flow of blood through the vessel. This applies more especially to adults, since in children the radial artery is too small to accommodate three grown-up fingers.

Normal Pulse.—In infancy the pulse beats from 110 to 120 times per minute; at two years of age from 90 to 100 times; and in the adult about 72 times per minute.

When the finger is placed upon an artery, it feels at each heart-beat an impulse due to the increased fulness of the vessel. It is this increase in fulness or distension of the vessel which constitutes the pulse. By pressing firmly with the finger we can prevent the blood from flowing through the artery, and so stop the formation of a pulse at that point. The amount of pressure necessary to do this enables us to estimate roughly the fulness or tension of the vessel.

We can now consider the different forms of pulse, their causation and meaning.

(1) **Frequent Pulse.**—This occurs most often in fever and in conditions of great weakness; but we also meet with it in some forms of heart disease, hysteria, &c.

The frequency of the pulse varies considerably in different fevers. It is more frequent in scarlatina than in either enteric or pneumonia: while in rheumatic fever it is slower than in any of the other three.

In children the pulse-rate is very easily raised by even a slight degree of fever, and a frequent pulse in their case has, therefore, not the same significance that it has in adults.

In grown-up people a pulse that is more frequent than the temperature and the illness will explain is a sign of a weak heart; especially is this the case when, with a stationary or falling temperature, we find the pulse gaining in frequency day by day.

Suppose that a patient were to start an attack of acute pneumonia with a pulse of 120, which, however, did not get more frequent as the illness progressed. We should say, "This man has a weak heart, but it is holding its own." When, however, the pulse begins gradually to increase in rapidity, it shows that the weak heart is commencing to give way, and that stimulants are required. Sometimes the pulse is so rapid, and, at the same time, so small, that we cannot count it. The beats follow one another so quickly that there is no appreciable interval between them, and all that the finger seems to feel is a kind of tremor in the artery.

This is called the "*running*" pulse. It occurs, for the most part, in patients who are moribund.

(2) **Slow or Infrequent Pulse.**—This occurs most often when there is some poison circulating in the system. We get it in jaundice, when there is bile in the blood; in uræmia, when that fluid contains certain poisonous substances which the kidneys have failed to remove; in diabetes, influenza, and in some of the feeble hearts of old age. It may also be the first symptom of commencing heart paralysis in diphtheria.

When counting the pulse you will sometimes find it difficult to determine the exact number of beats per minute, owing, it may be, to its extreme rapidity, smallness, or irregularity. In such a case you should count the beats of the heart itself, placing your fingers on the chest wall a little below and to the inner side of the left nipple. At this point the impulse produced by the apex of that organ can be most plainly felt.

(3) **Full Pulse.**—This is the usual accompaniment of a febrile attack. It gives a beat which feels larger than normal to the finger.

(4) **Small Pulse.**—This, as its name signifies, gives an impulse that feels smaller than normal to the finger, showing that the artery is not being properly filled with blood. It is, therefore, a sign of a weak heart. It occurs also in kidney disease, but from a different cause, and, therefore, has not the same meaning. This I shall explain later on. When a pulse is extremely small, so as to be scarcely perceptible, it is said to be "*thready.*" It indicates that the patient is in a very dangerous condition of prostration.

(5) **Soft Pulse.**—The soft pulse is one whose pulsation is arrested by slight pressure with the fingers. It is, therefore, also called the "*compressible*" pulse. Like the "small" pulse, it is another indication of heart weakness, for it proves that the arteries are not being sufficiently distended with blood, and, in consequence, there is said to be a condition of "low arterial tension."

Before leaving the soft pulse I should like to mention a variety of it—viz., the **dicrotic.** This word means "two strokes," and that is what you feel when you place your finger upon a good example of the "dicrotic" pulse. For every beat of the heart you feel two pulsations at the wrist. These are not, as a rule, equal in strength; the second being much weaker and, as it were, an echo of the first or principal beat.

These two beats of course only count as one, but sometimes they are so nearly equal in size that nurses have been known in counting such pulses to put them down at double their real frequency. Should there be any doubt, the point can easily be settled by counting the beats of the heart. This pulse is caused by the same condition that gives rise to the "soft" pulse—viz., an imperfect filling of the arteries with blood. It is usually met with in prolonged febrile attacks, such as enteric fever, in which it is not at all uncommon. It is not necessarily a dangerous symptom.

In endeavouring to estimate the condition of the heart from an examination of the pulse, we therefore pay attention to the *frequency, size, and compressibility* of the pulse. The more frequent, the smaller, and the softer the pulse, the greater is the cardiac weakness, and consequently the more dangerous the condition of the patient. We must, however, always consider the possible existence of individual peculiarities, and remember that some people, even when in good health, possess pulses that are more frequent, smaller, and softer than our own, and that such is their normal condition.

(6) **Hard Pulse.**—By the term "hard" we mean a pulse whose beating can only be stopped by a greater degree of pressure with the finger than is usually necessary. The reason for this is that the artery is tightly distended with blood; or, as we say, there is a condition of "high arterial tension." At the same time, there is an increased contraction of its muscular coat, so that the vessel seems to be smaller than normal. The conditions, therefore, which go to make

up a "hard," or "incompressible" pulse, are exactly the opposite of those found in the "soft" or "compressible." For, in the latter you have less blood in the artery than there should be, and a diminished contraction of the muscular coat. In grown-up people the "hard" pulse appears when the kidneys are inflamed, and to a less extent in gout.

Many theories have been put forward to explain its causation, and of them the following is perhaps as plausible as any:

Owing to imperfect working on the part of the kidneys when diseased, there are left in the blood certain poisonous substances which those organs should have removed. This impure blood irritates the muscular tissue in the walls of the smaller arteries, so that its fibres contract, and the vessels are consequently rendered smaller. At the same time, the heart is working harder to overcome this opposition. You have, then, a constant struggle between the heart and the smaller arteries; the former trying to force the blood through the vessels, the latter endeavouring to prevent it doing so.

Before leaving the "hard" pulse, I must warn you against confusing it with those cases in which the arteries are hard and thickened from disease of their walls. In some cases this is so marked that the vessels feel like little tubes of bone. It is not uncommon in old people, and is a frequent result of chronic inflammation of the kidneys.

(7) **Intermittent Pulse.**—In this form of pulse a beat is occasionally dropped, or left out. For instance, you count 1, 2, 3, 4, but at 5 you feel no beat. This

may occur at regular intervals, *e.g.* 1, 2, 3—5, 6, 7—9, 10, 11—13, 14, 15—where every fourth beat is omitted; or at irregular intervals, *e.g.* 1, 2, 3—5, 6, 7, 8, 9, 10—12, 13, 14—16, &c., where the fourth, eleventh, and fifteenth beats are dropped. In some people the pulse is persistently intermittent, in others this condition appears occasionally. Although it may seem an alarming thing for the heart to stop beating in this way, it need give rise to no uneasiness, unless there is distinct evidence of heart disease. As a rule it occurs after middle age, and is frequently due to dyspepsia, or excessive smoking.

(8) **Irregular Pulse.**—A pulse may be irregular in—

(*a*) *Force.*—When the beats vary in strength, so that the finger feels strong beats followed by weak beats, and *vice versa.*

Or it may be irregular in—

(*b*) *Rhythm, i.e.* there is not the same interval always between the beats. The pulse goes quickly for a few beats, then slowly for a few, and then quickly again.

This is a very much more serious condition than the intermittent pulse. It occurs most often in disease of the mitral valves of the heart, and is treated most efficiently by digitalis, which steadies the heart, and so diminishes its irregularity. It is also very common in the convalescent stage of bad diphtheria.

The pulse, with its many changes and varieties, is, as I know from personal experience, a source of difficulty to all of us. How much more, then, must it be so to you as nurses? Yet, I have thought it well to speak to you on the subject, for the reason that you will be constantly hearing such expressions as a "hard," a "soft," or a "dicrotic" pulse. By turning to your notes of this lecture, you will, I hope, be able to learn what is meant by these terms, and, therefore, their special significance for your patients.

VI

INFLAMMATION

I HAVE chosen inflammation as the subject of this lecture, because it is essential for a proper understanding of the various diseases that you should be acquainted with the changes which take place in an organ when it becomes inflamed.

It matters not whether the lungs, the kidneys, the skin, or the intestines be the seat of inflammation; the process, though varying in intensity, is essentially always the same. When you have grasped it for one part of the body, you have grasped it for all. That is why I wish you to pay particular attention to this lecture; for if you really understand it, those that follow will be rendered so very much more easy.

I must, to begin with, remind you of a few elementary facts in anatomy and physiology, since ignorance on these points would quite prevent your appreciating the results of inflammation.

In the first place, you will remember that the *blood* consists of a colourless fluid, called plasma, in which float immense numbers of excessively minute particles called "blood corpuscles." These corpuscles are of two kinds: the "red," which give the blood its colour, and the "white." The latter are larger, but very much fewer in number than the former, and of an irregular shape which is constantly altering. They possess also, in an elementary form, the power of movement.

Next, I wish to say a word about the **Circulation in the Capillary Blood-vessels.**

The arteries in all parts of the body, as they pass into the tissues, divide again and again, getting smaller and smaller as they do so, until finally they end in extremely minute vessels called "capillaries," a name which has been given to them because of their exceeding smallness, "capilla" being a Latin word meaning a "hair." The further extremities of these capillary or hair-like vessels form the commencement of the small veins. They are, therefore, the connecting link between the very smallest arteries and the veins.

This diagram (Fig. 5) shows a small artery ending in four tiny capillary vessels which themselves end in a vein. The arrows point to the direction in which the blood is flowing.

FIG. 5.

The walls of these capillaries are very thin and porous, so that the fluid part of the blood soaks through them, as if they were made of blotting-paper. As it oozes through the surrounding tissues it gives to them the nourishment which it has brought for them, while at the same time it cleanses them, by washing away the waste products caused by their working. This fluid which escapes from the capillaries has, therefore, a twofold duty to perform :

(*a*) To carry oxygen and food to the tissues.

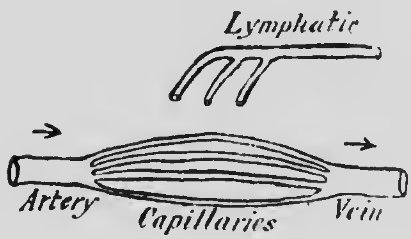
(*b*) To remove from them the waste material or ash formed by their working.

Having done this, the fluid is drained away by the veins and another set of vessels, viz. the lymphatics, whose duty it is to carry off the surplus fluid from the tissues.

The Lymphatics form a distinct system of vessels, and are not, except at their termination, directly connected with either the arteries or the veins.

They commence in the different tissues as extremely minute and thin-walled vessels, closely resembling the capillary blood-vessels in structure, and form a very thorough and complete system of drainage, for the purpose of removing the fluid which has oozed out of the capillaries. If this were not done, all parts of the body would become dropsical or waterlogged, and this, indeed, is what we see in some cases of heart disease, where, owing to the veins being over-full, fluid escapes from the capillaries more quickly than the lymphatics and veins can remove it, so that an excess remains in the tissues.

FIG. 6.

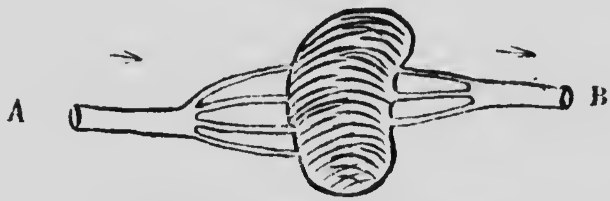


In this diagram (Fig. 6) you see, a short distance above the blood-vessels, the open mouths of three small lymphatics ready to act the part of drains, and carry away from the tissues the fluid which has escaped from the capillaries.

The arrows show that the fluid in the lymphatics, which is colourless and is called **lymph,** runs in the same direction as that in the veins, viz. *towards the heart.*

All the lymphatics finally end in two large vessels, which empty themselves into the great veins at the root of the neck, one on the right side, the other on the left. In this way the fluid which escaped from the capillaries returns again to the circulation.

FIG. 7.



A. Lymphatic vessel running to gland.
B. ,, ,, leaving ,,

The **glands** which we feel in the neck, armpit, and groin form a very necessary and important part of the lymphatic system.

They act the part of *filters*, and strain off from the lymph any hurtful or poisonous matters which it may contain, thus preventing them entering the general circulation. To do this, almost every lymphatic vessel at some part of its course, is connected with one or more of these glands.

This diagram (Fig. 7) will explain what I mean. On one side of the gland a vessel ends, on the other side one begins. To get from one to the other, the lymph slowly filters through the gland, which retains any hurtful material that that fluid may contain.

From sacrificing themselves in this way these glands frequently become the seat of inflammation. In the case of a sore throat, you have the glands of the neck inflamed; with a sore finger, the glands in the armpit; with an inflamed toe, those in the groin. In each case the glands are affected because they have removed from the lymph certain irritating and poisonous substances which it had brought back with it from the inflamed throat, finger, or toe. If it were not for these glands, this hurtful material would enter the general circulation, and, passing all over the body, do much harm. The lymphatic system, therefore, consists of vessels which drain off the surplus fluid from the tissues, and glands by means of which that fluid is purified before it is allowed to return again into the circulation.

The Various Stages of Inflammation.—We are now, after this somewhat lengthy introduction, in a position to study the changes produced in a part by inflammation. To do this, we must take some living tissue and observe the effects of irritation upon it. One of the best is the thin web of a frog's foot, for that is so transparent that under the microscope the capillary circulation can be watched going on in it.

Suppose, now, that we have the web of a living frog's foot under the microscope, and irritate it by placing a drop of a very weak nitrate of silver solution upon it. What we see is this:

To begin with, the blood-vessels dilate, and the stream within them is quickened, so that more blood is brought to the part.

Still watching, we next notice that the current begins to slacken, and the capillaries to get more and more full of corpuscles, the white, which are the more adhesive, keeping close to the walls of the vessels, while the red remain in the middle of the stream. This stage is called *congestion*.

This crowding together of blood-cells goes on, until finally the vessels in the inflamed area become quite choked with red and white corpuscles, so that the blood-stream in that part is, for the present, completely at a standstill. There is now said to be a condition of *stasis*.

The next thing that you see is some of the white cells gradually working their way through the wall of the vessel, until they appear in the tissue outside it. With them escapes a certain quantity of the plasma. This is called the stage of *exudation*. A good example of it is seen in the production of a blister.

The walls of the capillaries are made up of a number of flat cells joined together by a cement, so that they form an arrangement somewhat like the tiles which are used for the flooring of corridors. The white corpuscles are supposed to force their way out between these cells, the edges of which fall together again after the corpuscles have passed through, so that there is no hole left in the wall of the vessel. Next, if the inflammation be sufficiently intense, red cells follow the white and appear outside the vessel; not, however, by their own movements as do the latter. The capillary being overfull of blood, the red cells are forced outside it by the excessive pressure within. What we now see, on looking down the microscope, is a complete block in the circulation, the capillaries being choked with cells, which are also to be seen in large numbers in the tissues outside the over-distended vessels.

The **explanation of these various changes** lies in the fact that the walls of the blood-vessels in the inflamed part have been damaged by the irritant (*i.e.* the nitrate of silver solution), and, in consequence, the white corpuscles have a tendency to stick to them, and so block the way. At the same time, the damaged walls are rendered more porous than before, which accounts for the escape of fluid and corpuscles from the vessels. The white corpuscles are the scavengers of the body, and are attracted from the vessels towards any part where the tissues are being irritated by some foreign matter. They go there to remove it, each of them carrying away a small portion of it. Thus, with the aid of the microscope, we are able to see germs lying in the interior of white corpuscles, which have, so to speak, eaten them, and are going to remove them from the part they have invaded.

Terminations of Inflammation.—The next step in the process depends upon the intensity of the inflammation.

(1) If the damage done by the irritant be but slight, the vessels gradually recover themselves; the cells which are blocking them pass on, and the circulation is re-established. At the same time the cells and fluid are removed from the tissues, so that the part returns to its normal condition.

(2) There may be only a partial removal of the products of inflammation. Some remain behind, and become converted into fibrous tissue, thus leading to a permanent thickening of the part.

(3) The inflammatory process may increase in severity until pus is formed.

(4) Finally, the part affected may die from the intensity of the inflammation.

Just as a man dies if his heart stops working, so any part of his body, such as a leg, finger, or toe, dies if the circulation in that part be stopped for more than a very short time. The dead limb, or portion of a limb, is then said to be **gangrenous.**

In the same way, during the course of inflammation in any part of the body, all the capillaries supplying a portion of it with blood may be so choked with corpuscles, and, at the same time, so pressed upon by the products of inflammation outside them, that they become permanently blocked. That portion of tissue with which they are connected, having lost its blood-supply, must die, and is now called a **slough.** A piece of dead bone is spoken of as a *sequestrum.*

The next step is to separate the dead from the living, and this is accomplished in the following way. The former tissue, by its presence, irritates and inflames the latter, and in consequence it becomes surrounded by a large number of white blood-corpuscles, which gradually eat through everything which binds the two together, so that at last they are separated, and the slough is said to be free or cast off. There is then left behind, a clean granulating, healing surface which we call an **ulcer.**

When I come to speak to you on the subject of typhoid fever, we shall see that this is what happens to certain small lymphatic glands which are embedded in the wall of the small intestine. They become so acutely inflamed that the circulation in them is never re-established, and they consequently slough or die. They are then slowly separated and cast off from the intestinal wall in the manner that I have just described, leaving behind, in their places, the typhoid ulcers.

Signs of Inflammation.—When the part affected is situated superficially, so that the signs of inflammation can be detecetd by the eye, and by the hand, we find redness, heat, swelling, and pain.

Redness and Heat are due to the increased amount of blood in the inflamed part.

Swelling is caused by the accumulation of fluid and corpuscles in the tissues outside the vessels.

Pain is caused by the inflammatory products pressing upon the nerves in their immediate neighbourhood. Many of you must have experienced the very acute pain which is produced by the gentlest touch of the exposed nerve in a hollow tooth. So, when a part is inflamed, it contains much more blood than it previously did, and its tissues are crowded with corpuscles, which naturally press upon everything around them, including the nerves, and thus give rise to pain. From this you can understand that pain is most severe when the inflammatory process takes place in a part which is well supplied with nerves, and, at the same time, composed of dense and unyielding tissue, which does not stretch to make room for the cells and fluid which escape from the vessels. You might have a large abscess under the skin of the back containing several ounces of pus, and hardly any pain; because the skin in that region is loosely attached to the parts beneath, and so is pushed forward by the pus, which consequently does not exert any very great pressure on the neighbouring nerves.

Take, on the other hand, the case of a small abscess, holding, it may be, only a drop or two of pus, at the root of a tooth, or of a deeply seated whitlow at the tip of the finger, and how intense and frequently unbearable is the pain! Here the pus is shut in, in the one case by the bony socket of the tooth, and in the other by the firm, fibrous tendon sheath of the finger, neither of which can stretch and give way to make room for the pus, which consequently presses tightly on the nerves, and gives rise to sensations of pain.

From this it follows that a large inflammatory swelling does not necessarily mean a large amount of pain; rather the reverse, since the fact that the swelling is large shows that the tissues covering it are yielding, and so preventing it pressing upon the nerves. It is the small inflammatory [illegible] which are tightly bound down by firm [illegible] structures, that produce much irritat[illegible] and, therefore, a great deal of pain. H[illegible] more likely to get sloughing, since the blood[illegible] as the nerves, are pressed upon by the p[illegible], and sometimes the pressure is so great that the blood cannot get through the vessels, and so the part which they should supply sloughs or dies. Thus, you may get sloughing of the tendon, if a deeply seated finger whitlow be left too long unopened; or you may have a piece of dead bone in the socket of a tooth, as the result of an abscess in that part.

The **throbbing** which is sometimes felt, as, for instance, in the case of a whitlow, is caused by the heart, each time it beats, forcing more blood into the inflamed finger, and so increasing the pressure on the nerve fibres in the part. For the same reason, the pain becomes more intense when the hand hangs down, and is lessened when the hand is raised : because the former increases, while the latter diminishes, the amount of blood in the finger.

Finally, you must not forget that every part of the body when inflamed does less work than it did in health. This is equally true whether the hand, foot, lungs, kidneys, or intestine be the part affected.

Inflammation may be either acute or chronic.

Acute Inflammation gives rise to the signs which I have just enumerated.

Chronic Inflammation, as a rule, does not produce either redness or heat, and very little pain. The absence of these symptoms is due to the fact that the inflammatory process in these cases is extremely slow and gradual. There is no sudden increase in the amount of blood in the part, and consequently no heat or redness ; while the swelling forms so very gradually that the neighbouring nerves become accustomed to its presence, and hence fail to be irritated, thus explaining the comparative absence of pain.

Treatment.—The first and most essential point in the treatment of inflammation is *rest ;* rest for that which is inflamed. No organ, or member of the body, can recover itself if it is forced to do work when in a state of inflammation. The only result will be to aggravate the disease. No one, if they wished to get well, would think of using an inflamed joint more than was absolutely necessary. The same rule holds good for every part of the body, whether it be the eye, kidneys, intestines, or brain. When they are inflamed their work must be made as light as possible. Pain is a wise provision of nature, since it emphasises the necessity for rest. When possible, the part that is inflamed should be raised, as in this way its blood-supply is lessened and the pain diminished.

In the **external treatment** of inflammation we use both heat and cold, our choice being to a certain extent guided by the stage at which we consider the inflammatory process to have arrived. Both have a soothing influence on the nerves of the inflamed part.

Cold, or rather cooling applications, are of service in the early stages of the process, when the blood-vessels are dilating, and the current within them beginning to slow; that is, during the stage of congestion. Cold is then beneficial because it causes the vessels to contract, and so, by diminishing the amount of blood in the part, helps to prevent the blocking of the capillaries and consequent stoppage of the circulation. In this way it tends to check the escape of fluid and corpuscles from the blood-vessels, and thus helps to keep down the swelling of the inflamed part. This explains the usefulness of cold water in the early stages of a sprain.

Hot applications, on the other hand, increase the dilatation of the vessels, thus bringing more blood to the part, and so, by increasing the force of the current, help to wash on some of the cells that are blocking the way. They are therefore especially useful in the second stage of inflammation when the vessels are becoming blocked with cells. In the last stage when suppuration is inevitable hot moist applications are the only treatment that is admissible, since they relieve pain, hasten the formation of pus and render its passage to the surface easier.

Chronic Inflammation may be treated in various ways with the object of hastening the processes of repair, and so bringing about the removal from the tissues of the products of inflammation. The most useful of these methods are counter-irritation, massage, and pressure, aided by suitable constitutional treatment.

VII

ACUTE PNEUMONIA

TO-DAY I wish to speak to you on the subject of acute pneumonia, a very important one, since it is almost the commonest acute disease with which nurses in a general hospital have to deal.

This form of inflammation of the lungs is called "**lobar,**" because, as a rule, it affects a large part of the lung, usually a whole lobe, or even more.

Causation.—The cause of this disease is now known to be a particular form of germ, which invades the lungs, and there sets up inflammation. At the same time these germs produce a substance called a "toxin," which poisons the patient, and gives rise to the symptoms of the disease. This matter I have already explained to you when lecturing on "Germs."

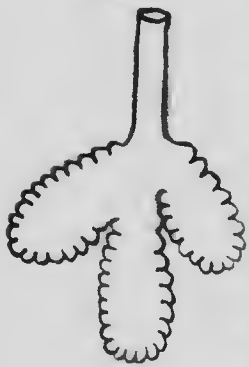
Structure of Healthy Lung.—To properly understand acute pneumonia, it is necessary to have a clear idea of the anatomy of the lungs. I shall, therefore, briefly recall to your recollection the structure of these organs in the healthy state, and then you will have little difficulty in comprehending the alteration caused in them by this disease.

Now, as you know, the trachea or windpipe run downwards from the larynx into the chest, where it ends by dividing into the two bronchi, one for the right lung and the other for the left.

Each bronchus divides into a number of smaller tubes, and these, as they travel through the lungs, divide again and again, at the same time getting smaller and smaller, until finally each little bronchial tube ends by opening into a number of tiny chambers.

Round the walls of these chambers are situated the *air-cells*, which are little sacs whose mouths open into the chambers (Fig. 8). In the walls of these air-cells run the pulmonary capillaries containing the dark venous blood which is being pumped through the lungs by the heart, so that it may be purified there, and become bright arterial blood again. The walls both of the air-cells and the pulmonary capillaries being excessively thin, the blood contained in the latter is brought into very close relation with the air that is in the former, the result being that a process of exchange takes place between the two. The blood gives to the air-cells a large part of the impure gases which it has picked up in its journey through the body, and takes in exchange that most necessary ingredient of good blood, viz. oxygen. Afterwards, it passes on to the left side of the heart, to be sent again to the various organs and tissues. Healthy lung-tissue, as you would imagine from the above description, is very light and spongy, readily floating in water, and decidedly difficult to cut with a

FIG. 8.



knife. Each lung is covered by a very thin, transparent membrane, which is called the *pleura*.

Structure of Lung in Pneumonia.—We can now consider the alteration which takes place in a healthy lung when it becomes the seat of acute pneumonia. There is the usual sequence of events which I described to you in my last lecture, viz. a gradually increasing fulness, and, finally, blocking of the capillaries in the inflamed portion of lung. Next a partial escape of the contents of those vessels into the neighbouring tissues, that is, in this case, into the air-cells.

The result, as you see from this diagram (Fig. 9), is that the air in the air-cells is now replaced by solid material—viz. blood-clot; so that that part of the lung, being airless, can for the present take no further share in the work of respiration.

Fig. 9.

Its character is completely changed. From being a light, spongy, easily floating substance, it has been converted into a heavy solid mass, which cuts, and feels to the touch exactly like a piece of liver, and sinks at once when put into water. Such are the alterations produced in a lung by the occurrence of acute pneumonia.

When the illness is at an end, the inflamed lung regains its normal condition in the following manner. The blood-clot in the air-cells becomes softened and partially liquefied. It is then, for the most part, carried away by the blood and lymphatic vessels, while some of it is coughed up by the patient. In this way the air-cells are freed from the presence of the blood-clot, and air is able to enter them again.

Effect of Pneumonia upon the Heart.—When part of the lung becomes solidified in the manner that I have described, *the work of the heart is made harder.* For the capillaries in the inflamed part are choked with blood corpuscles, so that the heart has a constant obstruction to struggle against in its efforts to force the blood through those vessels. At the same time it is being injuriously affected by a high temperature, and poisoned by the toxin of the germs. We have, therefore, good reason for constantly guarding against the risk of heart failure in this disease, since that organ is being put to a very serious strain.

Symptoms.—In adults the illness commonly commences with a rigor, in children with vomiting or convulsions, the temperature at the same time shooting up to 103°, 104°, or even higher. If the inflammation is seated in a part of the lung which is near the surface of that organ, it spreads to the pleura covering it, and then we get the sharp pain in the side, or stitch, due to pleurisy.

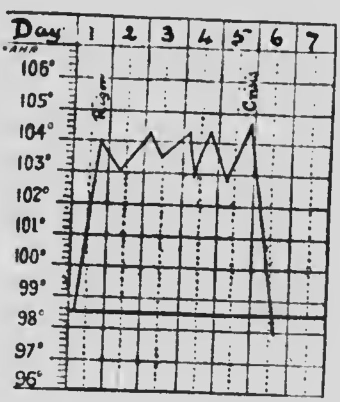
The **appearance** of a patient with acute pneumonia is very characteristic. He lies in bed with flushed cheeks and a wide-awake, anxious expression, his nostrils working, breathing in a quick but shallow manner, with a short, frequent cough.

In some cases there is an eruption of small blebs in the neighbourhood of the mouth.

The **expectoration** in this illness has features peculiar to itself. It is scanty, very tenacious, and of a yellow or rusty colour, which is due to the presence in it of altered blood, that blood with which the air-cells in the inflamed portion of lung are filled.

Cough is *frequent*, because of the great difficulty of dislodging this tough mucus from the bronchial tubes. It is also *short*, because coughing disturbs the inflamed pleura and causes pain; hence the patient restrains the desire to cough.

Respiration is markedly quickened, much more than can be accounted for by the rise of temperature. For instance, a man with acute pneumonia and a temperature of 104° would probably breathe between 40 and 60 times a minute, instead of the 17 or 18 that he does in health; whereas with a temperature of 104° from any other cause, such as scarlet or enteric fever, he would not breathe more frequently than 24 to 26 times in the minute. This marked increase in the number of respirations is one of the most characteristic signs of inflammation of the lungs.



Pulse is quickened by the rise of temperature, but not in the same proportion that the respirations are. In an average case it should be somewhere between 100 and 120.

Temperature rises sharply at the commencement of the illness to 104° or even higher; remains up, with slight daily variations, for about a week, and then in the majority of cases falls abruptly to normal. In about 40 per cent. it comes down more gradually. It generally begins to fall on either the fifth, sixth, or seventh day of the illness.

Sometimes the crisis is accompanied by profuse sweating or diarrhœa. Very occasionally this sudden fall in the temperature gives rise to symptoms of serious collapse. Cases of acute pneumonia, therefore, need particularly careful watching at this period of the attack.

Prognosis.—The next point that I wish you to consider with me is what we call the "prognosis" of the case; that is to say, the forecasting or foretelling, in so far as one is able, of the ultimate issue of the illness, whether the patient will recover or die.

There are necessarily many things to be taken into consideration when one attempts this most difficult task; but there are certain features in a case of acute pneumonia which, being of favourable or unfavourable significance, help us to do so, and about these I now wish to speak to you.

I am bringing forward this question of prognosis because I believe that a nurse who is taking a proper and intelligent interest in her patient will be anxious to learn everything that can add to her knowledge as regards the progress of the case; and will, therefore, like to know the explanation of those signs or symptoms which are a source of information to the physician. I am not going to discuss such obvious indications as sleeping well, feeding well, mild pyrexia, absence of delirium, with their opposites, since these carry with them their own interpretation.

There are, however, other symptoms the exact significance of which may be unknown to you. They are as follow:

Favourable Symptoms.—The only one I have to bring before you is the *eruption* which, in some cases of pneumonia, appears *in the neighbourhood of the mouth.*

For some reason or other, which I cannot explain, a larger proportion of patients recover who have this eruption than of those who fail to show it.

Unfavourable Symptoms.—These are many in number.

(1) *Prune-juice-coloured expectoration.*—This indicates a very severe form of pneumonia, combined with stagnation of blood in the lungs.

(2) *Abundant liquid expectoration.*—This is a sign of œdema or dropsy of the lungs, and is evidence of a failing heart.

(3) *A dry brown tongue, and delirium with only moderate fever.*—Inasmuch as the temperature is not high enough to account for the symptoms, they must be due to a dangerous poisoning of the system by the germs of the disease.

(4) *Lividity, or cyanosis,* appears first under the finger-nails, at the margins of the ears, and on the lips. It shows that the heart is giving way, and hence is failing properly to maintain the circulation through the lungs. The result is that the venous blood is imperfectly purified, and consequently remains dark in colour.

(5) *Cessation of expectoration about the fifth or sixth day,* there being still distinct rattling in the throat and chest. This is a grave sign, as showing that the patient is too weak for the exertion of clearing his bronchial tubes of the mucus which has accumulated in them.

(6) *Tendency to coma or low muttering delirium late in the illness.*

(7) *Respirations persistently above 60 per minute.*—This only refers to adults, for in children the rate of breathing may be much quicker, and yet there be no cause for anxiety.

(8) *Pulse persistently above* 120 in adults is always ground for alarm. A pulse gradually rising in frequency toward the end of the illness is a sure sign that the heart is giving way.

(9) *When the disease occurs* in patients *over* 60 years of age, in *drunkards*, or those who are the *subjects of heart or chronic kidney disease.*—As you see, I have spoken almost entirely about symptoms which are of bad omen, for when a patient is doing well there is naturally little in his condition that calls for remark or explanation.

Treatment.—We have now to consider the question of treatment. The first point that I wish most strongly to insist upon is that the patient must have *absolute rest.* Talking is distinctly harmful, and on no account should he be allowed to sit up in bed. At the commencement of the lecture I explained to you how much the work of the heart is increased by the alteration in the lungs brought about by this disease, and that the one thing we fear is that it may give way under the strain. We should, therefore, be careful to do nothing to increase that strain; and sitting a patient up does so to a very considerable extent, as you may prove for yourselves by counting a pulse under both conditions.

Perhaps it will emphasise the fact if I briefly mention a case to you.

A friend of mine in general practice was attending a young man through a very severe attack of acute pneumonia. The crisis had already passed, but, as the illness had been a very sharp one, the patient was told to remain on his back for the present, and not to sit up. Two days after the crisis he was lying in bed talking to a friend, when he suddenly sat up to reach for a book, and fell back dead. A post-mortem examination showed that there was nothing but the condition of the lungs to account for the weakness and consequent failure of the heart.

For the same reason, you must never struggle with delirious patients. When they insist on getting out of bed, try to persuade them to lie down again, and if they refuse, send for the doctor, but do not take upon yourselves the responsibility of indulging in a wrestling match with a man whose heart may give way under the exertion. Never argue with such patients, but agree with them, even when their statements are absurd. If you are nursing in private, be careful to keep the sick-room properly ventilated. Give your patient plenty of fresh air, but no draughts. The atmosphere of a hothouse is not necessary, nor even conducive, to the recovery of a case of acute pneumonia, though many people still think so. Remember that the whole, or greater part, of one lung is doing no work at all, so that the patient has need of the purest air you can give him. For this reason you should not burn more gas in his room than is absolutely necessary.

Then, as to food. This will naturally be of a liquid character during the acute stage of the illness, milk,

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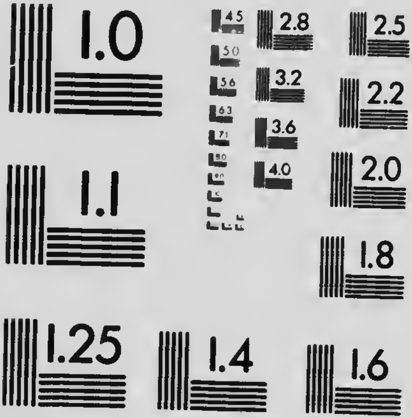

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beef tea, and broths, with lemonade or iced water to quench the thirst.

As regards the question of putting these cases upon **alcohol:** Many young patients will go through an attack of acute pneumonia without ever needing it. Should they require it, it will probably be about the fifth or sixth day, when they are nearing the termination of their illness, and the heart is beginning to show signs of the strain to which it has been put.

The *amount* that is given will depend to a considerable extent on the previous habits of the patient, and also on his age. A man who has been accustomed to take stimulants will tolerate, and will need, a much larger quantity than a woman who never touches alcohol. Brandy can, however, be given more freely in this disease than in enteric, because it is a fever of comparatively short duration, and we know, to within a day or two, how long it will last. At the same time, I must tell you that many physicians never use alcohol in pneumonia. They believe that it does more harm than good, and, consequently, prefer to give their patients such drugs as strychnia and ammonia.

As to **drugs** we give a saline mixture in the early stage, to promote a free action of the skin, and thus render the patient more comfortable, while, if necessary, we administer digitalis, ammonia, ether and strychnine towards the end of the illness, for the purpose of stimulating the heart.

For **sleeplessness** at the beginning of the attack we give opium or morphia, especially when there is also pain in the side from pleurisy. In the later stages of acute pneumonia these drugs have to be used with great caution, since patients are then very easily poisoned by them. In this disease, as the fever lasts only a short time, we do not, as a rule, adopt measures for lowering the temperature, unless it ranges very high, or the patient seems to be injuriously affected by it. An ice-bag to the head sometimes acts as a sedative when the patient is delirious.

As regards the question of **local applications** to the chest wall: The pain caused by pleurisy at the commencement of the illness may be stopped by a mustard-leaf, small blister, or a couple of leeches. Formerly linseed poultices were always applied to the chest in cases of acute pneumonia. Now, unless bronchitis is present, they are seldom used. Many physicians use the icebag instead, claiming that such treatment not only lowers the temperature and makes the patient more comfortable, but that it even tends to stop the spreading of the inflammatory process in the lungs and so hastens the crisis.

Finally, when the livid tint of the cheeks and ears is very marked, we *bleed* the patient, to diminish the strain on the heart, by giving it less blood to pump through the lungs.

VIII

ACUTE INFLAMMATION OF THE KIDNEYS

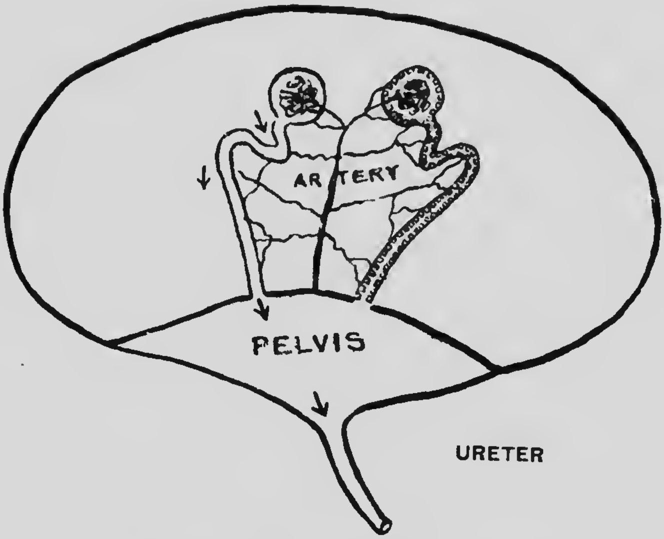
ACUTE inflammation of the kidneys is a common and important disease. It is also called acute nephritis, or Bright's disease, after the late Dr. Richard Bright, of Guy's Hospital, who first properly explained its symptoms.

Causation.—Amongst the many cases of acute nephritis are scarlatina, damp cold, pregnancy, and certain poisons such as turpentine and cantharides.

Before discussing its symptoms I shall, as usual, run over the anatomy and physiology of the healthy kidney, and then you will more easily understand the prejudicial effect which inflammation has upon its workings.

Structure of Kidney.—I have drawn here a diagrammatic representation of a kidney (Fig. 10). You see that the ureter, which conveys the urine to the bladder, as it approaches the kidney, expands into a shallow basin-shaped cavity called the pelvis of the kidney, which embraces the inner border of that organ. Opening into the pelvis are two narrow tubes. These are two of the renal tubules. If we follow them back from the pelvis into the substance of the kidney, we find that after winding about, they terminate near the outer border of the organ by each expanding so as to form a little chamber. Projecting from the wall into each of these chambers is a small ball or tuft of capillary blood-vessels. These, as you see, are formed by an artery which runs into the substance of the kidney from its

Fig. 10.



Diagrammatic representation of kidney.

inner border, giving off on its way numerous branches to the renal tubules in its neighbourhood.

You will notice also that one of the tubules is lined in its whole extent by little cells; in the case of the other I have, for the sake of contrast, only drawn the walls.

That is really the whole anatomy of the kidney, viz. that it is made up of an immense number of very small tubes, each of which opens at one end into what is practically the upper extremity of the ureter, while the other forms a small chamber for the purpose of enclosing a tuft of capillary blood-vessels. Of course you would not be able to see the renal tubules and vessels as I have drawn them, if you merely examined a kidney with the naked eye. They are far too small for that, and can only be demonstrated by the help of a microscope. Also, you must not imagine that each tubule opens by itself into the pelvis of the kidney. On the contrary, many of them, as they approach that part, join together to form larger tubes, just as you see a number of small streams uniting to form a river.

Work of the Kidneys.—Next, as to the working of these organs. The kidneys have a twofold duty to perform. In the first place, in grown-up people they withdraw from the circulation about 50 ounces of water every day. Secondly, they remove from it certain waste substances which have been produced, partly by digestion, and partly by the working of the human machine. These waste substances are the ashes of the human fire. For that fire to burn brightly, these ashes must be removed. In an earlier lecture (p. 57) I explained to you how the blood cleanses the different tissues from these ashes or waste substances which they are continually producing.

The task of removing these solid impurities from the blood, in which they are dissolved, is carried out by the cells which line the renal tubules. Bathed as they constantly are, like all the other tissues, in the fluid part of the blood, they pick out from it these poisonous substances, and deposit them in the tubules which they line. Into the chamber at the top of each tubule there is a constant oozing of water from the walls of the capillary tuft which it encloses. This water runs down the tubule, meeting and dissolving the solid material which has collected there, and, passing on, gets into the pelvis of the kidney, and thence into the ureter or bladder.

The physiology, or working, of this organ is, therefore, beautifully simple. You have a number of little tubes lined by cells which are constantly removing solid impurities from the blood. At the head of each tube is a tiny cistern or flushing tank, from which water is continually trickling down, so as to prevent a block in the tube below.

The Effect of Inflammation upon the Kidneys.—Now, what are the changes produced in the anatomy and working of the kidney when it becomes acutely inflamed? You have, in the first place, overdistension of the capillaries, and, as a result, many of the blood-cells forced outside the vessels. Some of these pass into the tubules, and so give rise to the presence of blood in the urine. Further, the cells lining the tubules are themselves injuriously affected by the inflammation, so that their working power is markedly diminished. Indeed, many of them die, and fall away from the walls of the tubules.

We have, then, *two influences at work tending to diminish the amount of urine secreted* by the patient.

(*a*) The injurious effect of inflammation upon the renal-cells.

(*b*) The blocking of many of the tubules by inflammatory products, *i.e.* blood-cells and dead renal-cells.

The Urine in Acute Nephritis.—Before I pass on to the symptoms of nephritis I wish to say a word or two concerning the examination of the urine in this disease.

Albumen is, as you know, what we especially look for. Now, albumen is not a waste substance, but one of the most important elements of our food, and, therefore, ought not to be found in the urine. Its presence shows that the kidney-cells are not doing their work properly, since they are allowing part of the food to escape from the blood, and be wasted in the urine.

You must not, however, hastily conclude that every patient with albumen in the urine has nephritis. That would be quite wrong, since you may find a small quantity of albumen in various conditions which disturb the working of the kidneys, such as a high temperature, heart disease, and certain other complaints in which the blood is deficient in quality.

Before we can positively say that the patient has inflammation of the kidneys, we must find out if any other symptoms of that disease are present in addition to albumen in the urine.

As regards the *methods of testing for albume[illegible]* [illegible] are many in number, but similar in action.

Whether you boil the urine with a drop of dilute acetic acid, or float the urine on the top of strong nitric acid, or float a solution of picric acid on the top of the urine, they all have the same end in view, viz. the clotting, or coagulation, of any albumen which may be present in the urine.

You know that the white of egg before boiling is a transparent liquid, and after boiling an opaque white solid. That is because it consists of albumen which has been coagulated by the heat. In the same way when we get a cloud, or a ring, in our testing, it is because the heat or the acid, as the case may be, has coagulated some of the albumen which is present in the urine.

Then, you will often hear it remarked that the patient is not passing as much *urea* as he should. This substance is one of those solid impurities which the kidneys remove from the blood. We know how much urea ought to be passed each day. If, therefore, we find less urea than normal in the urine, we conclude that the kidneys are not properly cleansing the blood, but are allowing this and other impurities to accumulate in the system.

Symptoms.—Frequently the earliest is dropsy, which shows itself first in the loose tissues of the eyelids, that being a part where fluid can most easily accumulate under the skin. With this there is an aching pain in the loins, and, perhaps, a rigor. The patient feels ill, has a headache, vomits, and suffers from constipation.

The temperature, if it be a typical case, rises suddenly to 103° or 104°, and then falls abruptly to normal. This curious rise and fall is, however, often absent, while its duration varies considerably in different cases.

The presence of *œdema* or *dropsy*, which I have just mentioned as occurring in the eyelids, can be demonstrated in other parts of the body, by the fact that firm pressure with the fingers leaves a little pit or depression in the skin. This is spoken of as "pitting," and shows that there is beneath the skin an excess of fluid which has been displaced by the pressure of the finger. When present, this is most clearly seen over the lower part of the vertebral column, and about the shin bones and ankles.

Since an inflamed kidney cannot do as much work as one that is healthy, there is considerably *less urine than normal* passed in the twenty-four hours. For the same reason we find a great diminution in the amount of urea which it contains.

The amount of *albumen* may be very large, so that the urine becomes almost solid on boiling, and the presence of *blood* is shown by the "smoky" or dusky brown tint of the fluid, together with the chocolate-coloured deposit that forms at the bottom of the specimen glass on standing. This deposit consists of red blood-cells, and is quite distinct from the light pink sediment which is so often seen in the urine of perfectly healthy people.

The pulse, in adult patients, is hard; that is to say, you must press firmly on it with the finger in order that you may stop its beating.

The further progress of these cases varies immensely. The dropsy may spread all over the body, the skin presenting a peculiarly white or waxy appearance, the temperature remaining high, the urine diminishing in quantity till only a few drachms are passed in the twenty-four hours, and yet the patient recovers. Or you may, and commonly do, get a milder type of inflammation with the same symptoms but lessened in intensity. Let me give you an example.

There is a slight rise of temperature at the beginning of the illness, a little puffiness of the eyelids and ankles, and sometimes vomiting; the urine, which contains blood and a large amount of albumen, being reduced in quantity to about half or one-third of what it ought to be. The patient is never seriously ill, and in the course of a few days begins to improve. This is the kind of case one sees in the wards of a scarlet fever hospital. Much dropsy and marked suppression of urine occur in a very small minority.

As regards the **ultimate issue of these cases:** They either

(*a*) **Recover.**—In which case the various symptoms of the nephritis slowly disappear. The temperature becomes normal, the urine and urea increase in quantity, while the albumen and blood steadily diminish, and the dropsy at the same time passes away.

(*b*) **Become Chronic.**—The patient improves up to a certain point. He gets rid of all his symptoms, with the exception of a small quantity of albumen in his urine. This persists, showing that the inflammation of the kidneys has not entirely subsided. It is a highly dangerous condition, since the damaged organs are liable at any time to again become acutely inflamed. Many of these cases steadily progress to a fatal termination, brought about, after several months, in the same way as in acute nephritis.

(*c*) **Die.**—They may die quite early in the illness fr. suppression of urine, and consequent blood-poisoning; or from the dropsy invading the lungs, pleural and abdominal cavities; or from a secondary inflammation, such as pneumonia.

Uræmia.—You will often hear the term "uræmia" used in connection with this disease. It means that, owing to the small amount of work being done by the kidneys, there is such an accumulation of urea and similar waste substances in the blood as to poison the system. There is a condition of blood-poisoning. The brain is sometimes affected by this impure blood, and then the patient has convulsive attacks of the same character as epilepsy, or he becomes comatose, or the two conditions may be combined. This indicates a desperately dangerous state of affairs. Twitching of the face, drowsiness, vomiting, and persistent headache, are usually the first symptoms of uræmia, and should, therefore, be carefully watched for by the nurse.

Treatment.—Locally there is little or nothing to be done, though poultices and hot fomentations are sometimes applied to the loins, or those regions are dry-cupped.

The great aim and object of our treatment is to lessen the work of the inflamed organs, and thus give them rest and time to recover. This we endeavour to accomplish in the following ways :

(*a*) **By Diet.**—We keep our patients on milk alone, whil the disease is in the acute stage ; for it has been proved by expe ment that such a diet gives less work to the kidneys than one that contains meat.

(*b*) **Purging.**—It is of the utmost importance that the bowels should be freely opened every day. In this way a considerable amount of waste material is removed from the body, with part of which the kidneys would erwise have to deal.

(*c*) **Sweating.**—By making the skin act well, we take water from the system, together with a small quantity of the solid impurities which are dissolved in it.

Thus, by means of a light diet, combined with increased activity on the part of the other excretory organs, we diminish considerably the amount of work which the kidneys have to do. For the same reason we clothe these patients in flannel, keep them in a warm room shielded from draughts, and place them between blankets, to prevent the risk of a chill; and we give them such drugs as acetate of ammonia, spirits of nitrous ether, and jaborandi, since these promote perspiration.

Since this disease throws considerable strain on the heart, as I explained to you when discussing the causation of the "hard" pulse, it is necessary to keep the patient absolutely at rest.

If the case is a very severe one, and there is practically no urine being passed, or if symptoms of uræmia appear, we take stronger measures; purge our patient very freely, and, at the same time, administer subcutaneous injections of pilocarpine, or use a hot-air or vapour bath, all of which produce profuse sweating. If this treatment fails to bring relief, and the uræmic condition becomes more pronounced, or if coma should supervene, we sometimes bleed: the reason for doing so being that, since these symptoms are due to the irritating action of the poison-laden blood upon the brain, by removing some of the blood we at the same time take away some of the poison. Vomiting, which is sometimes very troublesome, needs treating with effervescing mixtures, or tincture of iodine in doses of two drops every hour, these acting as sedatives to the stomach. As the disease subsides, and convalescence commences, we gradually increase the diet, and at the same time administer a thorough course of iron; for these patients are always very anæmic, and I think, too, that it hastens the disappearance of albumen from their urine.

CHRONIC INFLAMMATION OF THE KIDNEYS

Chronic inflammation of the kidneys, or chronic Bright's disease, as it is sometimes called, occurs in two forms. It may, as I have already told you, result from an attack of acute nephritis which has never entirely subsided; or it may commence as a chronic inflammation, by which I mean that it begins in a quiet, insidious manner, for a long time giving rise to no symptoms at all. It is this second form of chronic nephritis with which we are now concerned. It is a common disease, and also an important one, from the changes which it produces in the heart and arteries, and the consequent liability to cerebral hæmorrhage which is attached to those who suffer from it.

Causation.—It rarely occurs under forty years of age, and is most often due to gout, or chronic lead-poisoning.

Changes produced in the Kidneys.—In chronic nephritis there is a very slow but progressive wasting of the kidney substance, the place of which is gradually taken by fibrous or scar tissue, which, as time goes on, contracts, just as the scar from a burn does, so that the organs become shrunken, and finally much diminished in size. It is an extremely slow process, and lasts for many years. When in this way so much of the kidney substance has been destroyed that there is not enough left to do properly the work which these organs have to perform, we get symptoms. These are due to the accumulation in the system of those poisonous waste substances which the diseased organs are failing to remove. These symptoms, when they do occur, are, as a rule, vague and indefinite.

Symptoms.—There is a possibility of chronic nephritis when a man past middle life, *without any obvious cause*, suffers much from either headache, vomiting, anæmia, shortness of breath, or general weakness. The possibility becomes a probability if, in addition to one or more of these symptoms, there is distinct hardness of pulse.

The urine is nothing like the help to us in diagnosis that it is in acute nephritis. Frequently it is quite normal except for an occasional trace of albumen. There being no acute inflammation, we do not find blood and a large quantity of albumen in it.

Effect upon the Circulatory System.—Next, a few words with regard to the changes in the heart and arteries, which result from the presence of this disease. When speaking to you about the different varieties of pulse, I mentioned among others the "hard" pulse, and gave you an explanation of the way in which it is produced. We saw that in such a case there is a continual struggle between the heart and the smaller arteries, the former trying to force the blood through the latter, which are diminished in size from contraction of their muscular coats, so as to make the passage of blood through them more difficult.

In consequence of this continual struggle between them, both eventually become worn out.

The heart, to begin with, increases considerably in size, as would any other muscle that was constantly doing hard work. At last, however, it collapses and gives way under the prolonged strain, whereupon the patient gets dropsy of the lower extremities, together with other symptoms of heart disease.

As for the arteries, they also pay the penalty of too continuous hard work. Their walls become diseased, and lose their elasticity, so that they are brittle, and tear easily. This accident is especially likely to happen in the case of the arteries which supply the brain, since the soft cerebral matter is but a very poor support to the vessels which run through it, so that they are easily ruptured when diseased.

Thus, a large number of those who die from the bursting of a blood-vessel within the brain will be found to have chronic inflammation of their kidneys.

Chronic nephritis is, therefore, a very insidious and slowly progressing disease, the symptoms of which are, for a long time, vague and indefinite in the majority of cases. After lasting for a varying number of years it may cause death in one of the following ways :

(*a*) **Uræmia.**—The patient's blood at last becomes so poisoned that he falls into a condition of coma, or has convulsions, or he may die more gradually from chronic vomiting and diarrhœa.

(*b*) **Failure of the Heart.**—The patient dies with dropsy of the legs and other symptoms of heart disease.

(*c*) **Hæmorrhage into the Brain,** or " cerebral apoplexy " as it is sometimes called, due to the bursting of a diseased artery.

Treatment.—Though the progress of this disease cannot be arrested, yet much may be done by appropriate treatment to prolong life and render it more comfortable.

As in acute nephritis, we lighten the work of the inflamed kidneys as much as possible.

We cannot, of course, keep our patients on a milk diet for the rest of their lives, but we give them as little butcher's meat as possible, and no alcohol, unless absolutely necessary, since it acts as an irritant to the kidneys.

The bowels must be freely opened every day, and the skin kept active by means of baths and flannel underclothing, with removal to a warmer climate in the winter, if the patient's circumstances permit it.

Thus, by moderation in food, combined with increased work on the part of the bowels and skin, we leave the kidneys as little as possible to do.

When the pulse becomes very hard, or the patient complains much of headache or tightness of breath, we give very small doses of nitroglycerine, a drug which causes the muscular coats of the arteries to relax, thus increasing the size of the vessels and allowing the blood to pass more freely through them.

When symptoms of heart failure arise, the appropriate treatment for that condition is tried, digitalis and strychnine being the most useful drugs, since they steady and strengthen the contractions of the weak and exhausted organ.

In the acute forms of uræmia, as manifested by convulsions or coma, we use the same treatment as for the similar condition when occurring in acute nephritis.

For the chronic vomiting and diarrhœa it is often difficult to do anything. Though the looseness of the bowels may be moderated, it should never be altogether stopped, since in this way poisonous substances, which the kidneys should have removed, are escaping from the system. If they are prevented doing so, symptoms of acute uræmia may supervene.

IX

THE INFECTIOUS FEVERS

During the next few lectures I shall speak to you about some of the more important infectious diseases. Before we begin their study there are certain points common to them as a class about which I propose to talk to you to-day, such as their causation, mode of spread, and preventive treatment.

(1) **Causation.**—In my first lecture I explained to you that each infectious disease has its own special germ which can cause that disease but no other, though up to the present the germs of some infectious diseases have not yet been discovered. The fact that an individual's system has been invaded by the special microbe of such a disease as scarlet fever constitutes no protection against another disease, such as chicken-pox. When two or more infectious diseases occur at the same time the case is said to be one of "mixed infection." There may also be a simultaneous attack by the germs of an infectious fever and others which are usually present in septic inflammatory conditions. Such a combination is possible when the exanthem is one that attacks the nose and throat. The septic germs are already lurking in the tonsils, and as the resistance

of the patients' tissues fails before the onslaught of the fever microbe they begin to assert themselves; their number rapidly increases, and another toxin is added to that which is already circulating in the patient's tissues. When you see a "septic" case of scarlet fever or diphtheria you will remember that the patient is fighting against at least two kinds of germs; the one which has caused the special fever from which he is suffering, the other which is giving rise to what are called the septic symptoms in the case: the brawny neck, nasal discharge, foul throat, &c. It is not surprising that some of the worst cases of diphtheria die in spite of antitoxin since the remedy is powerless against the toxin of any other germs. You can now understand the importance of most carefully cleansing your hands after doing anything to the nose or throat of a septic case of scarlet fever or diphtheria, otherwise the next patient you do anything for in the ward may be infected by you.

(2) **Mode of Spread.**—It used to be taught, and is still believed by some, that the infection of such a disease as scarlet fever passes with the expired air from the patient's mouth and nose into the surrounding atmosphere. It naturally follows that all parts of the sick room and its contents are held to be infected. That view is gradually disappearing. We know now that in quiet breathing the expired air contains no germs, since they remain adherent to the moist surfaces which line the mouth and nasal cavities. There is consequently no risk in being in close proximity to a patient who has diphtheria provided he is breathing quietly and does not talk or cough. But if he talks,

and especially if he coughs, he expels from his mouth a very fine spray of saliva which travels many feet across a room and carries in its droplets a number of germs. Should there be amongst them any diphtheria bacilli they will strike anyone standing near the bed, if the patient coughs in their direction. In this way infection may be said to pass through the air. It is therefore through direct contact with infectious material that diseases like scarlet fever and diphtheria spread. The germs either leave the throat or nose in the droplets which are expelled by the acts of coughing, sneezing, and talking, or the infectious discharges from those parts are conveyed directly by the patient, or indirectly, by a third person to some one else. Though in the case of such diseases as scarlet fever and diphtheria our belief in aerial infection is waning, in the case of others, of which small-pox and chicken-pox are the chief examples, infection appears to travel from the patient through the air.

The Carrier.—We often hear nowadays of cases of infectious disease which are said to have had their origin in a "carrier," that is to say an individual who carries about with him the germs of the disease. The most striking instances have occurred in connection with enteric fever. In rare cases a person who has had this disease may continue to excrete the germs for many years. They can be found in the stools, and thus infectiousness can be definitely proved. The same thing probably happens to a less extent after scarlet fever, though we cannot prove it in the same way, since the germ of that disease has not yet been recognised. It is also possible for one to be a carrier of infection who has never suffered from the particular fever to whose germs he is acting as host. Nurses who work in the diphtheria wards may harbour the germs of that disease in their throats and remain in perfect health. Their tissues are able to hold the germs in check. Such an individual might, however, transmit some of those germs to another person, who develops diphtheria owing to his susceptibility to infection being greater, or the resistance of his tissues temporarily impaired. As nurses you should understand and be alive to the possibility of the conveyance of infection by carriers, since such knowledge will impress upon you the need for carefulness in nursing fever patients.

(3) **Prevention.**—To limit and, if possible, to stay the spread of infection, we isolate either at home or in a fever hospital all patients who suffer from one of the notifiable infectious diseases, of which the most important are scarlet fever, diphtheria, enteric fever, and small-pox. By law a medical man is compelled to notify the Public Health Authority of his district when he is called to see a patient suffering from one of the diseases just named. For so doing he is paid a certain fee, while, if he abstains, he may be fined. These diseases were selected for notification as being the most dangerous to the public health. At the present time, however, measles and whooping-cough, which are not notifiable except in a very few towns, are far more dangerous to the public health than scarlet fever, their death-rates being much higher and after-effects more serious.

In addition to isolation of the individual attacked, we disinfect his belongings and surroundings. These two defensive measures we must consider in detail.

(*a*) **Isolation.**—You will have gathered from what I said at the commencement of the lecture that we are beginning to attach much more importance to the direct conveyance of infection and less to the possibility of its passage through the air, except in the case of small-pox and chicken-pox. As a result, greater attention is being paid to the nursing of fever patients, and we are striving to introduce into it the same ideas of scrupulous cleanliness that are the essential factor in the success of modern surgery. It is believed by some physicians that a careful observance of aseptic principles on the part of both nurses and doctors will allow certain infectious cases that were formerly put into rooms by themselves to be efficiently isolated in a general ward. With due care on the part of the attendants it is maintained that the risk of conveying infection to, or carrying it from, such cases is reduced to a minimum. This belief has been acted upon in one or two fever hospitals where, in special wards set apart for the purpose, scarlet fever, diphtheria, whooping-cough, and measles, have all been treated in the same ward, together with doubtful and negative cases. The results obtained have been astonishingly good, and but a very few years ago would have been regarded as impossible. At any rate, they prove that in the past undue stress has been laid upon the risk of aerial infection. At the same time, we must guard ourselves against the other extreme which holds that infection is never conveyed by the air, for we know that in coughing a certain number of germs must be sprayed into the surrounding atmosphere. That such spraying does not more frequently infect others is due to the fact that the germs so expelled are scattered by the currents of air in the ward and their power of infection is thus diluted. Free ventilation is therefore obviously of prime importance in the wards of a fever hospital. The endeavour to isolate each patient in a ward from his fellow inmates is spoken of as "bed isolation." What is known as "barrier" nursing is the same thing on a smaller scale, since not more than two or three patients in a ward are isolated from the rest. In a twelve-bedded scarlet fever ward there might be two doubtful cases of that disease who also had whooping-cough. Under the system of "barrier" nursing these two patients would be regarded as a source of danger to the others on account of their whooping-cough, whilst as there is a possibility that they are not suffering from scarlet fever it is necessary by careful nursing to protect them from the infection of that disease. In some hospitals a tape is placed between uprights at the foot of each bed which is being isolated. This constitutes the barrier and is intended as a warning to every one who approaches the patient in that bed.

A further system of partial isolation, which is of comparatively recent introduction, is the use of cubicles. Under this system patients who would formerly have been completely isolated from one another are separated by partitions 7 ft. high, and hence share a common atmosphere. The nurse who is working in a cubicle ward, or in a general ward where bed isolation or barrier nursing is being carried out, must keep before her the same ideal as the modern surgical nurse. She must endeavour to be medically aseptic. With this end in view she puts on a special overall, which hangs beside or at the foot of the bed of each patient who is isolated a general ward or inside a cubicle. If she is going to do anything for the patient beyond arranging his bedclothes, she thoroughly cleanses her hands before touching him, and again when she has finished what she had to do. After syringing the throat or ear, or wiping discharge from the nose, she should most carefully scrub her hands, taking care to keep th ails cut short. If you once comprehend that there is more danger to a patient from the direct conveyance of infection to him by his doctors and nurses than there is from the air, you will recognise the necessity for strict observance of all rules which aim at the promotion of medical asepsis. The same principle is carried out in regard to feeding utensils, instruments, books, and newspapers.

(*b*) **Disinfection.**—As applied to the subject of to-day's lecture this means the destruction of all infection that has been given off by the patient during his illness. In a private house the room or rooms in which a case of scarlet fever has lived for some weeks are not used again until the ceilings have been whitewashed and the walls re-papered after a preliminary disinfection by sulphur or formalin. Those who have lost their belief in the conveyance of infection by the air hold that this treatment is really unnecessary, since any germs that may reach the ceiling or walls will be destroyed by fresh air and sunlight. This is possibly quite true, but it will be some time before the general public adopts such a view, and until it does so disinfection of rooms will go on as before.

The patient's bedding and personal linen are sent to a public steam disinfector should one be available; if not, the sheets are boiled at home and then sent to the laundry, while the blankets and mattresses are freely exposed for some days to the influence of sunlight in the open air. The rays of sunlight kill germs, owing to the chemical action which certain of the rays are able to induce in the germs. For this reason you do, as a matter of fact, find more germs in ill-lighted, badly ventilated living-rooms than in those which receive plenty of light and air. Everything that can be spared is burnt, and all feeding utensils are boiled.

X

ENTERIC FEVER

Enteric, or typhoid fever, is a disease which merits your most careful attention and study, for it is one in which good nursing is of the very highest importance.

Causation.—It is now recognised that the cause of enteric is a small germ which is found in the urine and fæces of patients suffering from this disease. It is usually introduced into the body by means of food or drink. Three-quarters of the cases occur in individuals under the age of twenty-five years, and autumn is the season when it is most prevalent.

Incubation period varies considerably. Its average length is between ten days and a fortnight.

Structure of Intestine.—I must next say a few words about the structure of the intestine, and the part of it which is affected in enteric.

Looking at this section, or slice, through the wall of the intestine (Fig. 11), you will see that there are four coats or layers, viz.:

(1) Most external of all, an excessively thin one formed by the **peritoneum.** This is very smooth, so that the coils of bowel can move easily upon one

another; at the same time, it is transparent, so that through it you see

(2) **The muscular coat,** which is the great support of the intestinal wall, and, in the healthy state, prevents undue stretching or dilatation of the bowel

Fig. 11.

Diagram of intestinal wall, showing the four layers or coats.

by its contents. At the same time, by contracting, it forces those contents onwards.

(3) Next comes a coat which serves merely to bind together the muscular coat, and

(4) **The mucous membrane,** which is most internal of all, and in contact with the contents of the intestine.

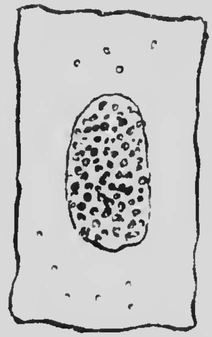
Looking again at the diagram, you see two little round bodies lying in the space between the mucous membrane and the muscular coat. These are two little lymphatic glands, similar in structure to those in the neck and other parts of the body. There are large numbers of them scattered throughout the whole of the small and large intestine. They lie singly, by themselves, and hence are called "solitary" glands.

In the lower half of the small intestine these glands are also in places collected into groups or companies, so that they form slightly raised, flat patches on the internal surface of the gut.

These are called "Peyer's Patches," Peyer being the name of the anatomist who first described them. They occur only in the small intestine, and are most numerous towards its lower extremity where it passes into the large.

In the diagram (Fig. 12) you see a piece of the small intestine laid open showing one of these patches and also some "solitary" glands.

Fig. 12.



Piece of intestine showing a Peyer's Patch and some "solitary" glands.

The Intestine in Enteric. It is the Peyer's patches and solitary glands, especially the former, that are inflamed in enteric fever.

Moreover, in the majority of cases, it is only the glands in the last two or three feet of the small intestine that are affected. Above and below this part they are, as a rule, quite normal in appearance, though sometimes the ulceration may be very widespread, involving even the solitary glands in the intestine.

Enteric fever is a disease that, roughly speaking, lasts on an average for about four weeks, during which time the course of the inflammatory process in the affected glands is supposed to be as follows :

In the *first week* of the illness they begin to swell.

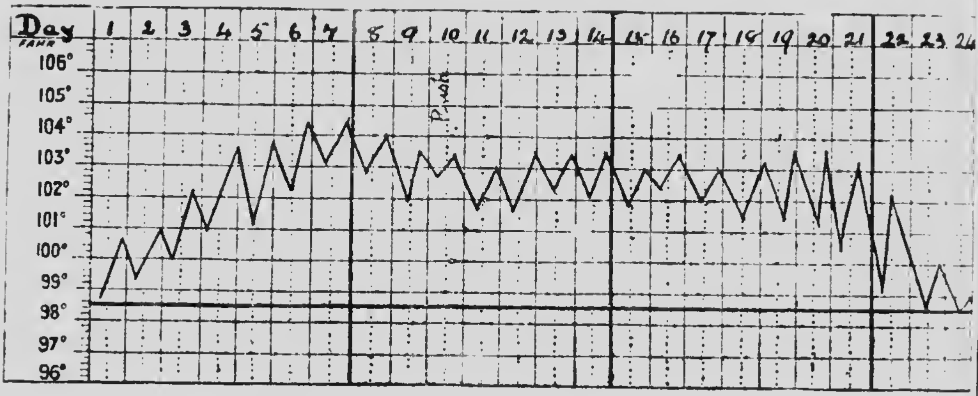
In the *second week*, if the inflammation is slight, the swelling subsides, or if severe it goes on and sloughing commences.

In the *third week* the sloughs separate, leaving ulcers of variable depth in the wall of the intestine.

In the *fourth week* the ulcers, thus formed, begin to heal.

(When speaking to you on inflammation I explained the formation of a slough, and the manner in which it is separated from the adjacent living tissues.)

You do not always get all these stages ; in children, for instance, there is, as a rule, only the inflammatory swelling of the glands, and but seldom the sloughing and consequent ulceration.



Symptoms.—I have drawn here the chart of a typical case of enteric fever.

The temperature, as you see, gradually rises during the first week, till at the end of that time it has reached its greatest height. It then remains up for about two weeks, falling a degree or two each morning and rising again in the evening. Towards the end of the third week, it gradually comes down again to normal. We rarely see such a typical chart as this, since these patients seldom come into hospital before the end of the first week, so that we miss the characteristically gradual ascent which takes place during that period.

During the first week the patient usually goes on trying to do his work, though feeling ill and depressed, and frequently complaining of a severe headache. At the end of that time, or perhaps sooner, he has to give in and take to his bed.

As the second week advances, his face begins to assume a weary, languid expression, his tongue becomes dry and red in the centre, with a band of white fur on each side.

About this time a rash of small rose-coloured spots appears on the abdomen, and sometimes also on the chest and back.

A large number of these patients suffer from diarrhœa, which closely resembles pea-soup in appearance, while many others are obstinately constipated. Retention of urine may be present, and should be reported by the nurse.

A slight degree of bronchitis is a very constant symptom, while deafness and bleeding from the nose are not at all uncommon.

If the case is a mild one, the temperature often begins to fall early in the third week, in a few days becoming normal again.

Should the attack, however, be severe, the temperature remains high, and the various symptoms increase in intensity. More or less continuous delirium may supervene, with extreme muscular exhaustion. The face wears a dull heavy expression; the teeth and lips are covered with sordes, and the tongue with dry, brown crusts; the fingers are tremulous and constantly picking at the bedclothes; the pulse is rapid and feeble; and the urine and fæces are both passed into the bed.

While in this condition the patient may die, either from the severity of the fever, or from one of its complications; or, on the other hand, he may gradually improve, and slowly struggle back to life again.

Even when his temperature is normal he is not safe, since he is liable to the risk of a relapse, which is, however, as a rule, much less serious than the original attack. Such is, in brief, the outline of a case of enteric fever.

I wish now to go more fully into the description and explanation of certain symptoms which may appear in the course of this disease, and which carry with them such danger to life that they are dignified by the name of complications.

Complications—

(1) **Hæmorrhage from the bowel,** when present, occurs most frequently in the *third week* of the illness, that being the time when the sloughs, if formed, separate from the inflamed Peyer's patches. During this process the arteries which supply the "patches" with blood are divided, and, unless previously plugged with clot, will bleed. Sometimes the symptoms of severe hæmorrhage are present (pallid face, with rapid fall of temperature and rise in rapidity of pulse) before any blood has appeared externally. The reason for this is that it has to pass all the way round the large intestine before it can escape from the body; so that if the bowels are acting sluggishly, and the vessel in the small intestine is bleeding quickly, the patien

may lose a dangerous amount of blood before there is any evidence of it in the stools. Hæmorrhage from the bowel occurs in about eight per cent. of all cases of enteric.

(2) **Perforation of intestine** is less frequent in its occurrence than hæmorrhage.

It is *the great danger* of this disease, against which we are always on our guard.

It is caused by the giving way of the floor of an ulcer, after the separation of a slough from a Peyer's patch or a solitary gland. It, therefore, occurs in either the *third or fourth week*, when these ulcers come into existence.

Here is a piece of the intestinal wall with a typhoid ulcer in it (Fig. 13). You see how the ulcer extends almost through the muscular coat to the peritoneum, and you can imagine that it would not take very much force to tear through the thin floor of that ulcer, and allow the contents of the bowel to escape into the peritoneal cavity, with the result of almost certain death to the patient. Of course these ulcers vary in depth. As a rule, they do not penetrate so far into the wall of the intestine as the one I am showing you; but we never know how deep they may be, and that is why such extreme care is necessary in the treatment and nursing of these cases.

FIG. 13.

Diagram of enteric ulcer left after sloughing of a solitary gland. Cf. Fig. 11.

The onset of this dreaded complication is generally marked by acute pain in the abdomen, collapse, and sometimes rigors. Following on this the patient will become more and more distended, as a result of the peritonitis that has been set up. As long as the ulcers remain unhealed, there is danger of perforation. In children this is very rare, since in them the inflammation of the Peyer's patches seldom goes on to sloughing. *Any pain in the abdomen should be at once reported by the nurse.*

(3) **Peritonitis.**—This generally results from perforation of the bowel. Its symptoms are a gradually increasing distension of the abdomen, with marked tenderness and pain, and persistent vomiting. No sooner is a teaspoonful of fluid swallowed than it is brought up again. The patient lies in bed with the knees drawn up to relax the abdominal muscles and keep all pressure off the tender abdomen. The pulse is small and quick, the face anxious, the eyes sunken, and the end comes, as a rule, within two or three days.

(4) **Abdominal Distension.**—At the commencement of the lecture I described to you the four coats or layers which make up the wall of the intestine. In speaking of the muscular coat I said that it was the great support of the bowel wall, and prevented it from being unduly stretched and distended by the contents of the gut.

In very severe cases this muscular coat becomes weakened and therefore unable to work properly. Then the intestinal wall, having lost its support, is easily distended by the gases which have collected within it.

This symptom most frequently occurs *about the end of the third week*, when the patient is at his worst. It is one that always causes anxiety and needs treatment ;

since the distended bowel, pressing the diaphragm upwards, embarrasses the working of the heart and lungs. Should the small intestine be the part affected, there is the additional risk that, as the wall of the bowel stretches, the thin floor of an ulcer may be torn through and fatal peritonitis follow. Abdominal distension sometimes occurs in the second week, and is then of very unfavourable significance, as it indicates that the enteric inflammation is of extreme severity.

(5) **Bronchitis.**—This I have already mentioned as being an almost constant symptom. It is usually of a very mild character, but sometimes it becomes so severe as to constitute a serious element in the case.

There are many other complications occurring in this disease, but the above are all to which I need call your attention.

Prognosis—

Favourable signs distinctly turn on the temperature.

(1) A temperature which, though high at the end of the first week, does not subsequently rise above 103°.

(2) The more marked the drop in the temperature each morning, the more favourable is the case.

(3) Childhood is a favourable feature, since at that age, as a rule, this disease is of a mild type, and frequently of short duration.

Unfavourable Signs.—(1) A temperature which remains at or above 104° during the second week of the illness.

(2) Active noisy delirium.

(3) Tendency to stupor and retention of urine occurring *early* in the disease. These symptoms are not

uncommon in the later stages of enteric, when the patient is prostrate after a prolonged period of fever; but if they show themselves early in the illness, as, for instance, at the end of the second week, they are especially unfavourable signs; for they show that the patient is suffering from an extremely severe form of the disease.

(4) Early abdominal distension is unfavourable for the same reason.

(5) Excessive diarrhœa, or hæmorrhage.

(6) A quick pulse—by which I mean a pulse that in adults keeps constantly at or above 120.

(7) The occurrence of enteric in drunkards, or those who are already suffering from kidney disease or phthisis.

(8) Severe bronchitis.

It is, however, never wise to say that a patient is sure to do well, because of the ever-present dangers of perforation and hæmorrhage. On the other hand, in no disease is it more true that "while there is life there is hope."

Treatment.—If you are nursing a case of enteric in private, the sick room must be well ventilated, but, at the same time, free from draughts, because of the bronchitis which your patient will almost certainly have. In severe cases, where the vitality of the patient is very low, the temperature of the room should be kept at about 60°. In milder cases 55° is high enough.

The bed, which must not face the window, should be narrow, so that the invalid can easily be lifted from either side without any awkward bending forward on the part of the nurse. It is sometimes recommended that there should be two beds in the room, one for use during the day, and the other for night, this being an arrangement which is more comfortable and restful to the patient than keeping him always in the same bed. The greatest care must, of course, be used in moving him from one to the other.

He should be sponged night and morning with tepid water to which has been added a little eau de Cologne or spirit of lavender, as this increases the refreshing effect of the bathing: at the same time, it helps to neutralise the unpleasant odour which is always associated with cases of enteric fever. Special attention will, of course, be paid to the back, with a view to preventing anything in the nature of a bed-sore, such an occurrence in a patient suffering from typhoid being a distinct reflection upon the nurse. A helpless patient should not be allowed to lie altogether on his back, but should be turned first on to one side and then on to the other, being kept in position by means of pillows. This will not only lessen the risk of a bed-sore, but will also diminish the tendency of the blood to accumulate in the lower parts of the lungs. The tongue, teeth, and roof of the mouth will need frequent and careful cleansing in consequence of the dry crusts which tend to accumulate upon them. Should the patient perspire freely in the later stages of the illness, he must be tepid sponged and put into a dry gown.

Just as in acute pneumonia we are constantly on our guard against doing anything which might throw extra work upon the heart, so, in this disease we have always to remember the risks of perforation and hæmorrhage from the thinned and ulcerated bowel. *Rest must* *therefore be absolute*, and the patient handled with the utmost gentleness and care.

No nurse should be allowed to take charge of a case of enteric fever unless she has first seen a piece of intestine from one who has died of that disease. She would then realise what a fragile barrier possibly exists between her patient and death, and how easily it may give way.

Diet.—A prolonged attack of enteric fever is always accompanied by great wasting. A patient under its influence may be reduced almost to skin and bone. We must, therefore, give him all the nourishment that he can take. While doing so, we must, however, never forget that *the organs of digestion are, as a result of the fever, weaker than those of a healthy individual*, and that they cannot do the work they did before the commencement of the illness.

This is especially true of the stomach, so that when you see a patient so prostrate from a severe attack of this disease as to be unable even to raise his hand from the bed, you must remember that his stomach may be in a similarly helpless condition.

It is, then, our duty to render the work of digestion as light as possible. If, in our anxiety to feed up our patient and maintain his strength, we give the stomach and intestines more work than they can comfortably do, we not only fail to benefit, but we do actual harm. For these organs will be irritated and upset, with the result of a further weakening of the invalid.

We must, of course, discriminate between different patients. Some take their food without any trouble all through the illness, while others are a constant source of anxiety from the readiness with which they get indigestion.

In addition to this weakness of the organs of digestion, we must always bear in mind the inflamed, and possibly ulcerated, condition of the lower part of the small intestine. We should aim at giving a diet which shall be thoroughly digested before it reaches that part, so that there may then be as little work as possible to do.

Now, it is quite certain that fluids are more easy of digestion than solids, and that in consequence they will be more quickly absorbed into the circulation. Apart from this consideration a patient with a dry mouth and a high temperature will naturally prefer them to solids.

Our staple article of diet in these cases is, therefore, a fluid food, viz. milk. We must not, however, forget that, although milk is a fluid outside the body, it in part becomes converted into a solid as soon as it reaches the stomach. For the digestive juice, which it there meets, clots or coagulates it, so that it forms solid lumps, called "curds," which some people find very indigestible.

We must, therefore, in a case of enteric fever watch our patient carefully, to see if he is properly digesting his milk. If he is not doing so, he will complain of pain at the pit of the stomach after food, or vomit curds or pass them in his motions. Hence the importance of constant and careful examination of the stools. The addition of one or two grains of citrate of soda to each ounce of milk, or dilution with plain water, lime-water or barley-water will render it easier of digestion.

Some patients vomit milk, in which case it must be peptonised; or a diet of cream, meat juice, plasmon, and whey may be tried. In some of these cases home-made koumiss is found to be very useful.

Others object very much to the taste of milk, especially after it has been peptonised. This difficulty is usually overcome by flavouring it with tea, coffee, or cocoa. Constant and careful cleansing of the mouth with some freshening wash, such as lemon-juice in glycerine and water, will often lead to the better taking of food.

As regards **quantity,** a fair average allowance for an adult is five ounces of milk mixed with three of barley- or lime-water every two hours. In this way the patient would get three pints of milk in the twenty-four hours. It is always better to dilute the milk, and barley- or lime-water is especially useful for this purpose, since they render it more easy of digestion. If the patient experiences difficulty in taking so much liquid, a smaller quantity of milk might be given diluted with whey, half a teaspoonful of the saccharated solution of lime being added to each feed instead of the three ounces of lime-water. Jellies and light broths may also be given, and beef-tea, if the patient is not troubled with diarrhœa. Beef-tea breaks the monotony of a milk diet. It should be taken hot and be well salted. It is especially useful in the early morning, when the patient's vitality is at its lowest.

Provided it does not interfere with the taking of his milk, the patient may be allowed as much cold water as he likes, indeed he should be urged to take at least three or four pints in the twenty-four hours in addition to the three pints of milk. It is refreshing, and, by flushing the system, cleanses the tissues. When the attack is at an end, a gradual return is made to ordinary diet, full directions as to which will be given you by the physician. Before leaving the question of food, I must remind you of the *extreme importance of insisting upon these patients taking a sufficient quantity of nourishment* in the twenty-four hours.

With regard to **stimulants.**

Alcohol is seldom needed in the first two weeks of the illness, unless the patient is taking his food badly, when weak brandy and water, or a light wine, such as hock, is given before food to freshen the palate and aid digestion. Many of the milder cases can do without alcohol altogether. The indications for its use are, broadly speaking:

(1) Increasing weakness or rapidity of pulse, both of which point to a failing heart.

(2) Low, muttering delirium, with a dry, brown, tremulous tongue, which is evidence of an exhausted nervous system. This is a condition which is not infrequently met with in the later stages of enteric.

It is especially in enteric fever that we have to be on our guard against poisoning our patients with alcohol; for, if given for too long, or in excessive quantity, it is apt to keep up, and even increase, the condition of low muttering delirium for which it is administered.

Our difficulty in giving this drug in enteric is that we do not know how long the patient may continue to need it, the duration of the fever varying so much in different cases. We cannot say, as in acute pneumonia, "If I can keep the patient going for a week the temperature will come down, and he will be out of danger." For in this disease the temperature may begin to fall any time between the commencement of the third and the end of the fourth week, and even after that there may be a relapse. So we are obliged to husband our stimulants, and not be lavish with them too early in the illness, otherwise the attack, if a prolonged one, may find us with our resources exhausted when the final pinch comes.

Next, as regards the treatment of special symptoms.

Diarrhœa.—If the bowels are not opened more than three times in the twenty-four hours, interference is unnecessary; but if the evacuations are so numerous as to become exhausting, a starch and opium enema is usually administered. I have found an icebag, or aluminium water coil, applied to the abdomen most useful in moderating severe diarrhœa. Pads of absorbent wool and carefully teased out tow placed on a small square of mackintosh are used in cases that have incontinence of urine or fæces. They are burnt immediately after removal from the patient. A disinfectant is usually placed in the bedpan before use, and, to diminish the risk of infection, any linen that has been soiled should be at once removed from the patient's bed. For the same reason, a nurse should always keep her finger-nails very short, and, by the constant use of a nail-brush, scrupulously clean; otherwise, infectious material may lodge beneath them, and subsequently by the mouth make its way into the system. She should always bear in mind the fact that in some cases the urine is intensely infectious.

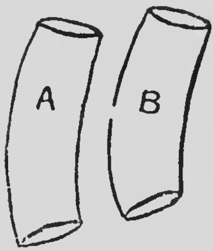
If the patient is constipated, an enema is usually administered about every third day. It must be given very slowly, as too energetic peristalsis might set up hæmorrhage.

Hæmorrhage from the Bowel. We know that the ulceration is, as a rule, most severe in the lowest part of the small intestine. When, therefore, this complication arises, we naturally conclude that the blood has come from that part of the gut. So we place an icebag suspended from a cradle on the abdomen just above the right groin, for beneath this spot is the termination of the small intestine, and therefore, probably, the bleeding-point. We also give some tincture of opium by the mouth, for this drug checks the movements of the bowel, and, by keeping it at rest, allows a clot to form in the vessel from which the blood is coming. At the same time, it is as well to peptonise the milk or replace it by whey, and, if possible, to stop all stimulant. To assist in the formation of this clot, the patient must be kept absolutely at rest, and for a time not moved even to change the draw-sheet. He should not be allowed to use the bedpan, but should pass his motions into pads of wool and carbolised tow.

Perforation of the Intestine.—It is now becoming more and more the rule, if the patient's condition will allow of it, to open the abdomen and close the perforation by sutures. Should this not be considered advisable, a full dose of opium is given, in the hope that, by stopping the movements of the intestine, the perforation may be glued to an adjoining coil of bowel by inflammatory material, and so leakage of the contents of the gut prevented.

A and B are two portions of small intestine. In that wall of B which is nearest to A you see a small hole or perforation. As fæcal material leaks out of that opening, it sets up the most intense inflammation in every part of the peritoneal membrane with which it comes in contact. This inflammation will at first be limited to that portion of the peritoneum which is in the immediate neighbourhood of the perforation. The products of inflammation, viz. fluid and blood-cells, will escape from the inflamed blood-vessels, and, if A and B do not move, will fill up the space between them with lymph, and so prevent any further leakage of faeces. This, unfortunately, rarely happens, as before the opium has had time to act, the movements of the intestines have spread the faecal material over a large surface of the peritoneum, and so set up a fatal peritonitis.

FIG. 14.



Abdominal Distension, or tympanites, as it is generally called.—An enema of oil and turpentine is, as a rule, most efficacious in bringing about the removal of gas from the bowel. The large intestine being the part usually affected, a fine trochar and cannula is sometimes passed into it through the abdominal wall, and an exit thus made for the gas. For this condition some medical men apply hot fomentations to the abdomen, while others prefer ice. While it is present, milk is usually discontinued and whey or albumen water used instead.

Bronchitis.—For this symptom, as a rule, no special treatment is required. When it is very marked, so that the patient has difficulty in breathing, a light mustard and linseed poultice applied to the front and sides of the chest often brings great relief. In such cases the patient should not be allowed to remain constantly on his back, but should be gently turned on each side alternately, to diminish the tendency to stagnation of blood in the lower parts of the lungs. It will also lessen the risk of bed-sores.

Temperature. With regard to the question of interfering with the temperature, there are some physicians who hold strongly that it is unwise to attempt to lower the temperature unless it should become dangerously high, *i.e.* above 105°. There are others who maintain that every effort should be made to keep it within reasonable bounds, *i.e.* it should not be allowed to go above 102·5° or 103°.

The results achieved by the systematic use of cold bathing in this disease, are due to the more rapid removal of toxins from the system rather than to the lowering of the temperature.

I will now briefly mention the principal ways in which fever may be diminished.

(1) **Moderation in Bedclothes.** Among the laity it is only natural to find deeply rooted the belief that the hotter a patient is the more likely he is to take cold and therefore the more bedclothes does he require. I fear that something of that belief still lingers among nurses, combined, it may be, with a not unnatural love of uniformity in the appearance of their wards, which causes them to resent the removal of a counterpane and a blanket or two from the bed of the restless fever patient. In hot weather, a sheet, or, at the most, a sheet and one blanket, are ample covering, and they should not be tucked tightly into the bed, but

left lying loosely on it, to give the air a chance of circulating beneath them. If by this means you do not do much to lower his temperature, you will, at any rate, do something towards making your patient comfortable.

(2) **Cold sponging** of the chest and abdomen for fifteen minutes reduces the temperature by $1\frac{1}{2}°$ to $2\frac{1}{2}°$, but has only a temporary effect.

(3) **Cold packing** is far more efficacious, but, as ordinarily done, involves considerable disturbance of the patient.

(4) **The Bath.**—This is generally used when the temperature reaches 102·5° or 103°; that is to say, if it is forming a systematic part of the treatment. The patient is either put into a cold bath at a temperature of about 65°, and kept there for fifteen or twenty minutes, or he is put into one at a temperature of about 95°, which is gradually cooled down to about 70° by the addition of ice and cold water.

The former is the quicker and more easily worked of the two, but the latter is more pleasant, and also safer for patients whose hearts might suffer from the shock of being plunged into cold water. We do not use the bath for patients suffering from collapse, severe bronchitis, or hæmorrhage from the bowel. I shall not attempt to describe in detail these various methods of reducing a high temperature by means of cold water, for my purpose in these lectures is not so much to teach you nursing as to explain the processes of disease, the meaning of symptoms, and the why and the wherefore of treatment.

(5) Lastly, we have the various antipyretic drugs, such as quinine, antipyrin, and antifebrin, of which the last named is decidedly the most efficacious. There is, however, a strong prejudice among medical men against their use in these cases, since they are believed to hinder the removal of the poison of the disease from the system, whereas cold baths and sponging produce the opposite effect. This is a point of great importance, for the more quickly the toxin is removed the more speedily will recovery take place.

In conclusion, I ought to say a few words about the treatment of enteric fever by drugs. This consists in the administration by the mouth of different antiseptics, such as salol, carbolic acid, perchloride of mercury, and oil of cinnamon.

Apart from this, and the administering of a few drops of some dilute mineral acid for the relief of thirst, we reserve our drugs for the treatment of symptoms which have become dangerously prominent.

XI

SCARLET FEVER

SCARLET fever, or scarlatina, as it is sometimes called, is by far the most common of the infectious diseases met with in fever hospitals.

It carries with it the risk of several important complications, a knowledge of the explanation of which cannot but increase your interest in this disease.

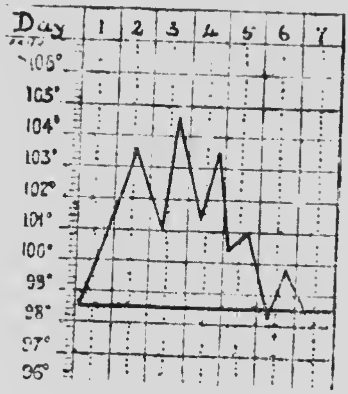
Incubation period varies from one to seven days. An individual who has been exposed to the contagion of this disease, if he is going to have it, as a rule develops symptoms within two or three days. Should he be free at the end of a week, he will almost certainly remain so.

Several varieties of scarlet fever are described; I shall follow Dr. Caiger's classification and mention only three, viz. (1) Simple; (2) Septic; (3) Toxic. All cases will fall into one of these three groups.

(1) **Simple Sc. F.**—This is the most common, and at the same time, the mildest form.

The illness, as a rule, begins with vomiting, sore throat, and a considerable degree of fever. The tongue is thickly coated with creamy white fur, the pulse is markedly quickened, and the glands of the neck are swollen and painful. Towards the end of the second day the rash appears. This consists of tiny red points set upon a vividly red background. When it is well marked, the patient is often compared to a boiled lobster. In a typical case the *temperature* rises higher and higher for the first three days, reaching its greatest height about the third or fourth day, when the patient is at his worst. It then begins to come down a degree or two each day, till by the end of the week it is normal again, when, if no complications arise, convalescence commences.

Here is the chart of such a case.

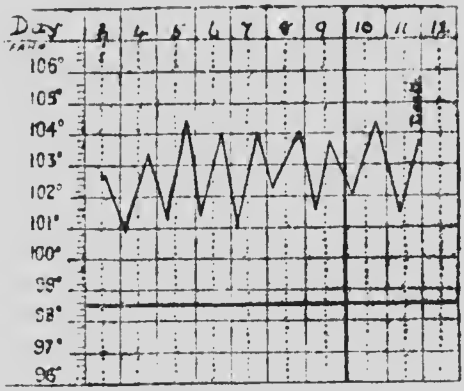


Simple scarlet fever.

In the inflammation of the throat the tonsils and soft palate are both involved, the latter being, like the skin, of a bright red colour. The *tongue* begins to clean about the third day; by the end of the fourth all the fur has peeled off, leaving a red surface covered by tiny elevations which are the swollen papillæ of the organ. This is called the "strawberry" tongue, since its appearance resembles that of a ripe strawberry.

About the fourth or fifth day peeling commences on the neck and upper part of the chest by the formation of tiny holes in the superficial layer of the skin, which gradually increase in size and spread all over the body. Hence it is spoken of as "pinhole" peeling. It is very characteristic of scarlet fever.

(2) **Septic Sc. F.**—In this form of the disease the inflammation of the throat is of a much more severe type than in the preceding. The tonsils and soft palate are ulcerated, and in some cases sloughing, and there is a profuse discharge from the nose. With this there is a correspondingly severe affection of the neighbouring lymphatic glands, the neck becoming hard and brawny.



Septic scarlet fever.

The child is very restless, refuses its food, and sleeps badly. The temperature, as you see from this chart, remains high for several days till the patient gets better, or death ensues. The latter event is frequently due to inflammation of the lungs.

This form of scarlet fever is called "septic" because the system is poisoned by the absorption of foul material from the sloughing throat.

Besides this severe form of septic scarlet fever, you will meet with milder cases in which the temperature keeps up for several days, with slight ulceration of the tonsils and soft palate, and discharge from the nose.

(3) **Toxic Sc. F.**—This is extremely rare, and will need only a very few words from me. Patients suffering from it die, as a rule, within the first two or three days. They either develop an exceedingly high temperature, together with a very dusky red rash marked delirium, vomiting and restlessness, or else they come in with hardly any rash, temperature, or sore throat, and die straight away. They are overwhelmed and killed by the poison of the disease before the usual symptoms have time to develop. It is, therefore, very properly called the "toxic," or poisonous form of scarlet fever.

Complications.—We can now pass on to the consideration of the most important of the many complications that may arise in the course of an attack of scarlet fever.

(1) **Joint Affections.**—Towards the end of the first week patients frequently complain of stiffness in the wrists, or slight pain in other joints, especially the shoulders and knees. Later on, in the more severe forms of scarlet fever, septic inflammation of one or more joints may occur, ending in suppuration. The latter is a highly dangerous complication which frequently results in death. Any tenderness or swelling of the joints in such cases should be at once reported by the nurse.

(2) **Discharge from the ear,** "otorrhœa," as it is generally called.—This may occur at any time during the illness, and is most common when the throat has been severely affected.

To explain it, let me ask you to look at this diagram of the ear and its different chambers (Fig. 15).

Starting from the outside, we have first of all the passage called the "external ear" or the external auditory canal. This is about 1¼ inches long in adults and ends at the "drum" of the ear, a very delicate membrane which stretches across the passage from side to side. On the farther side of the "drum" is

FIG. 15.

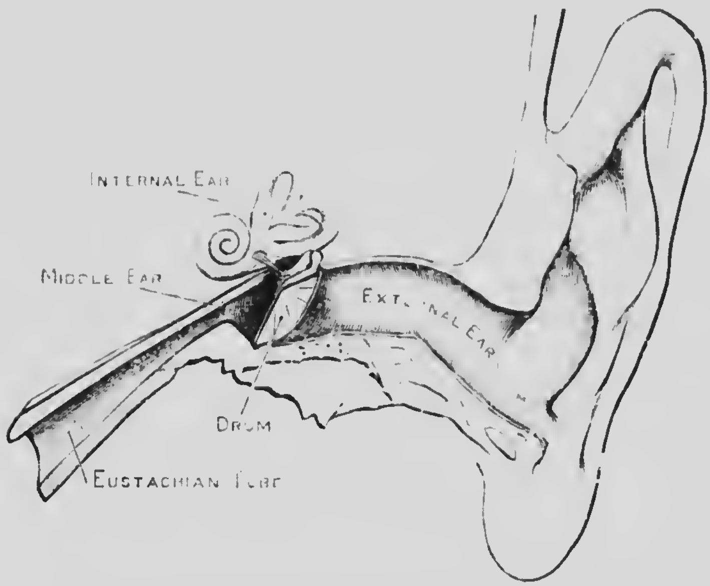


Diagram of the ear and its chambers. To explain the production of otorrhœa.

a chamber which is called the "middle ear," containing three small bones and some very tiny muscles. Beyond the "middle ear" is a third chamber, called the "internal ear." This lies deep in the interior of the skull, and contains the very complicated apparatus which we need for the proper hearing of various sounds.

Looking at the diagram, you will see a long tube passing downwards from the floor of the "middle ear." This is called the Eustachian tube, Eustachius being the name of the anatomist who first described it. It runs from the "middle ear" to the upper part of the pharynx, where it opens just behind the tonsil, so that a fine probe can be passed from the back of the throat into the middle ear.

When the throat is inflamed in scarlet fever, the inflammation in some cases spreads up this tube into the "middle ear." The "middle ear" thereupon becomes inflamed, and an abscess forms in it. This finally bursts through the "drum," and you then have pus running out of the "external ear." The ear discharge, therefore, is a direct consequence of the sore throat.

In the same way, the discharge from the nose, which you see in bad cases, is caused by the inflammation spreading from the throat into the back of the nasal cavities.

(3) **Inflammation of the Kidneys.**—This, though not the most common, is yet the most important complication of scarlet fever. The usual time for its appearance is about the third week.

It is caused by the irritating effect of the poison of scarlet fever upon the kidneys, which effect is much assisted by the presence of damp, cold weather. Cold alone, according to Dr. Caiger, has no such bad effect, but when it is both cold and wet, cases of inflammation of the kidneys are more likely to arise in the wards. This complication varies greatly in severity in different patients. A very few have typical attacks of acute nephritis, high temperature, vomiting, scanty, smoky urine, œdema of the face, and so on; others are not at all ill, the only evidence that their kidneys are inflamed being the presence of a small quantity of albumen in the urine.

(4) **Diphtheria.**—Some patients catch diphtheria and scarlet fever at the same time, so that one sees them brought into the hospital suffering from both diseases. Such cases do not come under this heading, which refers only to those instances of diphtheria occurring in patients after admission. It may appear at any time during the illness, but is most common in the convalescent stage, when the children play together and use the same toys. Overcrowding certainly helps it to spread. As a rule it is very mild in character.

(5) **Hyperpyrexia.**—Scarlet fever is one of the few diseases in which there is the risk of a dangerously high temperature. Anything over 106° is spoken of as hyperpyrexia. It is of very rare occurrence, but must always be watched for, as unless quickly and efficiently treated by means of cold water, the patient becomes comatose and dies.

There are other complications, but they are of much less importance than these I have referred to. Nor is there anything about them likely to puzzle you, and, therefore, requiring explanation from me.

Prognosis.—The chances of recovery in "simple" scarlet fever are all in favour of the patient. There is of course the possibility of some complication, such as diphtheria or nephritis, occurring during convalescence and proving fatal, but apart from this there is no cause for anxiety.

Cases of "toxic" scarlet fever practically always die. It is, therefore, in "septic" scarlet fever, with its foul, sloughing throat, profuse nasal discharge, and brawny neck, that the question of prognosis is most likely to arise.

These are very fatal cases, though if the child sleeps and takes its food well, and escapes the danger of broncho-pneumonia, it will probably recover.

When, however, it is constantly restless, refuses to take nourishment, has profuse nasal discharge, with a hard, brawny condition of the neck, and a high temperature, the chances are that it will die.

Diarrhœa is serious, from its weakening effect upon the patient.

Treatment.—In the management of scarlet fever we always endeavour to diminish, as far as possible, the risk of that very serious complication, inflammation of the kidneys. This, as we have seen, is caused by the irritating effect of the poison of scarlatina upon the kidneys, when those organs are removing it from the system, this effect being frequently materially assisted by the depressing influence of cold and damp. We, therefore, keep our patient in a warm room (temperature about 60°), which must be well ventilated, but at the same time, free from draughts. For the further prevention of chill, the nightgown should be of flannel, a precaution which is especially necessary in hospital wards, where free ventilation is so absolutely essential. The bowels should be opened regularly once a day, as in this way the kidneys are relieved of a certain amount of work, and so run less risk of becoming inflamed. With the same end in view, some physicians keep their patients on a milk diet for the first three weeks of the illness. Hospital patients are, as a rule, kept in bed until the end of the second or third week. They are given low diet while the temperature is raised and throat inflamed. In ordinary mild cases they will return to solid food at the end of the first week, when they should have a hot bath every second or third day. This hastens the process of desquamation, and, at the same time, by making the skin act, leaves less work for the kidneys to do. For the feeding of septic cases the nasal tube has often to be used, as, owing to the pain caused by swallowing, such patients take their food with great difficulty.

How to Syringe the Throat.—The throat requires syringing every two, four, or six hours, according to the severity of the inflammation. One that is foul and sloughing will need more frequent attention than one that is slightly inflamed. As regards the method of syringing, there are right, and there are also very wrong ways. I have seen nurses who must have performed this small operation scores of times quite ignorant of the proper method. Let me describe to you the one which I learned from Dr. Caiger, of Stockwell Fever Hospital. Two four-ounce india-rubber ball syringes with short nozzles are to be used. The advantage of this is that there is no waiting for the syringe to fill, as directly one is emptied it is put back into the porringer containing the lotion, where it fills itself while the other is being used. Short nozzles are preferable to long, as with them there is less risk of damaging the back of the throat should the child struggle during the operation. They should always be removed from the syringe and boiled before being used again.

A sheet is, in the first place, wrapped closely round the child, if it is likely to struggle, so that it cannot move its arms. It is then set up in bed; the nurse places herself beside it, putting her left arm round its neck, thus preventing its head moving by keeping it firmly pressed against her left side, while at the same time she bends it forward over the basin in front of her. She then takes one of the full syringes from the porringer of lotion, passes the nozzle into the child's mouth between its *back* teeth and forcibly compresses the ball of the syringe. The child, until it has got used to the process, will splutter and cry, and it must be allowed to regain its breath before the syringe is again squeezed. By passing the nozzle between or behind the back teeth there is less risk of the tongue intercepting the lotion on its way to the inflamed throat; by bending the child's head over the basin you diminish very considerably the chance of fluid getting into the air passages.

When the throat is finished, you will proceed to douche or syringe out the nose. Be gentle; as too often done, I am sure that excessive force is used. If the nose is blocked, do not try to force the lotion into it or you will cause pain and may do harm. No patient need sit up to be syringed who is sensible enough to submit to the operation without struggling. It can be done perfectly well lying down, if the head be brought to the edge of the pillow, so that the mouth hangs down over a basin. There are often masses of stringy mucus on the roof of the mouth and at the back of the throat, which are not dislodged by syringing. These the nurse should wipe away by means of a piece of damp wool wrapped round her forefinger. When cleaning the mouth, the nurse should notice if any teeth are loose or the gums ulcerated.

I have gone at some little detail into this question of syringing, as it is a most important point in the treatment of bad cases of scarlet fever. It is very necessary that these foul throats should be frequently and thoroughly cleansed, and yet, that the child's strength should not be exhausted by the operation. The patient must, therefore, be properly wrapped up and supported by the nurse, so that it can do but very little struggling.

We use linseed poultices, or hot fomentations, to the swollen and tender neck for the reasons which I gave to you when speaking on the subject of inflammation.

The average mild cases of scarlet fever make but a very slight call upon the nursing abilities of those who look after them. Septic cases, however, with their foul throats, profuse nasal discharge, constant restlessness, and objection to food, needing, as they do, continuous attention, call forth the best qualities of a good nurse. Such attentions many of them strenuously resist; yet they are absolutely necessary, and must be persisted in. A good nurse will accomplish them with the minimum of struggling; while an inferior nurse, not so careful or judicious on this point, will often seriously weaken a patient.

In connection with these septic cases there is a small matter which I should like to mention. These patients always have a very profuse discharge from the nose, which the most constant attention on the part of the nurse will not prevent from sometimes trickling down the cheek on to the pillow. For wiping such a nose a handkerchief ought never to be used; for this discharge is extremely poisonous, so that whatever is taken to mop it up ought always to be burnt. Pieces of soft rag may be used, but best of all is to take a small piece of damp absorbent wool in each hand, gently squeeze the nose, and then put the wool into a porringer to be subsequently committed to the flames. A nurse ought never to rub a child's face with the same cloth with which she has just wiped its nose, else there is a risk of some of the discharge getting into the eyes and there setting up inflammation. The hands should be most carefully washed after attending to the nose or throat of a septic scarlet fever patient, since the discharges from such a case are most infectious.

Earache, due to the formation of an abscess in the middle ear, is sometimes very severe. It may be relieved by the application of a hot fomentation to the affected ear, or by dropping into it a solution of cocaine or atropine, glycerine of carbolic acid or simple hot water. The most certain method of relief is for the surgeon to puncture the drum with a fine knife. This lets out the pus, and at once removes the pain.

With regard to the **treatment of discharge from the ears** I have also something to say.

It is important that nurses should recognise that ear discharge is by no means the comparatively harmless affection which the general public hold it to be in their ignorance of the risks run by the patient who has this complication. You all know the importance of keeping an abscess "sweet," that is to say, in such a condition that the discharge from it has no offensive smell. If it is foul, we know that unhealthy processes are going on in that abscess cavity, and that they must be stopped before there is any chance of it healing. Now, the best way to keep an abscess "sweet," is to cover it constantly and carefully with the antiseptic dressing, so as to prevent anything getting into it from the outside air. None of you would think of leaving an abscess in the neck or any other part of the body uncovered, without a dressing. You would at once feel that you were doing wrong, and exposing your patient to a needless risk. Yet, how often does one go round the scarlet fever wards and see patients with otorrhœa who have no absorbent wool in their ears. I don't say that the nurse has not put some there; that she has probably done, but she has not taken sufficient trouble in seeing that the child does not pull it out, as so often happens, so that it is left without a dressing for its abscess. If a child persists in removing the wool from its ears, pass a strip of flannel under its chin, then over both ears, and fasten on the top of the head with a safety-pin. Another plan is to bandage paper splints, made out of about six thicknesses of newspaper, round the elbow. This will prevent the child bending its arm sufficiently to put its hands to its face and ears.

Consider for a moment the condition of one who has discharge from the ear. We have seen that it is caused by the formation of an abscess in the middle chamber of the ear, which bursts through the drum and so discharges externally. This chamber, in which the abscess is situated, lies at some distance from the surface in one of the bones of the skull. On this bone, which is in parts extremely thin, the brain rests, so that it is very close indeed to the abscess cavity. In some cases this thin covering of bone is eaten away by the abscess, which thereupon comes in contact with the brain, causing it to become inflamed, so that the patient is in imminent danger of losing his life. This eating away of the bone is much more likely to take place if the discharge from the ear persists for a long time. We should, therefore, use every endeavour to keep it sweet, and get the abscess to heal as soon as possible. Do not look upon such a case merely as one of discharge from the ear, but remember that the patient has an abscess in a most dangerous situation, and that, if it is carelessly allowed to go on for month after month and no trouble taken over it, he might almost as well be walking about with a charge of dynamite in his ear, for at any moment it may set up inflammation of the brain. The longer it has continued, the greater is the danger. Such discharging ears should, therefore, be kept scrupulously clean by syringing, and the external opening carefully closed with absorbent wool after each washing out. Non-absorbent wool should never be used for this purpose, since it does not soak up the discharge, but merely dams it up within the ear. Moreover, by sticking to the walls of the canal, it tends to produce sore places when removed, since the sodden skin is often pulled off with it.

Method of Syringing the Ears.—Seating yourself opposite the affected ear, you take hold of it with the left hand, and gently draw it backwards and upwards if the patient is a child, backwards and downwards if an adult. By doing this, you straighten the passage of the external ear, it having a slight curve, and so make it easier for the lotion to enter it. You then place the nozzle of the syringe or douche, protected by drainage-tubing, just within the upper part of the opening of the ear, taking care to *depress the handle slightly, so that the point is directed towards, and touches the roof of, the canal.* You then gently empty the syringe. The temperature of the lotion should be about 100°.

It is important that you should hold the syringe in the way I have indicated—viz. directed very slightly upwards—and for the following reasons:

(1) *It is easier to cleanse the ear.*—If you syringe straight into the ear, you wash any pus and wax that it may contain inwards on to the drum. As the lotion flows back again from the drum it will bring with it the fluid part of the pus, but will probably leave on the drum any flakes of wax or dried pus that there may have been previously on the side of the canal.

Many and many a time have I asked a nurse to syringe out an ear, so that I might examine the drum, and afterwards, when I came to look at it, found that I could see nothing, because of the flakes of wax and dried pus with which it was covered.

If, on the other hand, you point your syringe very slightly upwards, you empty it on to the roof of the canal, along which the lotion runs until it reaches the drum, when it turns downwards, and comes out again washing everything in front of it. You will more easily understand this point if you look again at the diagram of the ear and its chambers, which I drew a short while ago. By no other method of syringing could you remove a foreign body which had become fixed in the ear.

(2) *It is more pleasant for the patient.*—If you syringe straight into the ear, your lotion falls directly on the drum. This is frequently both painful and startling to the patient.

By syringing so that the lotion runs along the roof of the ear the drum receives no shock, and the operation becomes less unpleasant.

If the child is at all inclined to struggle, a second nurse should always be present, otherwise it is impossible to cleanse the ear properly. Sometimes, when syringing an ear, you find that the lotion gets into the patient's nose and throat, it having escaped from the middle ear by means of the Eustachian tube. This is by no means a bad thing, since it proves that the abscess cavity is being thoroughly washed out. Bend the child's head forwards, so that the lotion may escape from its nose and mouth into a basin. After you have finished syringing an ear, carefully dry the canal and meatus with absorbent wool and lightly pack the external opening with the same.

There is nothing calling for explanation in the treatment of the other complications. Inflammation of the kidneys and diphtheria are treated in exactly the same way as they are when occurring independently of scarlet fever.

Duration of Isolation.—Private patients are, as a rule, detained until desquamation has finished, but from fever hospitals it is customary to send patients home before the completion of desquamation, since it is now thoroughly established that peeling in its later stages is not a source of infection. All discharges from either nose or ears should have ceased before dismissal, as these are a very fertile source of infection, though if they still persist at the end of three months the patient is usually allowed to go home. After the first peeling is over, some patients continue to desquamate about the soles of the feet, and between the toes. This is not infectious, though those who have it in a very marked degree are sometimes thereby detained in hospital, as the outside public, not knowing the difference between first and second peelings, might view such with suspicion, and declare that the patient had been discharged too soon.

XII

DIPHTHERIA

DIPHTHERIA is a Greek word meaning "skin," and the name is given to this disease because it is almost always associated with the appearance of what looks like a white or grey skin on the back of the patient's throat. It is one of the deadliest and most dreaded of all infectious diseases. It occurs most often in children under ten years of age. It is contagious, though not to the same extent that scarlet fever is. The poison of diphtheria is present in the discharges from the nose and mouth, or in any other part that may be the seat of the diphtheritic membrane.

Cause.—Diphtheria is a disease the special germ or microbe of which has been discovered. These germs enter the patient's mouth, and settling on the back of his throat, commence to grow there, at the same time, as I explained in my lecture on "Germs," producing the toxin which is to poison the system, and give rise to the symptoms of the disease. The irritation and inflammation set up by these germs lead to the appearance of the diphtherial membrane in the throat.

The **incubation period** is, as a rule, from one to three days, though it may be as long as a week; that is to say, the first symptoms usually appear from one to three days after the patient has been exposed to infection.

Symptoms.—The illness commences more gradually than in scarlet fever. The child seems out of sorts, perhaps vomits, has a slight rise of temperature, and complains of pain in swallowing. Sometimes this latter symptom is entirely wanting, even when there is most extensive membrane on the tonsils and palate. On examining the throat we see that the tonsils are red and swollen, and the tongue furred, while the glands at the angles of the lower jaw are slightly enlarged and tender.

Next day greyish-white patches appear on one or both tonsils, and gradually increase in size till they run together. If the case is a mild one, the membrane spreads no further; otherwise, it extends on to the soft palate, and, perhaps, also to the posterior wall of the pharynx. After about a week, during which time it has been getting darker in colour from decomposition, the membrane separates, leaving a raw surface which quickly heals.

In severe cases there is much swelling of the tonsils and soft palate, while the back and part of the roof of the mouth are coated with thick membrane, which resembles "wash-leather" in appearance. This also extends round the back of the soft palate into the nose, giving rise to a profuse irritating discharge from the nostrils together with marked fœtor of the breath. With this there is considerable enlargement of the glands on both sides of the neck, drowsiness, and a distinct aversion to food. Such cases correspond to the "septic" variety of scarlet fever. When occurring in young children this form of the disease is extremely fatal. There are, of course, intermediate conditions of severity between this and the very mild cases.

The **temperature** in diphtheria is irregular in character. It produces no typical chart such as you see in some of the other infectious fevers. Sometimes it rises to 103° or 104°; more often 101° or 102° marks its limit in the upward direction, while in some cases it is never above 100°.

The length of time during which the membrane remains in the throat varies considerably. The recent treatment by injections of antitoxin has undoubtedly shortened its duration. As a rule, all membrane has disappeared within three or four days from the commencement of the injections, though in some cases it reappears to a slight extent.

Laryngeal Diphtheria.—I have already told you that, in severe cases, the diphtheritic membrane spreads upwards into the back of the nose. Less often, and not necessarily in severe cases, it takes the opposite direction, and spreads downwards into the larynx. Though the case may have been a mild one before this complication occurred, it now becomes most serious and anxious. For the upper opening of the larynx, through which we breathe, is by no means large, and when the sides of it become swollen from inflammation there is considerable difficulty in getting air through it, and, as a result, unless help is at hand, there is danger of suffocation. This complication occurs most commonly in young children. In some cases the disease commences in the larynx and remains limited to that part.

Its **symptoms** are stridulous breathing, a loud, brassy, or, as it is called, a "croupy" cough, hoarseness and feebleness of voice, and, when obstruction to the entrance of air is well marked, extreme restlessness and c[illegible]is, together with sucking in of certain parts [illegible] chest-walls on inspiration.

[illegible] great danger in these cases is not so much suffo-[illegible]or that can always be averted by the operation of tracheotomy, but pneumonia from the inflammation spreading downwards into the lungs. This is the cause of death in almost all cases of tracheotomy.

Hæmorrhagic Diphtheria.—A real "hæmorrhagic" case of diphtheria, in which there is constant bleeding from the nose and mouth, is about as fatal and trying a form of illness as there is. Fortunately, such cases are very exceptional. It is more common to have occasional bleeding from the nose and mouth, more often the former, there being an oozing of the blood from the ulcerated surface which is left after the separation of the membrane.

The skin, also, is one of the most frequent seats of hæmorrhage, which shows itself there as a rash looking very like rather large fleabites. Under the skin are frequently seen extravasations of blood, in appearance resembling bruises. The friends, if they saw them, might think that the children had been roughly used. Of course, these bruises have no such significance, though they might also be produced by even a slight degree of violence, so that these cases must be very gently handled. Hæmorrhage in diphtheria is due to changes in the blood produced by the poison of the disease in consequence of which that fluid escapes from the vessels much more easily than it would in health. It is a very fatal symptom.

Complications. (1) *Albuminuria.*—Albumen is present in the urine of almost all severe cases. Unlike scarlet fever, it usually appears in the first week of the illness; while another difference is that it is of less serious significance, since it quickly disappears when the period of convalescence is established. It is very rarely accompanied by any of the other signs of inflammation of kidneys, viz. vomiting, fever, œdema, and blood in the urine. It seems as if the albuminuria were caused by a temporary disturbance in the working of the organs, due to the action of the diphtherial poison, and not the result of an actual inflammation, as is the case in scarlet fever.

(2) *Suppression of Urine*, also called "Anuria."—This rare complication, which is brought about in the same way as albuminuria is a much more serious symptom, and usually foretokens a speedy termination to the case.

(3) *Paralysis.* Paralyses of various kinds are the most frequent and important complication of diphtheria, and one for which you must always be on the watch. The date of their appearance varies considerably. As a rule, it is some time during the third week of the illness, though it may be much later. Both mild and severe cases are liable to this complication, though it is naturally much more frequent in the latter.

(*a*) **Paralysis of the Soft Palate.**—This is by far the commonest of the diphtheritic paralyses, and in a large proportion of those who suffer from this disease the only one to appear. As a result, patients "speak through their noses," so that it is sometimes very difficult to understand them, and when fluids are swallowed a portion often returns by the nose. This is because the soft palate, owing to the paralysis of the muscles which move it, is not drawn upwards and backwards against the posterior wall of the pharynx, as it should be during the act of swallowing, to shut off the back of the nasal cavities from the mouth, and so prevent food getting into them.

(*b*) **Paralysis of Limbs.**—The legs alone may be affected, or all four limbs.

It may be partial, so that the patient is able to get about, but staggers when he walks; or it may be complete, so that all power of moving the extremities is lost. With it there is sometimes a numbness or partial loss of feeling.

(*c*) **Paralysis of the Heart.**—This is the great disappointment of diphtheria. You nurse a patient through a bad attack, and have him nicely convalescent, when one day, without any obvious cause, he begins to vomit, and in a very short time he is dead. It rarely occurs in the mild cases, showing itself, for the most part, in those who have suffered from the severe form of the disease, with much membrane, profuse nasal discharge, and marked gland swelling. As a rule, it comes on about the end of the second week of the illness, though it may appear as late as the sixth or seventh. It would be more correct to speak of it as "heart failure," since it is not a true paralysis, but is principally due to the effect of the toxin producing a fatty degeneration in the heart muscle, though the nerve-supply of that organ is also involved.

The first symptom of this most fatal complication is vomiting, which quickly becomes incessant. Combined with it, and sometimes preceding it, is either a marked slowing, or excessive quickening, of the pulse. In some cases there is also severe abdominal pain. The child quickly becomes cold and collapsed, and very often is dead within forty-eight hours, though sometimes these cases linger on for a week or even longer. On the other hand, death may be absolutely sudden.

You may also have paralysis of the diaphragm, the great muscle which helps us to fill our lungs with air; or of some of the eye muscles, so that the patient squints or complains of dimness of vision; or he may be unable to swallow properly, from weakness of the muscles by which that act is performed.

All these various forms of paralysis result from the action of the diphtheritic poison upon the nervous system. The nerves of the part which is affected are damaged, and therefore unable to work. Hence, the muscles with which they are connected are deprived of their nerve-supply, and, consequently, paralysed.

Death may be due to

(1) **Toxæmia.**—This occurs in the very severe cases, when the patient only lasts a few days, and dies during the height of his illness. His system is so saturated with the poison of diphtheria that he quickly succumbs.

(2) **Pneumonia.**—From the disease extending down the windpipe into the lungs, and there setting up inflammation. On its way down it may cause sufficient

inflammatory swelling of the larynx to necessitate the operation of tracheotomy.

(3) **Paralysis of the Heart.**—Occurring during the period of convalescence.

(4) **Exhaustion.**—This is the termination of some cases which have much paralysis. They lie in bed unable to move, breathe, or swallow properly, gradually getting weaker and weaker, until finally they die.

Prognosis.—We should always be cautious when attempting to say how a case of diphtheria will end.

In the mildest attacks there is a possibility of heart paralysis occurring during convalescence, so that it is never safe to say at the commencement of the illness that the patient will certainly get well.

Deaths are very much more numerous among children than adults ; in fact, the younger the patient, the greater the risk.

The danger is always greater in cases with extensive membrane, especially when it has spread into the nose : in children, as I have already told you, a large proportion of those cases die that have much membrane, with profuse discharge from the nose and marked gland swelling. The gravity of the illness is very much increased when, from the peculiar cough and difficulty in breathing, it is evident that the diphtheritic inflammation has invaded the larynx. This is because it is but a short step thence to the lungs, and when once those organs are affected, there is but small chance of the patient recovering. The cases that have hæmorrhage, and those that show marked signs of paralysis of the heart, are practically hopeless.

Seeing how many pitfalls surround even the mild cases of diphtheria on their way towards recovery, it behoves one to be very cautious in giving an opinion as to the probable issue of the illness.

Treatment.—We have seen that diphtheria is caused by a particular form of germ, which settles on the back of the throat and grows there, at the same time producing a poison which spreads all over the system, and gives rise to the symptoms of the disease.

Our treatment must, therefore, be both local and general; the former, to prevent, as far as possible, the further growth of the germs in the throat; the latter, to combat the effects of the poisonous substances which they are producing.

General.—The patient must be confined to his bed, and owing to the risk of sudden failure of the heart, be constantly kept in the recumbent position, and on no account allowed to sit up, or do anything for himself until the physician's permission has been obtained. In bad cases the most *absolute rest* must be maintained, often for several weeks. Cases of hæmorrhagic diphtheria need very careful handling, because of the ease with which bruises are produced. If the attack is a mild one, no particular treatment is needed, beyond rest in bed and a nourishing diet. In the more severe forms of the disease the greatest care must be taken in maintaining the patient's strength. The food, which will of course be liquid so long as the throat is inflamed, must be as nourishing as possible, and administered at regular and frequent intervals. There will often be much trouble in getting young children to take their food. In some forms of paralysis swallowing becomes impossible and the nasal tube has to be used. If a patient coughs when drinking, always report the fact, and watch carefully for any other signs of paralysis.

The Use of Antitoxin.—At this point I must say a few words in explanation of the treatment by injections of antitoxic horse serum, since that is used for the purpose of neutralising the poison produced by the germs of the diphtheria.

When lecturing to you on "Germs," I explained how the microbes of the different infectious diseases, when growing in the human body, produce certain substances, called "toxins," which poison the system and cause all the symptoms of the disease. At the same time, the tissues of the body produce another set of substances, called the "antitoxins," which neutralise the toxins of the germs and so tend to bring the illness to an end. The more quickly, therefore, the antitoxins are produced the better the chance for each patient of recovering, for so much the more quickly will the making of toxins by the germs come to an end. If, then, we inject into the body of one suffering from diphtheria a fluid which is rich in the antitoxin of that disease, we are helping to hinder the further growth of the germs, and to counteract the noxious effects of their poison. Such a fluid is antitoxic horse serum. To produce this serum a horse is taken, and during a period of some weeks gradually increasing doses of the toxin of diphtheria are injected into its body, so that at the end of that time its system contains a large quantity of the antitoxin. It does not contract diphtheria, for horses are very insusceptible to this disease. Some of its blood is drawn off, and by allowing it to clot, the fluid part, or serum as it is called, is separated. This serum, which is rich in the antitoxin of diphtheria, is then injected under the skin of patients suffering from that disease. Thence it is absorbed into the circulation, where it helps the antitoxin which has been made by the patient's tissues to overcome the influence of the toxin, and so bring the illness to an end.

Some people, who are opposed to the use of this drug, seem to think that, if it has the power to cure, no one ought to die of diphtheria. Now, I have seen a good many cases of opium poisoning, and I do not think I am exaggerating when I say that the majority of them died. Why? We have an antidote for opium; how was it that it did not save their lives? Obviously, because they came under treatment too late. So it is with the disease we are considering. Too often the poison of diphtheria has done its work, and inflicted a fatal wound upon the constitution of the child, before the antitoxin has a chance.

Local Treatment.—With this we have to attack the headquarters of the disease—that is to say, the colony of germs on the back of the throat—and yet it is not wise to attempt a forcible eviction of those germs. No good is done by stripping away the membrane, and swabbing out the inflamed throat with a strong antiseptic. It is both painful and, in the case of a child, exhausting to the patient, difficult to do thoroughly, and probably productive of more harm than good. For keeping the throat clean and sweet, there is nothing better than frequent syringing with chlorine lotion, by means of the method which I described when speaking of scarlet fever, taking care to keep the patient in the recumbent position. For the nose boracic lotion is preferable, as the chlorine is too irritating. For wiping away discharge from this organ damp absorbent wool or pieces of old rag should always be used, and not a handkerchief. You must never forget that the discharges from the nose and mouth are most infectious, and that great care is necessary in dealing with them.

When the croupy cough and difficult respiration tell us that the air-passages have been invaded, the child is put into a steam tent. If the half-tent is used, each of the child's hands should be wrapped in lint, tied on by a strip of bandage round the wrist, to protect it from scalding by the steam. If the dyspnœa increases, and the child becomes restless, with sucking in of its lower ribs during inspiration, the operation of tracheotomy is performed. This relieves the difficulty of breathing by means of an opening which is made in the front of the windpipe just below the inflamed larynx. Into this opening is inserted a curved silver tube, which passes through the centre of a metal shield. A second tube fits closely into the first, and projects about an eighth of an inch beyond it, where it lies in the trachea. Through it the patient is able to breathe with comfort, and also to cough out any mucus or membrane which may be loose in the trachea. This inner tube can be taken out, and cleaned, as often as is necessary.

The Nursing of a Case of Tracheotomy.—The first case of tracheotomy is always anxious work for a nurse, especially if it occurs when she is on night duty. She has constantly before her a fear of the patient choking. It is an awful thing to see a child struggling for breath, and not be able to help it, or not to know how much you should do in attempting to help it. A nurse with experience of these cases will not lose her head at such a crisis, knowing, as she does exactly, how much she can and ought to do. But with the beginner it is otherwise. She imagines that it is only her ignorance which prevents her helpi _ the child, and so the worse it gets the more flurried she becomes.

If, after tracheotomy, a child's breathing becomes *suddenly* very embarrassed, one of three things has happened.

(1) The inner tube is blocked with membrane or mucus. This is easily remedied.

(2) The outer tube, of course carrying the inner with it, has slipped out of the trachea, although it may still be in the wound. This is *the usual cause of sudden dyspnœa after tracheotomy.* It is sometimes due to the tube having been tied in too closely, or to the child suddenly pulling on it; or it may result from the trachæal opening being low and the tube short. Paper splints should be put round the elbows for the first twenty-four hours after operation. It is evident from the sudden onset of the dyspnœa, the regaining of the voice, the bulging forward of the tubes, and the fact that no air is passing through them, that they have escaped from the windpipe.

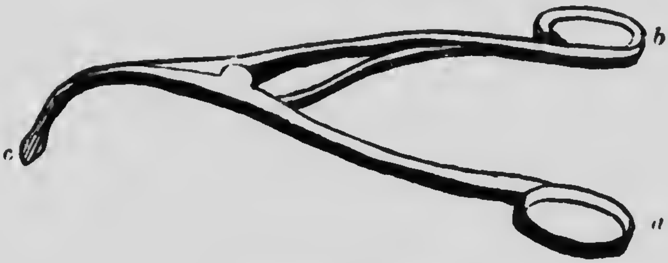
This is an accident with which you must deal promptly should there seem to be an immediate risk of the child becoming suffocated. At the same time, assure yourself that there is that risk before you interfere, and if the patient is getting a fair amount of air into his lungs report the matter at once to the medical attendant and leave him to deal with it. If you do not think it safe to wait for the doctor's arrival, lay the child across the bed, with its head hanging over the side, in a good light, seat yourself on its right hand, cut the tape on each side, and remove the tubes. The patient will now possibly breathe quietly. If it does not, you must carefully introduce the dilators, and hold them in position till help arrives. It is no good trying to push the tubes back again into the trachea. That is impossible, and the attempt could only do harm. Neither is there any use in leaving the tubes in the wound, after they have slipped out of the windpipe; for, by pressing upon the opening in the latter, they help to make the breathing more difficult. Therefore, cut the tape, and remove them altogether. Nobody could possibly blame you for doing so. I have known more than one child die from this accident, owing to the nurse not understanding what had happened. Under no other circumstances ought you, *without the doctor's orders*, to cut the tape, and remove the outer tube.

Not infrequently the dyspnœa which results from this displacement of the outer tube is not sufficiently urgent to require the interference of the nurse, who would in such case merely send for the medical attendant.

(3) If the outer tube is in its proper position, and the inner tube is not blocked, and yet the patient is breathing very badly, the cause of the dyspnœa is probably that a piece of membrane, too large to be coughed through the tracheotomy tube, has become wholly or partially detached and is blocking the trachea, thus preventing air entering the lungs. This form of dyspnœa, as a rule, comes on more gradually and is

less urgent than that first described. It may sometimes be relieved by the judicious use of a feather which assists in the separation and removal of the obstructing piece of membrane. Should this fail, the only treatment that can do any good is to cut the tape, take out the tubes, and introduce the dilators. In this way, you stretch the opening in the trachea, so that it

Fig. 16.



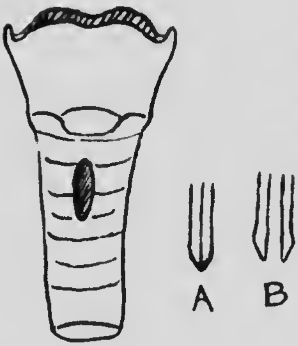
Tracheotomy dilators.

is more easy for the child to cough out the membrane. This you must never do, unless previously ordered to by the doctor if such an emergency should arise. Some physicians would never allow a nurse to do this. For myself, if I have a cool and experienced nurse who I feel sure would not lose her head, but would be able to use the dilators properly, I always direct as a last resource, if the child seems likely to die before my arrival, that she shall remove both tubes. I do not think, however, that it would be wise to lay this down as a general rule. For suppose that a nurse, without previous orders from the doctor, did, in such a case as this, remove both tubes, and then found herself unable to introduce the dilators. The doctor arrives, finds the child dead, the tracheotomy tubes removed, and no dilators in the trachea. He might think that the child would have had a better chance had the tubes not been removed. Any way, I am sure the nurse would.

What I have just been saying does not in any way refer to the question of removing the outer tube if it has slipped out of the trachea. That you would do, whether you thought you could introduce the dilators afterwards or not, always supposing that the child is in imminent danger of suffocation. If it is still getting a certain amount of air into the lungs you would not interfere but send for assistance.

How to introduce the Tracheotomy Dilators.—I feel that I ought now to say a few words in explanation of what I consider to be the easiest and most certain method of passing the dilators into the trachea.

FIG. 17.



This is simple enough if the child lies quite still, with its neck in a good light, so that you can see the opening in the trachea at the bottom of the wound. It is by no means so easy, when the patient is restless, or the wound a deep one, and you have no one to hold a light for you.

As many of you know, this instrument is generally held in the same way as a pair of scissors. The thumb of the right hand is placed in the ring *a*, and the second finger in *b* (Fig. 16). When the point *c* is felt to be in the trachea, *a* and *b* are pressed towards each other, the result being that the two blades are slightly separated at *c*, thus stretching or dilating the opening in the windpipe.

Fig. 17 is a diagram of the larynx and upper part of the trachea, showing the opening which is made in the latter by the operation of tracheotomy. Beside it are two diagrams of the end of the dilators, that is to say, the part which is passed into the trachea.

A shows the blades closed. B shows them slightly separated. You can see at once that, while A would pass readily through the opening, B never could, since, owing to the separation of the blades, one would always be outside the trachea, when the other was engaged in the opening. From which you will understand, that, when using the dilators, you must not press the handles together, even in a slight degree, until you are certain that the end of the instrument is in the trachea.

Now, when a nurse is suddenly called upon to introduce the dilators, perhaps for the first time in her life, she is apt to forget this very important rule. Maybe she is nervous and excited, or the patient is frightened and struggling, so that in her anxiety she grips the handles of the instrument too tightly, thereby pressing them together, so that the blades are separated slightly, as in diagram B, thus rendering it impossible for them both to pass through the opening in the windpipe. To avoid this mistake, *hold the instrument by the right-hand handle only*, while you are introducing the point. Directly you feel that slip through the opening in the trachea, place your thumb on the other handle and gently press the two together. When I say "press the two together," I, of course, do not mean that you are to press upon the two handles until they meet. Very slight pressure is all that is needed, since the opening in the trachea is so small, that it will only allow the blades of the dilators to be separated for a very short distance. Holding the dilators in the manner I have described makes it much easier to probe the bottom of the wound for the tracheal opening, besides preventing a too early separation of the blades. What I have just been saying applies of course only to that form of tracheotomy dilator represented in Fig. 16.

Never use the dilators unnecessarily, and after introducing them endeavour to make sure that they are in the trachea. You cannot be too gentle in your handling of this instrument. Any roughness may do the patient a serious injury, by tearing the tissues of the neck away from the front of the windpipe. There is then a risk of suppuration spreading downwards from the wound along the trachea into the chest. I have seen one child die in this way. This accident happens from the nurse fancying the point of the instrument is in the trachea, when all the time it is outside, so that she is merely dilating the wound. The child, being unrelieved, is very restless; the nurse, to keep the dilators in position, presses more and more firmly upon the handles, and so the mischief is done.

As a rule, it is only within the first twenty-four hours after operation that there is likely to be any difficulty in passing the dilators. By the end of that time the tissues of the neck on each side of the incision have retracted from the front of the windpipe, so that the opening in the latter is usually fairly obvious.

To recapitulate.—If the breathing of a patient upon whom tracheotomy has been performed, becomes suddenly much embarrassed, so that it seems to be in danger of suffocation, you first remove the inner tube, in case the trouble should be due to blocking of it with membrane.

Finding it clear, you examine the outer tube to see if it is still in the trachea. If it is obviously displaced, and no air is passing through it, while the resulting dyspnœa is extremely acute, you send at once for the doctor and then proceed to remove both tubes.

If the outer tube is in position, and the inner is not blocked by membrane, the cause of the dyspnœa is evidently due to a piece of membrane in the trachea, which is too large to pass through the tracheotomy tube. If the child seems to be moribund before the doctor's arrival, and *if he has given you permission to do so*, cut the tape, take out both tubes, and introduce the dilators. Before taking charge of a case of tracheotomy, always obtain clear instructions as to your course of action in the event of sudden and severe difficulty of breathing coming on, which is not relieved by the removal and cleaning of the inner tube.

With regard to the general treatment of cases of tracheotomy, the great secret of success lies in disturbing the patient as little as possible. A nurse who is constantly fussing round a child, pushing feathers down its trachea to make it cough, does far more harm than good. Some doctors do not use steam after tracheotomy, and then, if the cough becomes hard and dry, we spray the trachea through the tube, so as to moisten the dry mucus and membrane. This helps to loosen them from the wall of the windpipe, and so makes it more easy for the child to cough them up. With the same end in view, a sponge wrung out of hot water is placed over the end of the tube, so that the child may constantly inhale warm moist air.

The inner tube should be taken out and cleansed if it seems to be getting stopped up with mucus, or the child's breathing becomes in any way embarrassed. When removing it, be careful to hold the outer tube in position with the other hand, or you may pull it forward, so that it slips out of the trachea. When replacing the inner tube you will sometimes find that it does not slip easily in the outer, but sticks about halfway down. You should now place the first finger of each hand under opposite ends of the metal shield, while with your thumbs you steadily force the inner tube home. By thus supporting the shield with your fingers, you prevent the outer tube being driven against the wall of the trachea, an accident which might otherwise happen as the inner tube suddenly slips into place. The outer tube itself will, as a rule, be changed by the doctor at least once in every twenty-four hours.

When the tracheotomy tube is finally removed, which is often about the third or fourth day after operation, the child sometimes has difficulty in swallowing its milk, so that a portion of it gets into the larynx and escapes by the opening in the trachea. Such a state of affairs is very undesirable, since there is a risk of the food getting into the lungs, and there starting pneumonia. This difficulty is generally surmounted by thickening the milk with arrowroot or cornflour, or giving it in the form of junket, which makes it easier for the child to swallow, and by feeding with a teaspoon. Should this be unsuccessful, the nasal tube must be used for a time.

For the heart paralysis and attendant vomiting it is indeed difficult to know what to do. It is very rarely that one sees an undoubted case recover, yet we are bound to do all that we can, by means of stimulants, nutrient enemata, and strychnine, to keep the rapidly failing heart going for as long as possible, on the off chance that a change for the better may occur.

The slighter forms of paralysis, such as those of the soft palate and eye muscles, as a rule, get well without requiring any special form of treatment. When the loss of power is very extensive, involving the limbs and muscles of respiration, recovery is tedious. Here again, strychnine, and also the electric battery, are useful as stimulants to the affected nerves.

Hæmorrhage from the nose can, as a rule, be checked by the external application of ice or an iced compress to that organ, or by gently syringing it out with iced water. It has, however, a great tendency to recur, and in some cases nothing short of plugging the interior of the nose will stop it.

Intubation now frequently takes the place of tracheotomy. It has the advantage of being a bloodless operation and can be performed in a few seconds. Paper splints should be put on the child's arms afterwards, and it should be kept lying on one side so that the saliva and mucus may not run out of the mouth on to the cheek to which the thread is fastened; otherwise they will soften and loosen the strapping. The tube is removed by means of the thread, or it may simply be squeezed out of the trachea. For feeding the child a nasal tube is usually required.

XIII

MEASLES—WHOOPING-COUGH—BRONCHO-PNEUMONIA

To-day we are going to consider two infectious diseases which are responsible for a large number of deaths each year among young children. The greater number of these deaths are due to broncho-pneumonia, a complication which is closely associated with both these diseases. Measles, whooping-cough, and broncho-pneumonia may, therefore, be very well taken together in the same lecture.

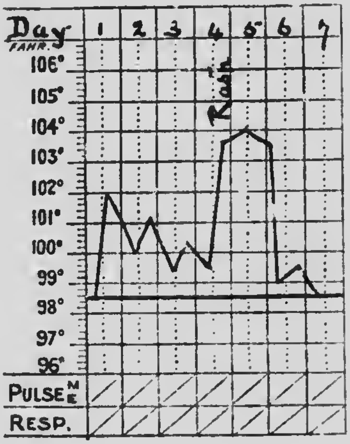
MEASLES

Incubation period is variable, but averages about fourteen days, that is to say, the first symptoms appear, as a rule, about fourteen days after exposure to infection.

Symptoms.—The illness begins with, what is, apparently, a bad cold in the head. There is running from the eyes and nose, the child being obviously out of sorts, with a moderate amount of fever, and frequently a short, hard cough. About the third or fourth day the temperature rises still higher, and the rash, which is more purple than that of scarlet fever, begins to come out. It first appears as small red spots on the face, especially on the forehead, about the roots of the hair, and behind the ears. Thence it quickly spreads downwards, on to the trunk. Within thirty-six hours it is fully developed, the face, limbs, and body being covered with a dull, red, blotchy eruption.

This, together with the injection of the eyes, and the running from the nose, gives to the patient a very characteristic appearance.

The rash soon begins to fade, the dark red blotches gradually passing into reddish-brown stains, which, as they lose their colour, produce a light brown mottling of the skin. This lasts for some days, and is succeeded by slight branny desquamation. With the disappearance of the eruption the temperature quickly falls to normal.



The chart presented by a case of measles is frequently one that is very typical of the disease.

During the first three days of the illness there is only a moderate degree of fever, varying between 100° and 102°. On the fourth day, with the appearance of the rash, the temperature shoots up to 103°, 104°, or even higher. After remaining up for about two days, there is a sudden fall to normal. If the temperature fails to come down by the end of the week, the patient is almost certainly suffering from some lung complication.

Several varieties of measles have been described with which I need not trouble you, since they merely depend upon the degree of severity of the attack, and consequent prominence or absence of certain symptoms.

Complications.

(1) **Inflammation of the Respiratory Passages.**—This is by far the most dangerous, and, therefore, the most important complication of measles.

Starting from above downwards, you may have—

(*a*) **Inflammation of the Larynx.**—There may be simply an inflammatory swelling of the interior of the larynx, or it may be lined with membrane, as sometimes happens in diphtheria. The symptoms of this complication I have already described to you when lecturing on this latter disease (cf. p. 144). In some cases this inflammation of the larynx, occurring in the course of an attack of measles, is the result of true diphtheria. It then almost invariably proves fatal.

(*b*) **Bronchitis.**—A certain amount of bronchitis is present in the great majority of cases of measles. Hence the cough, which usually accompanies the running from the eyes and nose in the first stage of the illness. Sometimes the bronchial affection becomes very marked, forming a most serious element in the case.

(*c*) **Broncho-pneumonia.**—Lastly, the inflammation may spread still further, and involve the lung-tissue itself. I shall postpone, for the present, the further consideration of these last two complications.

(2) **Discharge from the ears** occurs in a good number of cases. It is due, as in scarlet fever, to the spreading of inflammation from the back of the throat up the Eustachian tube into the middle ear. Having so recently explained this to you (p. 129), I need say no more.

(3) **Ophthalmia.**—A purulent discharge from the eyes is not at all uncommon after measles.

Prognosis.—Broncho-pneumonia is the cause of death in the great majority of the fatal cases. Very occasionally one sees patients with a dark rash, and a continuously high temperature. This, which is sometimes called the "malignant" form of measles, is very fatal.

The occurrence of croup adds greatly to the danger of the illness, especially if the laryngeal inflammation proves to be of the nature of true diphtheria.

Treatment.—The child must be isolated from the commencement of its illness. It should be kept in bed in a room that is warm and well ventilated but free from draughts. The temperature of the room should not be allowed to fall below 60°, nor rise above 65°. Patients with measles require a warmer atmosphere than those suffering from scarlet fever because of their extreme liability to lung complications.

The **diet** will consist of milk, beef-tea, and cooling drinks while the temperature is raised. Restlessness is best treated by tepid sponging, or a lukewarm bath. The ears, if discharging, are gently syringed out every four hours, or more often, with a warm, weak antiseptic solution, and their external openings afterwards lightly plugged with an antiseptic wool.

The eyes, when there is ophthalmia, need frequent cleansing with warm boracic lotion.

Should inflammation of the larynx supervene, it would be treated in the way that I described when lecturing to you on diphtheria.

In an uncomplicated case the patient should be kept in bed for three or four days after the temperature has become normal, and, after he has commenced to get up, he should remain in the same room for about another week. Care must be taken in guarding against a chill when he first begins to go out of doors. A course of sea air is a very excellent tonic for the measles convalescent.

Isolation.—Measles is a very infectious disease, especially in the first stage of the illness, before the appearance of the rash, when the patient is suffering from what is apparently a feverish cold. Isolation, therefore, is enforced from the very commencement. The patient will be allowed to return to school at the end of a month, provided that all cough and desquamation have ceased, and that there is no discharge from either eyes, ears, or nose.

WHOOPING-COUGH

Whooping-cough is a contagious disease, to which children, between the ages of one and seven years, are very liable.

It occurs in epidemics, and has not infrequently been observed to follow measles.

Incubation period varies from ten to fourteen days.

Symptoms.—The illness begins with what is apparently a mild attack of bronchitis, which is accompanied by a hoarse, dry cough and a slight degree of fever.

After this has continued for about a week or ten days, the characteristic whoop is heard.

A paroxysm of whooping-cough begins with a series of short, rapid, expiratory coughs, following which there is a deep inspiration, when the whoop is produced by the air being drawn quickly into the lungs through the partly closed larynx. There may be a second paroxysm, or even a third, after which the attack usually terminates with the expulsion of gas from the stomach, and the vomiting of blood-stained mucus and food.

It is a mistake to suppose that the whoop is always present, or that its absence proves the case not to be one of whooping-cough. The essential characteristic of the complaint is not the whoop, which in some cases is never heard, but the series of rapid, expiratory coughs which precede it. By the expression "series of rapid, expiratory coughs," I mean that the child coughs so quickly that it has no time to draw breath. It keeps on coughing until the lungs are as nearly empty of air as possible, then, of necessity, follows a deep inspiration, and with it the whoop.

If a child has this paroxysmal kind of cough, and, especially, if the attacks are followed by vomiting, you may be pretty sure that it is suffering from whooping-cough, even though it is never heard to whoop. The duration of the second, or whooping stage of the illness, varies considerably. It may be only three weeks, or it may last for six months. Even when the child has completely recovered, the whoop may reappear for months afterwards, whenever it catches cold. It has, so to speak, got into the habit of whooping.

Complications.—(*a*) **Hæmorrhage** may occur from the nose, mouth, or lungs, as a result of the violent cough. It is never severe enough to cause any anxiety.

(*b*) **Convulsions,** when present, are a very grave symptom.

(*c*) **Bronchitis and Broncho-pneumonia** are responsible for a majority of the deaths caused by whooping-cough.

Prognosis.—The younger the child, the greater the risk. When, therefore, this disease occurs in infants under a year old, there is always ground for anxiety, as is also the case when either convulsions or extensive broncho-pneumonia is present.

Treatment.—The patient should be confined in a warm, well-ventilated room. During the early stage of the illness, while the child is suffering from what is apparently a mild attack of bronchitis, it should be kept in bed. If the illness is a slight one, and there is no sickness, it will have its usual diet. In those cases, however, in which there are frequent and severe paroxysms of coughing followed by vomiting, the food should be liquid and as nourishing as possible. For not only is the child exhausted by the constant cough, but every time it vomits it loses a certain amount of nourishment. It is, therefore, highly important that food should be administered as soon as the child has settled down after each attack, so that the stomach may have as much time as possible in which to digest and absorb the food, before the next fit of coughing and vomiting comes on. In severe cases it is advisable to peptonise the milk.

As regards drugs, many have been tried, but none have been found which can prevent the development of the whooping stage, nor, when that has arrived, are there any which can do much in the way of shortening it. Belladonna certainly seems to be the most useful for controlling the paroxysmal cough. With it is frequently given carbonate of soda or potash, which helps to liquefy the thick bronchial mucus, and so renders it easy of expulsion. When the disease begins to subside, cod-liver oil and other tonics are of great service in restoring the child to health.

For severe cases, a change to the seaside during convalescence is of the utmost value, especially if the cough does not seem to be disappearing as rapidly as it should do.

Isolation.—The patient will not be allowed to mix with other children for at least two months from the commencement of the illness, and then only if it has ceased to whoop.

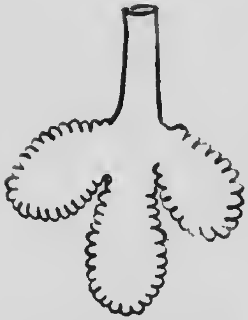
BRONCHO-PNEUMONIA

Broncho-pneumonia occurs most often in children who are under five years of age and in old people. It is a frequent complication of the various infectious diseases, especially measles and whooping-cough.

Rickety children are very liable to be attacked by this form of pneumonia, owing to the way in which the movements of their lungs are hampered by the distortion of their chest-walls.

Changes in the Lungs.—You will remember that each little bronchial tube finally ends in several small chambers, in the walls of which are situated the air-cells, or air-sacs. Fig. 18 shows a bronchial tube ending in three of these little chambers. The tube with its chambers is called "a lobule." Each lung is made up of a very large number of these lobules. The way in which broncho-pneumonia is caused is as follows:

FIG. 18.



A lobule of the lung.

There is, to begin with, inflammation of the small bronchial tubes. From these the inflammatory process spreads into the neighbouring air-cells, and causes them to become inflamed. Looking at the above diagram, you can understand how easy it would be for inflammation to spread from the tube into the three small chambers which are attached to it. When that happens, the chambers become filled with the products of inflammation, which now take the place of air. The disease is, therefore, called "lobular pneumonia," because isolated lobules are affected.

When a large number of the small bronchial tubes are inflamed, that is to say, when there is a general acute bronchitis, it is just a chance in which of them the inflammation will spread a step farther, and set up lobular pneumonia.

In ordinary acute pneumonia it is different. In that disease all the lobules in one or more lobes are affected, practically at the same time. You do not get small patches of pneumonia cropping up, one after another, in different parts of the lungs. It is, therefore, called "lobar pneumonia." Another difference is that this latter disease is not accompanied by bronchitis, as is the case with lobular pneumonia.

Symptoms.—It follows from what I have been saying that the symptoms of broncho-pneumonia are practically identical with those of acute bronchitis affecting the smallest bronchial tubes. It is often impossible to say whether the inflammatory process has spread as far as the air-cells or not. In some cases, however, we are able to say when this has happened.

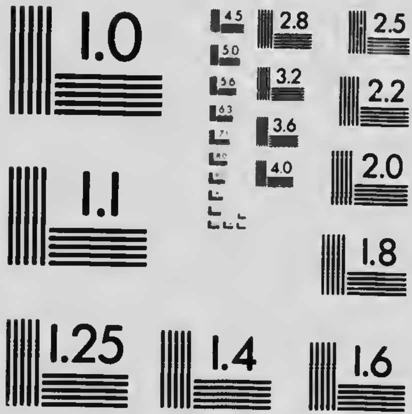
For instance—a child is suffering from a moderate attack of bronchitis, when one day there is a sudden increase in the severity of all the symptoms. The temperature rises still higher, while the pulse and respiration become markedly quicker. These signs are pretty certain evidence that lobular pneumonia has been added to the pre-existing bronchitis.

The urgency of the symptoms will, to a great extent, depend upon the amount of bronchitis that is present. If the very small bronchial tubes are extensively involved, there will be marked difficulty of breathing. The child lies in bed with a pale, livid face, the nostrils working, a short, frequent cough, quick pulse, and rapid, laboured respiration. Very commonly there is extreme restlessness.

If there is much pneumonia, and but little bronchitis, the symptoms will more nearly resemble those of lobar pneumonia. The respirations will be rapid and shallow, but free from difficulty. There will be less restlessness.

MICROCOPY RESOLUTION TEST CHART

(ANSI and ISO TEST CHART No. 2)



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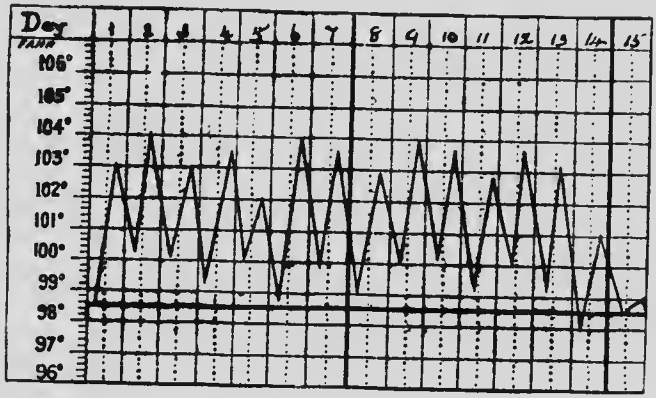
and the face will be flushed, rather than pale. The course of this disease is very variable. It may last one week, or it may go on for six. As a rule it terminates gradually, and not by crisis as in the other form of pneumonia.

The temperature in broncho-pneumonia, as you can



see from this chart, is very irregular, there being a marked fall each morning. It forms, therefore, a strong contrast, in this respect, to lobar pneumonia.

To bring them out more clearly, I will now contrast the differences between lobular, or broncho-pneumonia, and lobar, or ordinary acute pneumonia.

(1) **Age of Patient.**—*Lobar Pn.* Usually in adults up to middle age.

Lobular Pn. Usually in young children and old people.

(2) **Origin.**—*Lobar Pn.* Begins suddenly in a previously healthy person.

Lobular Pn. Frequently preceded by bronchitis.

(3) **Respiration**.—*Lobar Pn.* Free from dyspnœa, though the accompanying pleurisy may make it painful.

Lobular Pn. Laboured, when there is much bronchitis.

(4) **Temperature.**—*Lobar Pn.* Daily variation very slight.

Lobular Pn. Daily variation very marked.

(5) **Duration.**—*Lobar Pn.* About a week.

Lobular Pn. Variable—from one to six weeks.

(6) **Termination.**—*Lobar Pn.* Suddenly by crisis.

Lobular Pn. Gradually.

Prognosis.—As regards the probable issue of the case, the outlook is very serious when broncho-pneumonia occurs in a child who is the subject of severe rickets. Marked lividity and convulsions are very dangerous symptoms. Cases of the most desperate character, however, frequently recover, so that hope should not be lightly abandoned.

Treatment.—The temperature of the sick-room must be kept as nearly as possible at about 60°. Care must be taken to guard against draughts, for cold air is extremely irritating to inflamed bronchial tubes. The food, which should be constantly and regularly given, must be liquid, and as nourishing as possible : for a bad attack of broncho-pneumonia, with the constant cough and restlessness, is a sore tax upon the strength of a young child.

Local treatment will to a great extent depend upon whether bronchitis or pneumonia is the more important element in the case.

If there is much bronchitis, and the child has distinct difficulty of respiration, a steam tent and a jacket poultice are usually employed. Do not have too much steam, or too much poultice. In very young children it is usual to apply the poultice to the back and sides of the chest only, as any weight on the front of the chest must increase the difficulty of respiration. Instead of a poultice you may be ordered to well rub the chest with a stimulating liniment and put on a light wool jacket.

If pneumonia, rather than bronchitis, be the principal feature of the case, we can dispense with the steam and linseed poultice. A slight cotton-wool jacket is all that is now required, though some physicians use ice poultices, just as they do in ordinary acute pneumonia.

For the bronchitis, we give drugs which help to liquefy the thick bronchial mucus, and so make it easier for the child to cough it up.

When bronchitis occurs in weakly, rickety infants, there is a risk of the patient falling into a drowsy condition, with very rapid respiration, and marked cyanosis. These symptoms are due to the blocking of a large number of bronchial tubes with mucus which the child is too weak to cough up. Hence it is being slowly asphyxiated. This is a highly dangerous state of affairs, for if the child cannot be roused sufficiently to clear its lungs of some of the accumulated mucus, it will certainly die of suffocation. Under these circumstances some physicians give an emetic, so that, during the act of vomiting, some of the mucus may be expelled from the lungs. Others endeavour to excite coughing by means of alternate douches of hot and cold water, or the child may be put into a bath of mustard and hot water. If this latter method of treatment be pursued, care must be taken that the chest is not submerged, otherwise the act of respiration is rendered more difficult by the weight of the water. The nurse should support the back of the child with one hand, and sponge the chest with the other. The same precaution is necessary when bathing cases of pneumonia for the reduction of pyrexia.

XIV

PARALYSIS

To-day I am going to speak to you on the subject of paralysis. One sees so many cases of this complaint in the wards of a general hospital, that I thought you would like to know something of the ways in which it is caused and what prospect there is in each case of recovery.

It is obvious that you must comprehend how our limbs possess the power of movement, before you can understand the way in which they lose that power ; so that I shall, to begin with, say something about the anatomy and physiology of the nervous system.

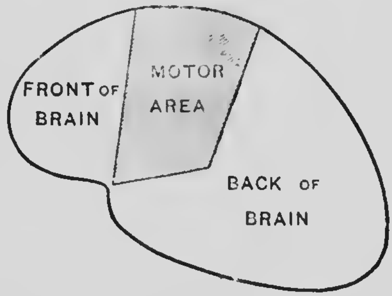
The nervous system may be divided into three parts : the brain, the spinal marrow, and the nerves.

These three divisions correspond roughly to the three forms of paralysis which you most commonly see. Thus, when there is loss of power in the face, arm and leg on one side of the body only, the disease is situated in the brain ; when the lower half of the body is paralysed, it is the spinal marrow that is affected ; when all four limbs are helpless, it is the nerves supplying them which are usually at fault.

This is a rough division, which though not absolutely correct, is yet true for a majority of these cases.

Structure and Working of the Nervous System.—To understand how this loss of power is brought about, we must start at the beginning of what is a very difficult and intricate subject, and inquire into what happens when we wish to move any of the muscles of our body. The brain, as you know, governs and directs the rest of the body. Now, just as Parliament, which rules the nation, is made up of a number of representatives from all parts of the country, so the brain is divided up into a number of different parts, each of which represents, and, at the same time, regulates, some portion or function of the body. Thus, one part has to do with hearing, another with seeing, while a third controls all the movements of the body. This last portion is, therefore, called the "motor," or moving part, since it is responsible for the working of the different muscles.

Fig. 19.



Side view of brain, showing that part of it which controls the movements of the body.

As you see from Fig. 19, it is situated on the surface of the brain about the centre of the lateral aspect of the organ.

The brain is made up of two halves, which resemble one another both in structure and in the work they have to do. One of the halves governs the right side of the body, the other the left. There are, therefore, two "motor areas," one on the right, the other on the left-hand side of the brain.

The motor areas, again, are divided up into a number of smaller portions, each of which is exclusively concerned with the movements of a particular group of muscles; that is to say, each has its own muscles to look after, and has no influence over those in any other part of the body. Thus, there is one part which moves the side of the face, another the arm, a third the hand, and so on.

If you had the brain of a living man exposed, and you irritated or stimulated these different parts by sending an electric current through them, you would see movements in the corresponding muscles. Similarly, if they are damaged by disease, or injury, so as to be unable to work, you have loss of power, or paralysis, in the groups of muscles over which they have control. Thus we are often able to say exactly where disease is situated in the brain, from the way in which particular parts of the [illegible]re affected. There is nothing in the external [illegible]ance of the brain to show you the "motor area[illegible]s only by experiment that we know their position in the "cortex" or rind, as the external portion of the organ is called.

In the motor areas are a number of large nerve-cells, each of which is connected with a single nerve-fibre. The nerve-fibres run from these cells down through the centre of the brain into the spinal marrow, from which they branch off, and finally end in the muscles. They, therefore, connect the nerve-cells in the two motor areas to the muscles in the different parts of the body. They serve to carry messages from the former to the latter; for it is these cells in the brain which control all our movements. The cells may be compared to telegraph clerks, and the nerve-fibres to telegraph wires.

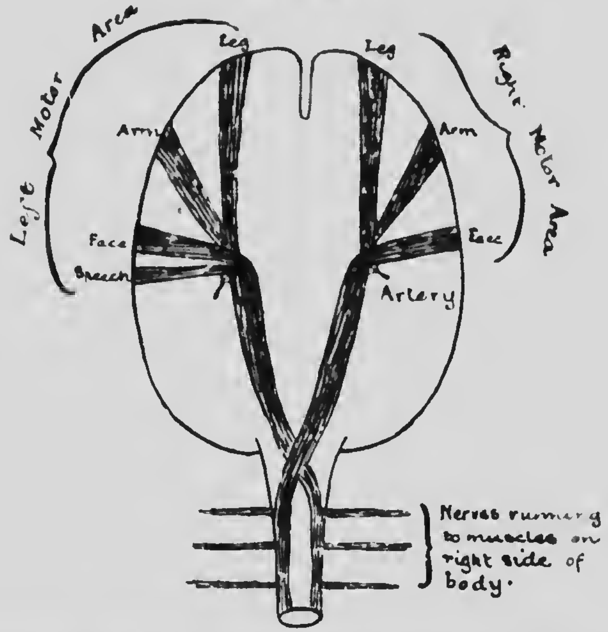
When, therefore, we wish to move any part of our body, a message is sent from certain nerve-cells on the surface of the brain through the nerve-fibres to the muscles of the part, which thereupon move.

When any muscle is, by injury or disease of the connecting fibres, separated from those cells in the brain which regulate its movements, that muscle becomes paralysed. The same thing, of course, happens if the nerve-cells themselves are injured or destroyed.

In the first case the nerve-cells cannot send messages to the muscle, because the connecting link between them is broken. In the second instance there are no nerve-cells to send messages. The muscle cannot move without such messages; it is, therefore, paralysed. So, if the telegraph wires are broken, the clerks can send no messages; while if there are no clerks or they are too ill to work, a similar state of affairs results.

The motor area on the left-hand side of the brain sends its nerve-fibres to the muscles on the right-hand side of the body, while that on the right side of the brain supplies the left half of the body. In Fig. 20 the brain and upper part of the spinal cord are supposed to have been cut in half, the knife entering the top of the brain and cutting downwards through it into the cord below. You see the nerve-fibres leaving the motor areas on the surface of the brain. Passing down through the centre of the organ the two bundles of nerve-fibres approach one another, and, as they enter the spinal marrow, cross, and then run down on opposite sides of the cord. In the right half of the spinal marrow, and, therefore, supplying the muscles on the right side of the body, are the nerve-

FIG. 20.



Section through brain and upper part of spinal cord, showing course of nerve-fibres. Also to explain production of hemiplegia.

fibres which come from the motor area on the left side of the brain.

Hitherto we have been considering only those nerve-fibres which run downwards from the brain to the muscles. There are also fibres which run in the opposite direction. These start in the skin and muscles, from which they convey messages to the brain, so that, by means of them the brain knows when any part of the body has touched, or been touched by, anything.

We have, therefore, in the spinal cord nerve-fibres running downwards from the brain to the muscles, and nerve-fibres running upwards from the skin and muscles to the brain.

Suppose, for instance, that I wished to move this book from the table to the chair, what happens is this :

Certain nerve-cells on the surface of the left half of my brain send a message down by the nerve-fibres to the muscles of my right arm and hand, which thereupon move, and lay hold of the book. Immediately I touch it, the nerves which are connected with the skin and muscles of my right hand convey the information to the brain. Instantly a fresh message comes down to the muscles, which execute another movement, and I place the book upon the chair. It may seem incredible to you that so simple an action should involve so much work on the part of the nervous system ; indeed, you may think it impossible that so much should happen in so short a time. That, however, is no difficulty, since these messages, or "nerve impulses," as they are called, travel with the most amazing rapidity, in the same way as does the electric current along a telegraph wire.

You have now, I hope, a general idea of the working of the nervous system, so that we can pass on to consider some of the ways in which that working is interfered with by injury and disease. So delicate and sensitive are both nerve-cells and nerve-fibres, that even pressure, if at all severe, prevents their working and, if it be long continued, causes them to become inflamed. An example of this is seen in that form of paralysis which sometimes follows the deep sleep of the drunkard, during which he has been resting his head upon his arm, as it hung over the back of a chair. When he wakes up, he finds that he is unable to use the limb, the nerves of which have been pressed upon and damaged by the sharp edge of the chair. The long-continued use of crutches, in the same way, causes "crutch paralysis," by pressing upon the nerves in the armpit. Later on we shall come to other instances of the way in which pressure interferes with the working of the nervous system.

The diseases of the nervous system, which, at one time or another, may produce paralysis, are many in number. I am only going to speak about the three forms that I mentioned at the commencement of the lecture.

Cerebral Hæmorrhage.—We will begin with the brain, and consider the effects produced by the bursting of a blood-vessel within that organ—"cerebral apoplexy," as it is called.

You will remember that in chronic inflammation of the kidneys, the walls of the arteries become diseased and brittle, and, therefore, liable to rupture. This accident is especially likely to happen in the brain, since the soft cerebral matter is but a poor support to the vessels which run through it.

Look again at Fig. 20, which shows the nerve-fibres running downwards through the brain from the two motor areas. From it you will see which fibres run to the leg, arm, and face respectively.

When about half-way through the brain the fibres on each side have converged, so as to form two compact bundles. About this point each bundle is supplied with blood from a small artery, which runs in among the nerve-fibres and which is shown in the diagram.

"This is the vessel which, by rupturing, is almost always the cause of apoplexy; indeed, it has been named "the artery of cerebral hæmorrhage." This accident is most likely to happen in those who are suffering from chronic inflammation of the kidneys; for as a result of that disease the arteries become brittle, and the heart becomes enlarged and beats more strongly, thus putting a greater strain than normal on the weakened vessels.

When it breaks, the blood, being forced out of it by the heart, tears up the soft brain tissue, which at that point consists of nerve-fibres. When these nerve-fibres are torn through, the muscles to which they were running are cut off from all communication with the nerve-cells on the surface of the brain, and are, therefore, paralysed.

In the same way, when the telegraph wires are broken, the clerk at one end cannot send messages through to the other end. If all the nerve-fibres in the bundle at that point are damaged, or pressed upon by the blood-clot, you will have paralysis of the face, arm, and leg on the *opposite* side of the body. If the hæmorrhage takes place among the fibres coming from the right motor area, there will be loss of power on the left-hand side of the body, and *vice versa*. This condition is called *hemiplegia*, a word which means a "half stroke," since one half of the body is paralysed.

Hemiplegia.—The attack generally commences with severe pain in the head, followed by the gradual onset of unconsciousness, which slowly, or in some cases quickly, deepens into complete coma. The patient is then fo·nd to have lost the use of the arm and leg on one side o the body. If they are lifted off the bed, they fall at once in a limp and helpless way. The face on the same side is also paralysed, as is shown by the way in which it is drawn over to the other side, by the contraction of the unparalysed muscles. The muscles of the chest and abdomen are not involved in hemiplegia to anything like the same extent as those of the extremities and face.

In rare cases the patient does not lose consciousness during an attack of cerebral hæmorrhage. There is pain in the head, which may be very slight, together with the gradual loss of power on one side of the body, but no coma. This shows that there has only been slight bleeding, and, therefore, not much damage done to the brain tissue, the nerve-fibres being probably only pressed upon by the blood-cut, and not torn.

Hemiplegia may be caused in various other ways besides the bursting of an artery at the spot which I have mentioned. This is much too difficult a subject for me to enter upon in a lecture such as this.

When the right side of the body is paralysed, there is also, to a greater or less extent, loss of the power of speech. This is because that part of the brain which governs and regulates our power of speech is situated *only* in the left motor area; so that when the fibres running from it are damaged, the power of speech is lost (cf. Fig. 20).

Prognosis.—With regard to this, we have to consider—first, the risk of death; secondly, the chances of recovery from the paralysis.

Risk of Death is very great in the following:

(1) If there is no diminution of the coma at the end of twenty-four hours.

(2) When there is a marked rise of temperature within a few hours of the commencement of the illness.

(3) When the breathing is sighing in character, or there is constant rattling of mucus in the throat.

(4) If bed-sores form within the first few days.

(5) If there is albumen in the urine, and, therefore, probably chronic kidney disease.

Chances of Recovery from the Paralysis.—Those patients who do not become comatose at the commencement of the illness are much more likely to recover the use of their limbs than are those in whom the original attack is attended with loss of consciousness. For in the case of the former there has not been so much damage done to the brain by the bursting of the artery.

If there is some return of movement in the affected limbs by the end of the first month, the patient will probably regain a considerable degree of power in them.

If they are by the end of the second month still quite helpless, but little improvement need be looked for.

Even in such a case as this, the patient will eventually be able to move his leg a little, though the arm may remain perfectly helpless.

The paralysis always lasts longer in the arm than in the leg, and longest of all in the hand.

Treatment.—Owing to their absolute helplessness these are difficult and tiring cases to nurse; and they need very careful attention. It is of great importance to prevent, if possible, the formation of a bed-sore. The patient must, therefore, be kept scrupulously clean, which is no easy matter. For the same reason, he must not be allowed to remain constantly on his back, but must be turned occasionally on to one side or the other, and propped in that position with pillows. This change of position is also necessary to prevent stagnation of blood at the bottom of the lungs, and the consequent risk of pneumonia. Another cause of this latter complication is food which has got into the larynx during the act of swallowing, so that great care is needed in the feeding of these patients while they are still insensible. The safest plan is to pass a tube through the nose or the mouth into the stomach, and pour the food down it.

Watch must be kept while the patient is unconscious that his respiration is not impeded by the tongue falling backwards upon the upper opening of the larynx. Should this seem to be the case, his head must be placed on one side and kept in that position.

A brisk purge is usually given at the commencement of an attack of cerebral apoplexy, as this has the effect of drawing away a certain amount of blood from the vessels of the brain, which is an important matter when one of them is bleeding. In connection with this, I might mention the mistake, so commonly made by the general public, of administering stimulants in cases of cerebral hæmorrhage. The onlookers feel that they must do something, and so they fly to the brandy-bottle, frequently under the impression that it is only a fainting attack. This is an error that may be productive of much harm, for, if the heart is stimulated, and the strength of its beats increased, it will force more blood out of the ruptured artery, and so do more damage to the brain. Our aim should be, rather, to keep the circulation as quiet as possible, so as to allow of a clot forming in the bleeding artery. With this end in view, an ice-bag is generally applied to the head after it has been shaved. Some physicians also bleed their patients, though this is not done to anything like the extent that it was twenty or thirty years ago.

We will now leave the brain, and pass on to paralysis as produced by disease or injury of the spinal marrow.

Of the many forms of this complaint I shall again only take one, which is the most common, and, at the same time, the most easily understood, viz. that in which there is paralysis of the lower extremities; "paraplegia," as it is called.

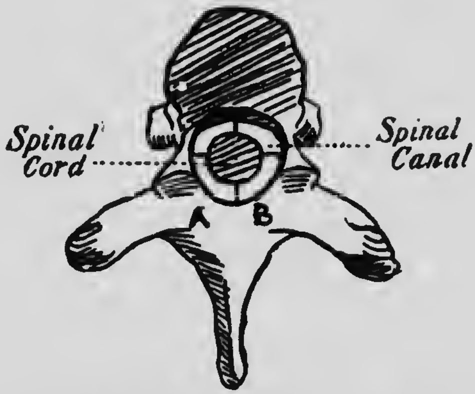
Paraplegia.—We have seen that the spinal cord or marrow consists of two sets of nerve-fibres—one running downwards, which conveys messages from the brain to the muscles; the other running upwards, carrying messages from the skin and muscles to the brain.

These different nerve-fibres may be prevented from working by either injury or disease.

The spinal cord is, as you know, for the sake of protection, surrounded on all sides by bone.

Fig. 21 represents one of the bones of which the spine, or the vertebral column, is composed. You will notice that the bony processes (A and B) project backwards and meet behind, enclosing a space which is called the "spinal" or "vertebral canal," in which is situated the spinal cord. A thin fluid, called the cerebro-spinal fluid, surrounds the cord, and thus prevents it being jarred or bruised by the bone. When a man's back is broken by a blow or fall, the two bony processes, which arch over and protect the cord, are driven in upon it, and crush it. Or there may be disease of the bones themselves, "caries of the spine" it is called, so that an abscess forms within the vertebral

Fig. 21.



A vertebra, showing spinal cord in the canal.

canal, pressing upon the cord, and prevents it working; for nerve-fibres, as I have already told you, are rendered helpless by pressure, in the same way as they are by disease or injury.

Thirdly, the spinal marrow may be inflamed. This is called "myelitis"; it is either acute or chronic. Being inflamed, the working power of the nerve-fibres is seriously impaired, or completely lost.

These three conditions, fracture of the spine, disease of the spine, and inflammation of the spinal marrow, are all most common below the level of the upper extremities, so that the arms are, as a rule, unaffected.

The legs, however, are cut off from all communication with the brain, since from either injury or disease the nerve-fibres which connect the two are prevented working. The same result is produced as would follow if the telegraph wires were cut at one point. It is of no use there being wires, or healthy nerve-fibres, on either side of the break, because no message can get past that.

There will, therefore, be loss of power, or paralysis, of the legs, since nerve-impulses or messages cannot get to them from the brain; while there will also be "anæsthesia," or loss of sensation, in the legs, since nerve-impulses cannot get to the brain from them.

For the same reason, the patient will lose control of both his bladder and rectum.

In many cases there is only a partial paralysis. The patient is able to move his legs, but cannot walk, or does so with great difficulty. This shows that the nerve-fibres in the spinal marrow are not sufficiently injured, or diseased, to prevent them doing some work. Similarly, there may be only a partial loss of sensation. The patient can feel, but not so well as formerly.

Prognosis.—In cases of injury to the spinal column, the chances of recovery depend entirely upon the amount of damage which has been done to the cord itself. If a piece of bone has been driven into it, so that it is much crushed, or torn, there is no hope of improvement. If the paralysis is caused by the bone pressing on the cord, there is every prospect of recovery if the former be removed by operation.

Similarly, when loss of power in the legs is due to pressure on the cord by an abscess, much good is often done by letting out pus; though sometimes absolute rest in bed results in the absorption of the inflammatory products and the return of power to the affected members.

When the spinal marrow itself is inflamed, there is much less chance of recovery; though, even then, some patients get almost perfectly well, while a good number become chronic paralytics.

Treatment.—As regards the treatment of these cases, there is not much that I need say to you. They require the same careful nursing, with regard to cleanliness and the prevention of bed-sores, that is so necessary with patients suffering from the effects of cerebral hæmorrhage. Inflammation of the bladder is another complication that is only too likely to arise. To guard against it catheters must be carefully sterilised, and the external genitals of females be thoroughly cleansed before an instrument is passed.

In all cases of paralysis be careful, when using hot-water bottles, not to burn the patient's skin. For, if he is suffering from partial or complete loss of sensation, a wound may be produced without his knowledge that will take a long time in healing.

Absolute rest in the recumbent position on a water-bed, often for a very lengthened period, is always required. In those cases where, by reason of injury or disease, one or more of the bones composing the spinal column is pressing on the cord, surgery can in some instances effect a cure. In others the cord has been so much damaged, that removal of the pressure fails to bring relief. For inflammation of the cord itself we can practically do nothing. Should a change for the better take place, nerve tonics, such as strychnine, together with electricity and massage of the paralysed members, are often useful in expediting recovery.

Multiple or Peripheral Neuritis.—Lastly, we have to consider the effects produced by inflammation of the nerves of the extremities. This is called "multiple neuritis," which means inflammation of many nerves, since those of all four limbs are frequently affected; or "peripheral neuritis," which means that the periphery, or extremities of the nerves, are the chief seat of disease.

The first symptoms are numbness, tingling, muscular tenderness, and in some cases, a certain amount of fever. Both arms and legs gradually become paralysed, and, in the course of time, extremely wasted. Such is the course of events in a severe case. There is, however, great variety, both in the degree of paralysis, and in the number of muscles affected. There may be nothing more than weakness of one or two muscles in one limb, or all four extremities may be absolutely helpless.

Among the numerous causes of this affection are alcohol, diphtheria, lead-poisoning, cold, and influenza.

Chronic lead-poisoning is, next to spirit-drinking, responsible for the largest number of cases, the neuritis due to it affecting principally or entirely the upper extremities. The patients suffer from what is called "wrist-drop." When they hold their arms out in front of them, the hands hang down in a helpless manner, and cannot be bent backwards. "Foot-drop" is the same condition occurring in the lower extremities.

Prognosis.—A few of the very acute cases die. The great majority slowly recover the use of their limbs. Others improve up to a certain point, and there stop.

Treatment.—The particular poison which has caused the illness, if it be one such as alcohol or lead, must of course be prevented entering the system. Complete rest, with a water-bed for bad cases, and a nourishing diet, are essential. Massage and the electric current are of great value during convalescence.

XV

HYSTERIA

THE true nature of this complaint is frequently quite misunderstood by nurses, many of whom look upon it as being much the same thing as shamming. This is doubly unfortunate, since it is both unjust to the patient and calculated to retard her recovery. I am, therefore, anxious that every nurse who is present here to-day should carry away with her a clear idea of what hysteria really means. This is no easy matter to explain, and I must, therefore, ask your close attention to what I am going to say.

To begin with, you must recognise *the difference between disease and disorder*. In the first there is a change in the structure of the particular organ affected; in the latter the organ is healthy, but is not working properly. Take the case of a child that has pain and vomiting after food. The parents say that its stomach is out "of order." Owing to improper feeding, or some kindred cause, that organ has been upset, and is, for the time, unable to perform the work of digestion. This is an instance of disorder. The same symptoms, occurring in an individual of fifty years of age, might be due to a cancerous growth in the stomach. That would be an instance of disease.

In the same way, hysteria indicates a disordered condition of the brain, in consequence of which the working of that organ is upset and thrown out of gear.

In a healthy individual the will is the ruling power in the brain. It directs all the movements of the body, and it also exercises a restraining influence upon the emotions, thus preventing an immoderate display of joy, sorrow, &c. In hysteria these positions are reversed. The emotions now govern the will, and consequently direct and regulate the actions. An emotional individual is one who is carried away by her feelings, which lead her to do things that would be impossible to one whose emotions were under better control.

When a strong desire for sympathy arises in one who is the subject of hysteria, it gives rise to actions which are calculated to procure gratification for her longing, *e.g.* she persists in remaining ill, or becomes the subject of some imaginary complaint, so that she may obtain the desired sympathy.

You must not, however, conclude from this that such a patient is wilfully endeavouring to deceive. When she says that she has lost the use of her legs, or that she has a terrible pain in some part of her body, she is speaking what she believes to be the truth. These symptoms are due to the disordered condition of her brain, as a result of which her emotions cause her to feel a pain which exists only in the imagination, but which, at the same time, is, to the patient, a very real pain; or they prevent the will moving the legs, which are therefore temporarily paralysed.

Let us consider for a moment the effect which sudden terror or fright has upon some people. They become, as we say, "paralysed by fear," so that they are quite unable to move, or call for help. They would give anything to do so, but the emotion of fear for the time being overpowers their will, and they cannot stir. Take the case of a woman under these conditions. When the danger has passed, and she has shaken off her fear, the power of movement returns to her. If somebody came to her, and encouraged her to move, she would do because her will had in this way been strengthened, an so enabled to ' the upper hand of her emotion. You would not think of disbelieving such a story, or doubting that fear could exercise this paralysing influence. And yet I expect that a hysterical patient, who suddenly lost the use of her legs, would be regarded with considerable suspicion by most of you: though, in reality, her paralysis is brought about in the same way as in the case of one who has been overcome by sudden fear. The fact that she may slowly recover the use of her limbs under the influence of encouragement, or quickly, from the effect of shock, no more proves her to be a humbug than does the ability to walk, on the removal of fear, the person in the case I have just been describing. In both the will is overpowered by the emotions, and, therefore, for a time, unable to act.

We must explain in the same way the behaviour of the man who suffers from a violent temper. In his case the emotion of anger at times proves too strong for his will, leading him into outbreaks of which he is afterwards ashamed.

Hysteria, then, I hope you will understand, is not so much the desire to do wrong, but rather, the absence of power to do right; indeed, it would be impossible to produce voluntarily some of the symptoms of this disorder. The same patient may, however, exhibit a mixture of hysteria and shamming: or there may be real disease and hysteria added to it. It is in the latter that most difficulty arises. I have seen patients who exhibited the most typically hysterical symptoms die rather suddenly, thus proving that they had serious disease, as well as the nervous disorder.

Causes.—It chiefly affects females, though males, especially boys, are occasionally subject to it. Mental and physical disturbances of various kinds, such as grief, worry, slight injuries, &c., are responsible for its appearance. It has been called "the mocking-bird of disease," from the way in which it imitates or mimics various maladies.

Symptoms. Mental.—Extreme self-consciousness, combined with a weak will and strong emotions. The patient has no control over her feelings, and, consequently, indulges immoderately in both tears and laughter. She has a morbid craving for sympathy, and, therefore, delights in posing as the interesting invalid. She may even go so far as to injure herself in some way, so as to induce her friends to think that she is really ill.

Affections of Sensation.—The special senses of sight, hearing, and touch are often involved. One patient may declare that she cannot stand the slightest noise, and may groan with pain if any one speaks above a whisper. At the same time she does not mind making a great deal of noise herself, thus showing that her imagination is the cause of her symptoms. I remember a girl who had become suddenly stone-deaf, when an unexpected question, spoken in an ordinary tone of voice, caught off her guard. She answered it, and thus proved the unreal character of her complaint.

Here is a case related by Dr. Reynolds and quoted by Dr. Fagge. "A woman had for weeks been lying with her hands before her eyes, to keep out the light of a dull London sky. When Dr. Reynolds brought a candle close to her to examine her pupils, she shuddered, knit her brows, and held both hands between it and her eyes. But as soon as her attention was distracted to the state of her front teeth the brows became relaxed, the hands were removed, and she bore the light without flinching." These three cases show that in hysteria you may have increased or diminished sensitiveness to light or sound.

The sense of touch may be affected in the same way. Some patients complain of numbness, and say that they can feel nothing; while others are excessively tender, so that they cry out at the lightest touch.

Paralysis.—These patients may have paralyses of various kinds. There may be loss of power in both legs, or in a leg and arm on the same side of the body, or there may be inability to speak, or difficulty in swallowing. A characteristic symptom is drooping of one or both upper eyelids from weakness of the muscles which ordinarily raise them.

Visceral Symptoms—that is to say, symptoms produced by the different viscera or internal organs. The *stomach* is an organ that is very frequently affected in hysteria, *pain* in that region, together with persistent *vomiting*, being a common symptom. Another is absolute *loss of appetite*, with refusal to take any food whatever. This condition may last for a long time, and produce extreme emaciation. Well-marked examples of it are occasionally seen in the so-called "fasting girls," whose hysterical ailments are fed by the fame and pecuniary gain which they bring to their possessors.

Flatulent distension of the abdomen, retention of urine, constant barking cough, hiccough, and extremely frequent respirations are all found in hysteria. The last of these I have seen in a boy aged fourteen.

These patients may also complain of flushings, pain at the heart, and palpitation. Another very interesting feature of this disorder is the way in which the *joints* are sometimes affected. It is generally the knee or the hip, and it is occasionally very difficult to decide whether the joint trouble is caused by disease or is merely the result of hysteria.

A very extraordinary symptom met with at times in these cases is *fever*. This may be extremely high, and most erratic in the way in which it comes and goes. In some cases, no doubt, deception has been practised by the patient who has rubbed the bulb of the thermometer against the bedclothes and thus produced a spurious pyrexia. In others, however, where every care has been taken to guard against fraud, extraordinary temperatures have been registered, the explanation of which it is indeed very difficult to see.

The Hysterical Fit generally follows emotional disturbance of some kind. The patient has a choking sensation, as of a lump rising in her throat, after which she may begin to cry, or go off into fits of uncontrollable laughter, or the two may alternate, until she is compelled to stop by exhaustion. This is the milder form of the hysterical fit, and is generally spoken of as "the hysterics."

In the more severe form, after the choking sensation, the patient falls to the ground, and either becomes quite rigid, or else goes into violent convulsions during which she throws her limbs about in all directions, bumps her head against the floor, and strikes at or pushes away the bystanders who are trying to restrain her. The eyelids are closed, the face is red, the saliva may run from the mouth. Consciousness is not lost, for the patient's movements may be influenced by the remarks of the lookers-on. The paroxysm, after lasting several minutes, gradually subsides, leaving the patient in a panting and exhausted condition.

It is important to know the difference between an epileptic and a hysterical fit. I will, therefore, place side by side the principal points of contrast between these two conditions.

EPILEPTIC FIT.	HYSTERICAL FIT.
1. Only lasts for a few minutes.	1. Lasts 15 to 20 minutes or even longer.
2. Patient's face becomes livid.	2. Face is pale or red from exertion.
3. Bites the tongue.	3. As a rule does not, nor does she hurt herself, as the epileptic occasionally does, by falling into the fire or against sharp edges of furniture.
4. Eyes are open during the fit; and there is no response when the eyeball is touched.	4. Eyelids closed, winks when the eyeball is touched.
5. Pupils dilated.	5. Pupils normal or contracted.
6. Never talks during fit.	6. Patient screams or calls out while struggling.

EPILEPTIC FIT.	HYSTERICAL FIT.
7. The convulsions are devoid of purpose, since they are merely alternate contractions and relaxations of the different muscles.	7. The convulsive movements have a purpose or object—*e.g.*, the patient strikes somebody, or knocks her head against the ground.

I think that I have said enough to show you what an extraordinary disorder hysteria is, and how very properly it has been called the "mocking-bird of disease." The great variety of symptoms which it can manifest in its imitation of different diseases renders its diagnosis at times extremely difficult. Moreover, though it is not the same thing as shamming, it is impossible to draw a hard-and-fast line between the two, and say where hysteria ends and shamming begins; indeed, they are not infrequently combined in the same individual. Then, we always have to remember the possibility of real disease being present as well as hysteria, or we may miss the former through paying too much heed to the latter. Further, we must not forget that hysterical patients are extremely prone to practise deception, that their statements are rarely worthy of belief, while they themselves always need careful watching.

Thus, you will understand some of the difficulties with which a physician has to contend when he finds himself in the presence of hysteria.

Treatment.—I have, as I said at the beginning of the lecture, spoken to you on this subject because I think it most important that a nurse who has charge of a case of hysteria should clearly understand the nature of her patient's complaint. For, if she does not, she may possibly fall into one of two errors, and either sympathise and condole with the patient, or else let her see, even if she does not actually tell her, that she knows there is nothing whatever the matter with her. It is hard to say which of these two mistakes does the more harm. In the first instance the nurse, though well-meaning, is administering what can only be described as a poison; for sympathy is what these patients most crave for, and so long as they get it they will not improve. It is the same thing as giving drink to a drunkard. On the other hand, to let a hysterical patient see that you consider her an impostor is to forfeit her confidence at once, and with it the chance of doing her any good.

Such patients, if they are to be properly treated, should be removed from the midst of sympathising friends. When they find the place of these taken by people who will neither pity them nor regard them as interesting invalids, one of their reasons for remaining ill will disappear. Many of them recover at once when taken into a hospital; others require rigid isolation, no visits or letters from friends or relatives, strict rest in bed and abundance of food, nobody being allowed to see them except the doctor and the nurse. To do any good our treatment must be both moral and physical—*i.e.* we must treat the mind as well as the body.

(*a*) **Moral.**—We have seen that just as the emotion of fear may overcome the will, and temporarily paralyse the individual, so in hysteria other emotions, such as a craving for sympathy, may similarly get the upper hand of the will, and prevent it working. We must, therefore, do all we can to stimulate and strengthen the will, so that it may once more resume its proper mastery over the emotions. To return for a moment to the paralysing influence of fear. Suppose that you were to find a woman in a condition of helpless terror from having seen what she thought was a ghost. You would not be angry with her for her weakness, but with kind words would reason with her, and persuade her that her fears were groundless, the supposed apparition being nothing more than a shadow. Thus you would enable her to conquer her emotion, and regain her self-control. Similarly, if we have a patient with hysterical symptoms, such as paralysis of the legs, she must not be looked upon as a sham, nor sympathised with as though she were seriously ill, but treated with both kindness and firmness. The great thing is to gain her confidence, and encourage her to improve, pointing out to her that she is not quite so ill as she thinks, since she can move her legs slightly, and that, if she can only go on trying, she will certainly get the use of them again. She should be handled in the same way as a child; encouraged when she is good, and reproved, but not scolded, when she behaves foolishly. I trust that by now you all understand what an important factor good nursing is in the treatment of hysteria. An intelligent nurse is a great help to the physician, while one who is foolish or ignorant only increases the difficulty of his task.

(*b*) **Physical.**—We can now turn to the treatment of the body. This is of great importance. For if the body be weak, the mind will not gain strength. The patient's general health must be improved in every possible way. She must have plenty of fresh air, good food, which in some cases has to be forcibly administered, and moderate exercise if she can take it. She must not be subjected to anything in the nature of mental worry. Iron and other tonics are often of great value, and the condition of the bowels must be attended to. There are certain drugs, such as valerian and asafœtida, which are reserved almost exclusively for the treatment of hysteria. These are medicines of very evil odour, which is regarded by many people as the reason why they do good. This, however, is a mistake, for they not infrequently prove efficacious when given in the form of a pill. They are what is known as nerve tonics, and are supposed to strengthen and brace up the debilitated nervous system. As a rule, we avoid the use of stimulants and narcotics, unless the latter consist of nothing more deadly than a bread pill, or an ounce of peppermint water.

As regards the management of the patient when in a hysterical fit, sprinkle cold water on the face, loosen her clothes at the neck, and open the window. Having recognised the nature of the attack, a calm and quiet demeanour is essential, so that the patient may not think you flurried or alarmed by her goings on.

The electric battery is very useful in the treatment of numbness and the various forms of paralysis, one shock being often sufficient to effect a cure. In those cases where there is loss of power, as, for instance, of the legs, the patient must be encouraged, and at the same time assisted, by her nurses to exercise the affected limbs. This, as I know from experience, is often a sore tax upon the patience of the helpers; but it is well worth the trouble when you see your patient gaining confidence and even showing a pleasure in her improvement. There is of course a variety of treatment for particular symptoms with which I need not trouble you, nor indeed is it wise to let the patient think that one attaches too much importance to any special symptom, or she will do the same thing. It is better, rather, to follow the general rule for dealing with these cases and encourage her to think lightly of it, when it will be more likely to disappear than if it is seriously and persistently treated.

XVI

SOME FORMS OF INTERNAL HÆMORRHAGE

To-day I am going to speak to you on certain forms of hæmorrhage in which the bleedi ; vessel is situated internally, so that you cannot pl. .e your finger on it, and stop further loss of blood, as you could if it were on the surface of the body.

It is important that you should have some knowledge of the cause of hæmorrhage in each of these cases, the extent to which the bleeding may possibly prove dangerous, and the proper treatment to adopt in such an emergency. For you will not always be working in a hospital, where you have a doctor constantly within call ; but some of you, no doubt, will ultimately take to private, others to district nursing. In either case you might have to wait some little time for assistance from a medical man, however urgently you required his presence, especially if you happened to be living in the country. Meanwhile your patient is losing blood in the most alarming manner, while his friends not unnaturally look to you for help, and for an explanation of the disaster.

These are .ases which make great demands upon one's nerve and presence of mind. It is bad enough in a hospital, but infinitely worse in a private house, where you are surrounded by anxious and inquiring relatives.

You will find that merely to apply a remedy and bid your patient hope for the best is not enough. You must be able to explain that it is not an unusual occurrence; that the hæmorrhage will probably cease before a dangerous amount of blood has been lost; and that you are doing practically all that can be done. For it is most important to reassure the patient and if not to remove, at any rate to diminish, his very natural alarm.

If you know that the doctor cannot arrive for some time, it is clearly your duty to do all that lies in your power, and not to watch the patient getting weaker and weaker, without making some sort of an effort to help him.

Moreover, from your own point of view it is important that you should know the cause of the hæmorrhage as well as its treatment. Having that knowledge, you will feel equal to the occasion, and your confidence and self-reliance will reassure the anxious ones around you.

The great majority of you have probably never seen a really severe case of bleeding from the stomach, or lungs. I think you would feel the situation rather a trying one, should your first experience of such come to you in private, with the possibility that the hæmorrhage may have ceased, or the patient be dead, before you can fetch a medical man.

We must, in the first place, consider the means by which nature arrests hæmorrhage; for in these cases where the bleeding-point is hidden away in the interior of the body, she does far more to stop the loss of blood than we do, so we must be careful that our treatment does not interfere with or oppose her methods. In internal hæmorrhage our aim should be to work with nature and not against her.

Nature's Method of Arresting Hæmorrhage.—There is only one way by which hæmorrhage from an artery can be arrested, viz. by closing or stopping up the mouth of the bleeding vessel. If it is situated on the surface of the body, we do so by placing a finger upon it. If it lies deep down, among the muscles, we either plug the wound or else press upon the main artery of the limb above the point, taking care to press it against a bone, so as to prevent any more blood going through the vessel. In either case we stop further loss of blood, and give time for the application of a ligature.

If, however, the seat of the hæmorrhage is within the chest or abdomen, we can do nothing by pressure. In such cases we have to rely upon nature, who steps in, and prevents fatal loss of blood by plugging the bleeding vessel with clot.

While the blood is issuing from an artery in a quick full stream, any clot that is formed will be washed away. Something must, therefore, be done to retard the flow of blood, and so allow the clot to form. This is brought about in the following way.

When an artery is torn through, its circular muscular coat, which I described to you when lecturing upon the pulse, being stimulated by the injury, contracts, and so diminishes the size of the vessel at that point. At the same time this coat retracts from the outer coat at the point where it is divided, while the inner, which is composed of elastic tissue, also curls up. This renders the escape of blood less easy. Further, as hæmorrhage proceeds, the patient becomes faint, and the heart beats more feebly, so that the blood is not sent into the different arteries with the same force that it previously was. It therefore escapes more slowly from the injured vessel. From this you will understand that the faintness which results from the loss of a large quantity of blood is useful as helping to prevent further hæmorrhage, and should, therefore, not be heedlessly interfered with by the administration of stimulants.

Nature, then, arrests hæmorrhage by plugging with blood-clot the mouth of the bleeding artery.

To retard the flow of blood, and so enable that clot to form, we have—

(1) *Diminished size of vessel*, from contraction of its muscular coat with partial blockage of its orifice from retraction of the middle and inner coats.

FIG. 22.

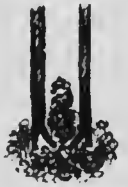


Diagram illustrating nature's method of arresting hæmorrhage.

(2) *Diminished strength of the heart-beats*, and consequently a smaller and feebler flow of blood through the different arteries.

In this diagram (Fig 22) you see the end of the artery, from which hæmorrhage has been taking place, buried in a mass of clot, which not only surrounds it externally, but also occupies the interior of the vessel, so as effectually to plug it, and thus prevent further loss of blood. You will also notice that the ends of the middle and inner coats are drawn together, so as to diminish the size of the artery at that point.

Whether it is torn through by injury, or ulcerated by disease, the bleeding end of the vessel is rough and uneven. This materially assists in the coagulation of the blood, the little filaments of clot becoming entangled in, or dep sited upon, this rough surface. We must, then, in these cases of internal hæmorrhage, abstain from doing anything that could interfere with the plugging of the bleeding vessel with blood-clot; and when the hæmorrhage has ceased, from the clot having formed, we must be careful to do nothing to disturb the latter, or the bleeding will recommence.

We must, therefore, keep such a patient absolutely at rest.

If he is collapsed, we must not give him stimulants, unless the condition threatens to become dangerous; otherwise, we shall increase the force of the heart-beats, and so run the risk of washing away any clot that may have formed. For the same reason, we must endeavour to calm an excitable and nervous patient, because excitement acts upon the heart in much the same way as stimulants.

Heat and Cold in the treatment of Hæmorrhage.—I must next say a few words with regard to the use of heat and cold in the treatment of hæmorrhage.

They both act in the same way, viz. *by stimulating the circular muscular coat of the artery*, and so making it contract. The vessel is thus rendered narrower, and consequently the blood escapes from it with more difficulty. This, as we have just seen, is one of nature's methods of arresting hæmorrhage, so that heat and cold are useful because they te. l to assist nature.

For superficial hæmorrhage, where one can see the bleeding-point, as in the case of troublesome oozing from amputation flaps, hot is far more efficacious than iced water.

It must, however, be very hot, 115°–130° Fahrenheit. For if it is merely warm, it will have the effect of encouraging the bleeding. It is hardly necessary for me to tell you that hot water would not be used for the purpose of arre..ing hæmorrhage from arteries of any size. Such would be picked up with forceps and ligatured. It is when there is oozing of blood from a number of small points that this agent is employed.

When, on the other hand, the bleeding vessel is situated within the chest or abdomen, cold is generally used in preference to heat. An ice-bag seems, in such cases, more likely o do good than a hot fomentation. It is impossible, however, to say exactly what share they take in arresting internal hæmorrhage. It must, of course, be small in comparison with the effect they produce when applied directly to the bleeding spot.

When, in a case of hæmoptysis, an ice-bag is applied to the chest, it is not with the idea that the cold will extend through the chest-wall and lung till it reaches the bleeding vessel. Its influence reaches that spot in an indirect and roundabout way, just as the stimulating effect of alcohol does the heart. When speaking to you on the use of stimulants, I told you that alcohol irritated the nerves of the stomach, and that these nerves passed on the irritation or stimulation through the nervous system to the heart. In the same way, the contracting or astringing influence of an ice-bag passes from the skin of the chest through the nervous system to the vessels of the lung beneath, and, by stimulating their muscular coats, makes them contract, and so helps to stop the hæmorrhage.

The old remedy for a bleeding nose is the application of cold, in the shape of a large key to the skin of the back. This, which often proves efficient, can only act indirectly on the bleeding-point through the central nervous system. We can now pass on to the consideration of those forms of hæmorrhage about which I wish to speak.

1. Hæmorrhage following Extraction of a Tooth.—Neither this, nor bleeding from the nose, is, strictly speaking, an example of internal hæmorrhage. In both, however, as in the case of hæmorrhage from the stomach, lungs, and intestine, the bleeding takes place into one of the cavities of the body, where it is treated with more difficulty than if it had occurred on the surface: for this reason I have included them.

The hæmorrhage which needs treatment after extraction of a tooth is not the first spontaneous flow, but that steady oozing which may continue for days. It almost always occurs in that peculiar class of individuals called "bleeders," who, from some constitutional abnormality in their circulatory system, bleed to death from the smallest scratch. No one belonging to that class ought ever to have a tooth extracted. Such an operation is sometimes performed in ignorance of the danger to which the patient is thereby exposed, and then follows that uncontrollable bleeding from the tooth socket which must be efficiently treated, or death will result.

In such cases it is better, if possible, not to use remedies like the actual cautery, or strong preparations of iron. These may indeed stop the hæmorrhage, but, at the same time, they form a slough, and when that separates you will have the same trouble again, only more widespread, and, therefore, more difficult to cope with.

The proper treatment is to take a very narrow strip of some extremely thin material, such as an antiseptic gauze or old linen, and, having removed, by syringing,

FIG. 23.

To explain the treatment of severe hæmorrhage after tooth extraction.

any clot there may be in the tooth socket, carefully to pack that cavity, using a probe or knitting-needle gently but firmly to press the plug into the socket. Having filled this, take a cork which you have previously shaped so that it fits on the top of the socket, and, at the same time, projects slightly above the neighbouring teeth. Place this in position, and bandage the jaws together. The teeth in the upper or lower jaw, as the case may be, will then press upon the cork, and, forcing it down upon the packing in the bleeding socket, effectually prevent further hæmorrhage.

In this diagram (Fig. 23) you see the cork in position.

As these cases almost always occur in children, you are not likely to be troubled by the absence of the necessary tooth to make pressure on the cork.

The further treatment of such a case will be taken out of your hands by the medical attendant, since you are only supposed to be acting in an emergency.

2. **Epistaxis,** or Bleeding from the Nose.—This condition, if resulting from a blow, is not harmful, nor, if it comes on of itself, need it necessarily be stopped at once. It is often a safety-valve in cases of chronic liver or kidney disease. By relieving the over-full circulatory system, it serves to prevent the rupture of a blood-vessel in some other part of the body, as, for instance, the brain, where such an occurrence might be attended with considerable danger to the patient.

It may, however, become excessive, and, therefore, need treatment, while in old or feeble folk it should be taken in hand at once.

The following are methods which you might employ in such a case:

(1) A simple and frequently effectual plan is to make the patient sit down, raise his arms above his head, and breathe deeply several times through the side of the nose from which the blood is coming, the other nostril being closed by pressure with the finger. A short expiration follows through the mouth. Blood is thus drawn from the head to the lungs. In all cases of *spontaneous* hæmorrhage the blood comes from one nostril only.

(2) Ice applied to the outside of the nose is sometimes effectual. I have seen it stop very persistent epistaxis.

While the foregoing methods are employed the patient will be in the recumbent position, and this will cause the blood to run from the back of the nose into the throat, and so to the stomach. You must not, therefore, conclude that hæmorrhage has ceased, because none comes from the nostril, for all the time your patient may be quietly bleeding into the throat. To prevent this mistake, you should from time to time open his mouth, and, depressing the tongue, examine the pharynx to see if blood is running down it; or the patient may be placed on his side so that the blood can run out of his nostril.

(3) If the above fail, syringe out the nose with iced water; the interior of this organ is too sensitive for the application of that fluid when very hot; or a solution of adrenalin or hamamelis may be used.

(4) Should all the above fail, and the hæmorrhage show no sign of stopping, the side of the nose from which the blood is coming must be plugged. This, if properly performed, is certain to prove effectual, but it is extremely disagreeable [illegible] ying to the patient, for which reason it is always [illegible] as the last resource in these cases. It is an operation that is by no means easy to perform, and, as it would be done by the medical attendant, I shall not trouble you with its description.

3. **Hæmatemesis,** or the Vomiting of Blood.—In these cases we first enquire if the patient has recently been bleeding from the nose, or has had any operation performed within the mouth, so as to make sure that he is not returning blood which he has previously swallowed. Young children, after removal of their tonsils, sometimes alarm their parents by vomiting blood which has trickled down into the stomach from the cut surfaces.

Putting the above on one side, vomiting of blood is caused by hæmorrhage into the stomach from a blood-vessel in its walls. The chief causes of profuse hæmatemesis are—

(1) Chronic liver disease.

(2) Simple ulcer of the stomach.

Treatment of the hæmatemesis will differ according as to which of these two is the cause :

(1) In chronic liver disease the patient is usually of middle age, with a history of alcohol, which is generally confirmed by his appearance. In this case the hæmorrhage is caused by the congestion of the liver, for which it is a means of relief, and, therefore, unless excessive, does not require treatment.

Should the loss of blood become alarmingly severe, the patient would need to be treated in the same way as in a case of gastric ulcer.

(2) **Ulcer of the Stomach.**—This is by far the most important cause of profuse vomiting of blood. It occurs, for the most part, in anæmic young women, and is generally accompanied by indigestion and tenderness on pressure at the pit of the stomach.

Hæmorrhage is caused by the ulcer which is situated on the inner surface of the stomach, as it spreads, eating its way through the wall of a blood-vessel, which thereupon begins to bleed into the stomach.

In these cases there may be considerable loss of blood before any appears externally, owing to its collecting in the cavity of the stomach. Meanwhile, the patient's appearance tells us that such loss is taking place, by the pallor, faintness, and cold perspiration about the forehead and extremities; finally, she vomits, bringing up one, two, three, or even more, pints of blood.

Blood from the stomach is generally dark in colour, and sometimes partly clotted, so that it resembles small pieces of liver.

When retained for some hours it becomes to a certain extent digested, and is then very like coffee-grounds in appearance.

A patient who has had hæmorrhage in the stomach will, later on, almost certainly pass motions that look like tar. This peculiar form of stool is only seen after blood has been acted upon by the digestive juices of the stomach, and is, therefore, a certain proof of there having been bleeding either from that organ or from the uppermost part of the small intestine.

Treatment of Hæmatemesis.—We feed our patient by the rectum, and *give nothing by the mouth* except occasional sips of cold water or a little ice. Thirst is relieved by the daily injection into the bowel of a pint of warm saline solution. Thus we prevent, as far as possible, the occurrence of vomiting, and, by placing the stomach in a condition of absolute rest, we give nature time to plug the bleeding vessel with clot, and the ulcer a chance of healing. At the same time, I must tell you that some physicians continue feeding by the mouth in spite of hæmatemesis. They hold that the patient's strength is better maintained by this treatment than by the use of nutrical enemata, and that the ulcer will consequently heal more quickly.

If the hæmorrhage persists, an ice-bag suspended from a cradle should be applied to the pit of the stomach. Astringent drugs, such as the perchloride of iron, tannin, or oil of turpentine, are not given unless absolutely necessary; for it is doubtful if they are able to do any good, and they certainly tend to promote vomiting. A little opium is, however, very useful, as, by dulling the senses, it removes to a great extent the very natural alarm which the hæmatemesis has caused; and thus, by quieting the patient, it diminishes the risk of further hæmorrhage.

While pursuing one or more of these methods of treatment the patient must be kept absolutely at rest in the recumbent position. On no account should she be disturbed to allow of the removal of blood-stained linen. This, for the sake of the friends, ought to be temporarily covered over, and taken away later on.

4. **Hæmoptysis,** or the Spitting of Blood.—Profuse hæmoptysis is almost invariably due to phthisis, or "consumption," as this disease of the lungs is popularly called.

Unlike hæmatemesis, there are no warning signs of pallor or faintness, as the blood cannot collect in the lungs before appearing externally, as it does in the case of the stomach. The first symptom is a gush of blood from the mouth, usually following on an attack of coughing.

Hæmoptysis may be the first indication that the lungs are diseased; though, as a rule, one obtains, on questioning, a history of cough, night sweats, and wasting, and perhaps also of previous similar attacks, while the patient's appearance is often quite enough to tell us where the blood has come from.

In phthisis the lungs are eaten away into holes or cavities by the disease. During the formation of these cavities the ulceration may eat its way into a large vessel, which thereupon commences to bleed.

Phthisis almost invariably begins in the apex or upper part of a lung, so that the cavities which are the cause of hæmoptysis are more likely to be there than lower down.

The blood which is coughed up is bright red in colour, and the sputum for some days afterwards is stained by it.

It happens sometimes that a medical man is called to a patient who is said to have brought up some blood. He finds the patient, and he finds a basin of blood, and the first thing to be done is to decide whether the latter has been vomited or coughed up.

Occasionally this is difficult; should there be any doubt it is always wiser to be on the safe side, and treat such a case as one of hæmatemesis, and thus avoid the risk of rupture of an ulcer of the stomach.

The points that guide us in coming to a decision as to the seat of hæmorrhage are:

(1) **Previous history of patient.**

(*a*) *Hæmatemesis.*—We should get a history of dyspepsia, and tenderness at the pit of the stomach.

(*b*) *Hæmoptysis.*—History of wasting, cough, and night sweats.

(2) **Mode of onset of attack.**

(*a*) *Hæmatemesis.*—Appearance of blood, preceded by faintness.

(*b*) *Hæmoptysis.*—Sudden appearance of blood without any warning symptoms.

(3) **Character of blood which has been brought up.**

(*a*) *Hæmatemesis.*—Probably dark in colour, and possibly partially clotted.

(*b*) *Hæmoptysis.*—Bright red and frothy.

Should there be any doubt, the coughing up of blood-stained sputa, or the passage of a tarry motion, will settle the point within the next twenty-four hours.

Treatment of Hæmoptysis.—Hæmoptysis sometimes proves fatal at once, either from the severity of the hæmorrhage or from suffocation, the bronchial tubes of both lungs becoming killed with blood The patient must be kept perfectly quiet in the semi-recumbent position, and not allowed to move or talk, while you should do your best to allay his alarm, for, if he is nervons and excited, the heart will beat more quickly. If you have been told from which lung the hæmorrhage will probably come, you should place the patient on his side with that lung undermost, to prevent as far as possible the flooding with blood of the tubes of the other lung.

No food or drink should be given him until the doctor has seen him, though he may be allowed to suck a little ice, as that assists in checking the cough, which, if troublesome, is liable to disturb any clot that is forming in the mouth of the bleeding vessel.

An ice-bag is the most common form of local application. Phthisis almost invariably commences in the upper part of the lung, which is, therefore, the probable seat of hæmorrhage in such a case as this. If you do not know from which lung the blood is coming, you should place your ice, for five minutes at a time, alternately beneath each collar-bone on the front of the chest. A fomentation or hot bottle applied to the abdomen might also do good by drawing blood to that part from the lungs. This can be at once obtained while ice is not always at hand. As regards drugs, nitrite of amyl is often used. It acts immediately by causing a general dilatation of the arteries all over the body and so lowers the blood-pressure in the lungs. A few drops are put up in a small glass capsule. This is broken in a handkerchief and the drug inhaled.

5. **Hæmorrhage from the Bowel.**—When profuse, this form of internal hæmorrhage always results from the ulceration of typhoid fever. When speaking to you about that disease I described the causation and treatment of this complication.

Here, as in hæmoptysis and hæmatemesis, we trust to nature to stop the hæmorrhage. All that we can do is to try to assist her. We therefore place our ice-bag, suspended from a cradle, on the abdomen, just above the right groin, in the hope that it will cause some contraction and consequent diminution in size of the blood-vessels in the small intestine beneath; and we give full doses of laudanum by the mouth to keep the bowel quiet, and so prevent the disturbance of any clot that is beginning to form.

What a Nurse ought to do in these Cases.—Though it is quite true that in the last three forms of internal hæmorrhage we trust almost entirely to nature to stop the bleeding, yet a nurse may materially assist; in the first place, by allaying the fears of those who are looking to her for help; and in the second place, by preventing the too hasty administration of stimulants by anxious friends. The patient does not need such treatment merely because he is faint after the loss of blood, but only when that faintness threatens to pass into collapse. In that case, before using alcohol, lower his head, give him ammonia to smell, and apply a hot sponge over the region of the heart. These are milder methods of stimulation, which do not affect the circulation so powerfully as does the administration of brandy by the mouth.

In speaking to you about these cases of internal hæmorrhage I do not wish you for a moment to suppose that I approve of a nurse, except in an extreme emergency, ever taking upon herself to treat a patient. The object of this lecture is rather to enable you to meet one of these cases, should you be called upon to do so, in a calm and collected manner. If you are only able to quiet the friends, and relieve the patient's fears, you will have done your duty well.

More than this you need not do, unless you are some distance from a doctor, and without instructions from him as to the course of action you are to pursue in the event of hæmorrhage taking place.

Should it be certain that help cannot arrive for some time, you might, I think, safely go farther, and in the case of bleeding from the stomach, lungs, or intestine, apply ice, as near as possible to what you consider to be the seat of hæmorrhage, taking especial care, should you suspect that it is in the stomach, to keep that organ empty. If the blood is coming from the nose, or a tooth socket, you might use the simple methods which I have mentioned for dealing with these accidents.

More than this you ought not to do; that is to say, you must not take upon yourselves to administer drugs, like opium, though this may be a part of the treatment of such cases; for medical men are jealous, and very rightly so, of any unqualified person taking upon himself or herself to practise the art of medicine. If, however, you restrict yourselves to doing no more than I have recommended, and that *only when clearly necessary*, you may materially assist in the saving of a life, and escape being censured for unnecessary interference.

XVII

DROPSY

To-day I am going to take dropsy as the subject of my lecture. This, which is merely a symptom and not a disease itself, is, in one form or another, of extremely common occurrence in medical wards. I propose to take the three principal forms of dropsy, and explain the way in which they are produced. It would be impossible for me within the limits of a single lecture to discuss every ailment which has dropsy for a symptom, nor would it profit you if I attempted to do so.

By "dropsy" is meant an accumulation of clear fluid in some part of the body not caused by inflammation in that part. It may be universal—*i.e.* the whole of the body may be dropsical, or it may be local—*e.g.* there may be fluid only in the abdomen, or in one pleural cavity, or it may be confined to the lower extremities. This fluid is of a light straw colour, and is quite clear. It is the fluid part of the blood, or plasma, without either the white or the red corpuscles.

When fluid accumulates in a part such as the chest or abdomen—as the result of inflammation in that part, it is not spoken of as dropsy, since that is always non-inflammatory in its origin.

The three most common causes of dropsy are—

(1) *Inflammation of the kidneys.*—In its early stages this produces a general dropsy. Later on it affects the heart, with the result that we get the dropsy of heart disease.

(2) *Disease or weakness of the heart.*—In these cases the dropsy commences locally in the feet, and tends, by spreading upwards, to become general, but does so more gradually than in acute inflammation of the kidneys, and not to the same extent.

(3) *Obstruction to the passage of blood through the portal vein.*—This produces a purely local dropsy, viz. an accumulation of fluid in the abdominal cavity, "ascites" as it is called.

I shall now take these three forms of dropsy, and explain, as well as I can, their method of production, and their usual line of treatment.

(1) **Dropsy from Kidney Disease.**—As a result of inflammation of the kidneys we may get two forms of dropsy. In the early, or acute, stage we have the true renal dropsy; in the late stages of chronic kidney disease we have ordinary cardiac dropsy, owing to the heart having given way under stress of overwork.

True renal dropsy is universal. Everywhere under the skin there is an excess of clear fluid which has escaped from the blood-vessels. This condition is spoken of as "œdema," and, as I explained to you in Lecture viii (p. 85), is demonstrated by the little "pit" that is formed on pressure by the finger. It shows itself first in the eyelids, because the looseness of the tissues in that part readily allows the accumulation of fluid in them. The fluid is able to move under the skin from the higher to the more dependent parts. If a patient with acute inflammation of the kidneys has slept all night lying on one side, that side of his face will be much more œdematous than the other in the morning. Similarly, if he sits up in a chair, the fluid will drain from the upper into the lower parts of his body.

The exact way in which renal dropsy is produced is still a matter of dispute, so I shall not bother you with unprofitable theories.

Treatment. This, as I explained to you in Lecture viii, consists in lightening the work of the kidneys as much as possible in the acute stage. When that has passed, we give drugs called "diuretics" because they promote an increased flow of urine, by means of which the excess of fluid is removed from the tissues, so that the dropsy disappears.

(2) **Dropsy from Weakness or Disease of the Heart.**—Cardiac dropsy, as this form is called, is by far the most common variety. It arises in the following way:

The clear fluid part of the blood, or plasma, is constantly oozing out of the very small blood-vessels, in order that it may take food to the tissues, and also cleanse them. Having done its work, this fluid is removed from the tissues by the lymphatic vessels, and to a larger extent still by the veins. You will readily understand that if there is any obstruction to the passage of blood through the veins, those vessels will not remove this fluid from the tissues as quickly as they should do, with the result that an excess remains in the tissues; in other words, they become dropsical. Just as a piece of ground becomes waterlogged if it is badly drained, so the tissues in any part of the body become waterlogged or dropsical when their veins, which are the principal drains, are working badly.

This form of dropsy, resulting as it does from a weakness in the circulatory system, will naturally first show itself in those parts of the body where the work of that system is hardest—that is, in the lower extremities. If the patient is up and about, cardiac dropsy therefore first appears in the feet, from whence it slowly rises until at last the abdomen and chest are involved. The weak point in the circulatory system in these cases is the heart, which is the pump of that system, and which, from weakness, is unable to prevent the blood from stagnating in the veins, and hence producing dropsy.

I must now say something about the causes which lead to this incapacity on the part of the heart to do its work properly. Such failure of the heart may be the result either of disease in the organ itself, or it may give way under the strain of too hard work brought on by disease in some other organ, such as the kidneys or lungs.

The Heart.—The heart is a hollow organ, divided into four compartments, the walls of which are composed of strong muscular fibres which, when they contract, empty these cavities by squeezing their contents out of them. The two smaller of these four chambers are called the auricles, the two larger the ventricles. The two auricles contract simultaneously, and, when they are empty, the two ventricles immediately follow suit. The right auricle and ventricle form the right half of the heart; the other two the left half.

While tracing the course of the blood through the heart let me ask you to follow carefully what I am saying upon this diagram (Fig. 24), in which I have, so to speak, divided the heart into its two halves, the right and the left, separated by the lungs, so that you can follow the blood in a straight line from the moment it

Fig. 24.

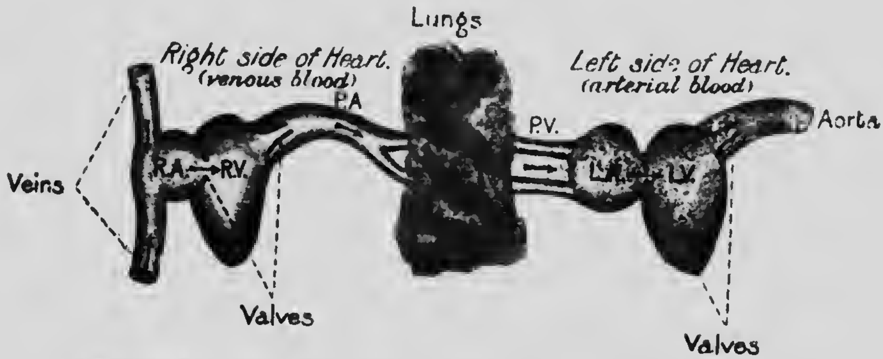


Diagram to explain the course of the blood through the heart and lungs. The arrows show the direction in which it is flowing.

R.A. Right Auricle.	L.A. Left Auricle.
R.V. Right Ventricle.	L.V. Left Ventricle.
P.A. Pulmonary Artery.	P.V. Pulmonary Veins.

enters the heart a dark venous stream, until it finally leaves it of a bright arterial hue.

To put the heart together again, all you have to do is to move the right side across the diagram and place it by the left, so that the two ventricles lie side by side, and the two auricles do the same. The lungs, with the vessels running between them and the heart, will then lie at the back of that organ.

All the veins which bring blood back to the heart from various parts of the body empty themselves by means of two large vessels into the right auricle. This, when full, contracts, and forces its contents into the right ventricle. From this chamber, as you see by the diagram, the venous blood passes to the lungs, whence it very shortly returns as bright arterial blood, re-entering the heart by way of the left auricle. From this chamber it passes into the left ventricle, whence it is pumped into the arteries all over the body. The two auricles therefore receive the blood as it enters the heart, while the ventricles pump it out again. The right side of the heart contains venous blood, the left side arterial.

Each of the openings, by means of which the blood passes from one chamber of the heart into the next, is guarded by small delicate membranous flaps called *valves*. These, which you see represented in the diagram I have just drawn (Fig. 24), are swept aside by the stream of blood as it passes forward from the cavity behind them into the one in front. When, however, that front cavity is emptying itself, the edges of these valves are pressed closely together, so that not one drop of blood can get back into the cavity from whence it has just come.

Fig. 25 represents the opening through which the blood passes on its way from the left auricle into the left ventricle. A and B are the two valves, which you see completely cover the opening and close it, so that the blood cannot get back into the auricle when the ventricle contracts. It all passes forward into the aorta. These two valves are called the " mitral " valves, because together they are supposed to resemble in shape a bishop's mitre.

Before passing on, let me remind you again of the fact that when the right auricle is emptying itself into the right ventricle, the left auricle is doing the same to its ventricle. Similarly, when the right ventricle is pumping the blood into the lungs, the left is emptying itself into the aorta.

Disease of the Heart.—Sometimes one set of valves fails to completely close the opening which it guards, with the result that blood flows back again into the cavity it has just left as well as forward in the proper direction. This state of affairs is most commonly caused by inflammation of the valves, in consequence of

Fig. 25

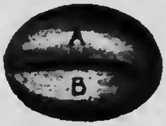


Fig. 26.

which their delicate tissue becomes puckered and deformed, so that their edges do not meet. This condition is represented in Fig. 26, which shows that the blood could flow back again between A and B into the left auricle.

The most common cause of inflammation of the valves is acute rheumatism and after that chorea, or St. Vitus's dance, as it is popularly called. The valves which are almost always the ones affected by these two diseases are the mitral valves, which I have represented in the last two diagrams. When they are inflamed, the patient is said to have "mitral disease," that is to say, disease of the mitral valves.

How Mitral Disease causes Dropsy.—The next step is to e[illegible]lain how this failure of the mitral valves

(I am taking them as an example) to properly close the opening between the left auricle and the left ventricle leads to the production of dropsy. This you will have less difficulty in understanding if you carefully study Fig. 24.

When the left ventricle contracts and empties itself, all the blood which it contains should pass forward into the aorta. If, however, the opening between it and the left auricle is not completely closed by the mitral valve, some of the blood will pass back again into the auricle. This condition is called "mitral regurgitation," which means a flowing back of the blood between the two flaps of the mitral valve. In consequence of this, the passage of blood from the lungs into the left auricle is obstructed, since that chamber is being filled by the ventricle in front as well as by the lungs behind. The right ventricle will therefore have more difficulty in pumping the blood through the pulmonary vessels. As time goes on this difficulty increases, until at last the right ventricle gives way under the strain and dilates, with the result that blood flows back from it into the right auricle. In consequence of this there will be an obstruction to the flow of blood through the vessels which empty themselves into the right auricle.

Now the vessels which empty themselves into the right auricle are the two great veins which bring back the venous blood to the heart. Anything which retards the flow of blood through these two veins will have a similar effect upon the venous circulation in all parts of the body—that is to say, all the veins will be over-full of blood. There will be a similar block in the lymphatic system which empties itself into the big veins at the root of the neck. In consequence of this obstruction to the flow of blood through the veins and lymph through the lymphatics, these vessels are not able to properly perform their work of draining the tissues, which will therefore contain an excess of fluid; in other words, dropsy will appear.

This shows itself first in the feet, since that is the region where it is most difficult to keep up an efficient circulation, owing to its distance from the heart, and also to the fact that when we are in the erect posture the blood has to flow uphill on its way through the veins and lymphatics to the heart. You must not, however, suppose that everybody who has œdema of the feet has heart disease, because that would be quite wrong. It is not at all an uncommon symptom in anæmic people, and in their case merely denotes a slight weakness in the circulation. It is only when found in conjunction with other evidence of heart disease that it has a serious significance.

I have gone at considerable length into this explanation of the working of the heart in health, and also when diseased, because it is a most difficult subject for nurses to understand. At the same time, it is such a very common condition that you ought to know something about it.

Symptoms of Mitral Disease.—It would be quite out of the question for me to describe the symptoms of the various forms of heart disease, and, moreover, it would be a waste of time on your part to listen to them. I shall, therefore, take disease of the mitral valve, which is the most common form of heart affection, as an example, and briefly describe the principal symptoms of such a case.

To begin with, they may for some time be hardly noticeable, there being nothing more than slight palpitation and shortness of breath on exertion. As the disease advances, the heart muscle begins to give way under the strain of overwork. It is not able to contract as strongly as it did, and so gives way and stretches, the heart becoming, in consequence, larger than it previously was. With this dilatation or giving way of the heart muscle we get pain and distress in the region of that organ, palpitation, shortness of breath and swelling of the feet. This state of affairs, unless relieved by treatment, steadily gets worse. The œdema or dropsy, which was at first confined to the feet, gradually spreads up the legs. When the abdomen is reached fluid makes its appearance in that cavity, and subsequently in one or both sides of the chest.

The patient is now "waterlogged." Owing to the stagnation of blood in the lungs he is much troubled by cough, difficulty of breathing and sometimes by hæmoptysis—that is to say, spitting of blood. There is commonly a slight degree of jaundice. This shows itself especially about the forehead, the cheeks being a deep red colour, and the lips and ears of a more livid hue from congestion of the lungs. This appearance of the face is very characteristic of mitral disease. The condition of the patient is now one of extreme discomfort. He can get but very little rest, since, owing to his dyspnœa, he is obliged to be propped up in bed. This, together with the very marked palpitation, shortness of breath, and aching pain in the back and swollen legs, combine to render his existence a misery. Unless relieved by treatment, he steadily gets weaker, and finally dies of exhaustion.

Treatment of Cardiac Dropsy.—We apply to these cases the same great principle that guides us in our treatment of other diseases—viz. we endeavour to make the work of the heart as light as possible. This we accomplish by means of—

(*a*) *Rest.*—The work of the heart is much harder when we stand up or move about than it is when we lie down in the recumbent or semi-recumbent position. We therefore keep patients with cardiac dropsy in bed. As a rule they have to be propped up with pillows, since their shortness of breath is markedly increased when they lie down. Very severe cases are most comfortable when allowed to sit up in an armchair, with their legs wrapped up in a blanket and their feet on the floor. In that position the abdominal organs cannot press upon the heart and lungs, which are also relieved by the draining of the ascitic fluid from the upper to the lower parts of the body, while the muscles of respiration are able to work at the greatest advantage.

(*b*) *Depletion—i.e.* the withdrawal of fluid from the body.—By diminishing the quantity of fluid in the body we lessen the amount in the circulatory system, and so relieve the heart by giving it less blood to pump through the vessels. Depletion may be effected in various ways.

(i) The bowels, the kidneys, and the skin can, by means of drugs, be rendered much more active, and so a considerable quantity of fluid be removed from the system.

(ii) In severe cases the legs are punctured with a needle or a knife, and thus the fluid which has accumulated beneath the skin is allowed to drain away. Sometimes a tiny metal tube, called a Southey's tube, is inserted with the same object.

(iii) In very severe cases bleeding is performed, usually from a vein in front of the elbow. This is done when the patient is very livid, and suffering greatly from difficulty of breathing. It generally relieves him markedly for a time, because it at once diminishes the work of the heart by lessening the amount of blood which is entering it from the veins. Leeches also are not infrequently applied.

When sufficient fluid has accumulated in the abdomen, or in either side of the chest, to seriously inconvenience the patient, it is drawn off with an aspirator, or by means of a trochar and cannula.

(*c*) *Drugs.*—In addition to diminishing the work of the heart by means of rest and depletion, we give drugs to stimulate it, and so increase the force of its contractions. Such drugs are ether, ammonia, and strychnine. The drug, however, which is useful above all others in cases of mitral disease with dropsy is digitalis, which is the Latin name for foxglove. This drug acts by steadying the heart, which is very irregular in these cases, and slowing it, so that its beats are rend· slower, stronger, and more regular. Thus the organ acts with greater force and more efficiency upon the blood which is contained in its cavities.

Nursing of Heart Disease.—Cases such as I have just been describing with marked dropsy and dyspnœa are both trying and tiring to the nurse. It is but seldom that they are able to remain in the same position for any length of time; they are always endeavouring to find one that shall bring them some degree of comfort.

Thus they need constant attention, while, owing to their weight and bulk (due to the dropsy), they are, if adults, awkward to move. Especial care must be taken to guard against bedsores, which in these cases are very slow to heal. The diet must be light and easily digestible. It should not contain too much fluid, as that will increase the fulness of the blood-vessels and so add to the dropsy. Careful attention must be paid to the bowels. It is essential that they should act every day without any straining on the part of the patient.

Patients who are taking large doses of digitalis should be kept as much as possible in the semi-recumbent position. Should they sit up suddenly, there is risk of their being attacked with faintness, giddiness, or vomiting. Digitalis has a tendency to accumulate in the system, and suddenly to produce symptoms of poisoning. For these symptoms you should be carefully on the watch. They are a very slow and irregular pulse, sickness and headache.

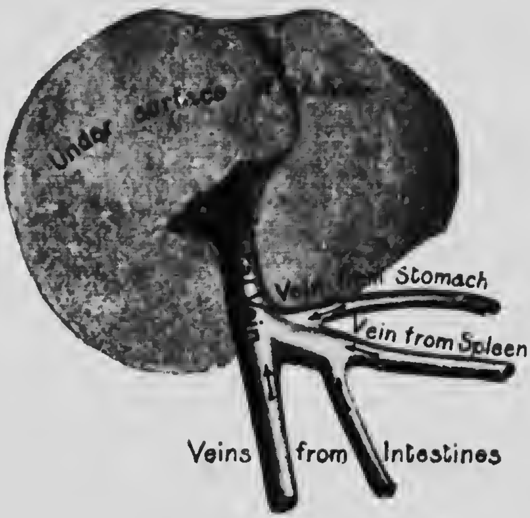
When a patient's legs have been pricked for the relief of dropsy, great cleanliness is necessary, otherwise there is a risk of inflammation starting in the neighbourhood of the punctures.

(3) **Dropsy from Obstruction to the passage of Blood through the Portal Vein.**—Dropsy produced in this way always takes the form of ascites—that is to say, the fluid collects in the abdominal cavity and nowhere else.

The portal vein is a large vessel which is formed by the union of the veins which run from the stomach, intestines, and spleen. In Fig. 27 you see those veins uniting to form a short thick trunk, which disappears in t'.. liver, where it breaks up into an immense number of branches, which run through that organ in every direction.

Cirrhosis of the Liver.—This is a disease in which there is a growth of fibrous or scar tissue in the substance of the liver round the branches of the portal vein.

Fig. 27.



The Portal Vein.

This scar tissue, as time goes on, gradually contracts, just as it does on the surface of the body after a severe burn. The result of this contraction is that the branches of the portal vein, round which this scar tissue has formed, are squeezed by it, and so rendered smaller; consequently the blood is not able to flow through them as easily as it formerly did. Now I have just explained to you, when speaking about heart disease, that when there is obstruction to the passage of blood through a vein, the tissues from which that vein is bringing blood tend to become dropsical, since the vein is not draining away from them as quickly as it should the fluid which is constantly oozing into them from the capillaries. The same thing happens when the portal vein is obstructed. Normally it should drain the abdominal cavity by means of the veins which unite to form it. When, owing to pressure upon its branches within the liver, the circulation through it is impeded, it ceases to properly perform its functions as a drain, and so fluid accumulates in the abdomen, and the patient is said to have ascites. Ascites may also be caused by tumours pressing upon the main trunk of the vein just before it enters the liver.

In addition to ascites, there is in cirrhosis of the liver, as a rule, a slight degree of jaundice. Vomiting of blood is another symptom that is frequently present in this disease. It is due to the over-full condition of the veins of the stomach, one of which may in consequence give way and bleed into the cavity of that organ. This, when moderate in amount, is useful rather than otherwise, since it relieves the congestion in the abdominal veins.

The outlook for patients with cirrhosis of the liver and ascites is gloomy in the extreme. A few recover after repeated tappings, but the great majority gradually waste away and die of exhaustion, or become delirious and finally comatose.

Treatment of Ascites.—If this is due to cirrhosis of the liver it is very important that all alcohol should be stopped, since this is frequently the cause of the disease, and, if continued, will only aggravate the

complaint. In the last stage of the illness, when all h
of cure has been abandoned, alcohol may, however
given with a view to sustaining life as long as possib

The next indication is to drain away as much flui
possible by means of the bowel and kidneys. We th
fore give drugs which will keep these organs active.

Finally, when there is such a considerable collec
of fluid within the abdomen as to cause the pat
serious discomfort, we empty that cavity by mean
a trochar and cannula. Inasmuch as the cause of
dropsy has not been removed (*i.e.* the cirrhosis of
liver), the fluid collects again and again, until a
repeated tappings the patient dies.

XVIII

DISEASES OF CHILDREN

TO-DAY I am going to take a few of the more common diseases of children, and explain their symptoms and treatment. Before doing so, I must say something about the difference between the symptoms of disease in young children and in older patients.

One thing which you must never forget is that a very trifling matter, such as a slight chill, or a little indigestion, may produce the most alarming symptoms in a child, symptoms that would be quite impossible in an adult. On the other hand, a child, if it is much exhausted by disease or want of food, may present hardly any symptoms at all, though suffering from an acute illness such as pneumonia. In the first instance the indications are more urgent than they would be in the case of an adult; in the second instance the opposite holds good. This apparent contradiction is due to the extremely sensitive and excitable character of a healthy child's nervous system, in consequence of which it is easily upset by trifling ailments, so that exaggerated symptoms are produced; while, on the other hand, it is more quickly exhausted by illness and want of food, with the result that it then responds only feebly to the stimulus of disease. You must, therefore, be on your guard against underrating the importance of an illness occurring in one of these weakened children because the symptoms are not so urgent as you have been accustomed to see in adults. Rather, the danger is greater, the lack of symptoms indicating a serious defect in vitality. It is therefore most essential that you should exercise your powers of observation to the utmost, so that you may gain all the information possible from a child's expression, its cry and posture. On these points I shall next say a few words.

Observation of Patient—

(*a*) *Expression.*—If a child is in pain, it will always show it in its face. Sometimes it is possible to tell by the expression in which part of the body the pain is situated. According to Dr. Eustace Smith, "pain in the head is indicated by a contraction of the brows: in the chest by a sharpness of the nostrils; and in the belly by a drawing up of the upper lip." Exhaustion, which sometimes comes on very rapidly, especially after acute diarrhœa, is shown by depression of the anterior fontanelle in infants, by pallor of the face with lividity of the lips, by sinking in of the eyes, with incomplete closure of the lids during sleep, so that the white of the lower half of the eyeball is seen. Exhaustion when extreme is a symptom of great gravity, and one for which you must carefully watch. Stimulants internally, and immersion for three or four minutes in a hot mustard bath, are the most efficient means of overcoming this condition. To and fro movements of the nostrils during respiration are a sign of lung trouble.

(*b*) *Cry.*—The character of an infant's cry often gives as much information as the articulate speech of an adult. A child that is hungry gives vent to a prolonged passionate cry, after which it tries to extract nourishment from its fingers or thumbs, and failing to do so cries again. With pain in the abdomen we get a loud paroxysmal cry, accompanied by a drawing up of the legs, with exhaustion a low whine. With meningitis we get at intervals sharp piercing screams, the child between whiles lying quietly on its back. When there is inflammation of the larynx, the voice is hoarse and whispering. With inflammation of the lungs a child, as a rule, cries but little, because of the pain which a deep breath causes it.

(*c*) *Posture in bed.*—This should be noted by the nurse as sometimes conveying a certain amount of information. Healthy children, when sleeping, commonly lie on their sides; when seriously ill, or suffering from exhaustion, on the back with the face directed upwards. Drawing of the head backwards may be due to meningitis. Abdominal pain will cause a child to draw its legs up. This posture soon after a meal is a sure indication that food is the cause of the trouble.

To see if a child is losing flesh examine the inner sides of its thighs. Acute diarrhœa will quickly make these parts soft and flabby to the touch, with wrinkling of the skin from the wasting of the fat which lies beneath it.

Take care that any children which you nurse have plenty of fresh air, but at the same time keep them warm. Do not let them suffer from cold hands and feet. Young children are very prone to do so. In most cases they do not seem to be any the worse for it, but this condition carries with it a certain element of danger. It means that the blood which should be circulating in the extremities and keeping them warm has been driven inwards, so that the organs in the interior of the body contain more than their share of blood—in other words, they are congested. Congestion, as I have already told you, is the first step towards inflammation, though it does not necessarily mean that every organ which is congested will subsequently become inflamed. Still, that organ is more likely to be so than one that is not congested. Of the abdominal organs, the stomach and intestines are especially liable to be upset and to work badly as the result of congestion. Hence, children who suffer from cold feet and hands are more likely to have pain after food, colic and diarrhœa, than those whose extremities are warm. Similarly they are more liable to bronchitis. Sunlight should never be kept away from a child unless it is shining in its face, in which case the blind should be temporarily lowered. Children, like everything else that is growing, are the better for sunlight.

Summer Diarrhœa.—This is a complaint that is most common in the latter part of the summer. It occurs for the most part in very young children, who are still being fed largely or entirely upon milk. It is therefore in many cases probably due to germs which have got into the food, and, favoured by the hot weather, have grown in it. It is responsible for a very large number of deaths every year.

Symptoms.—The symptoms vary much in intensity. There may be merely a moderate looseness of the bowels, with a temperature that is normal or slightly raised; or there may be a most acute diarrhœa, with severe vomiting, and a temperature high at first, but quickly falling below normal, the child being reduced in a few hours to a state of collapse. This form of the complaint, which is very fatal, is called "infant's cholera" from the resemblance which its symptoms have to those of ordinary cholera. In an average case of summer diarrhœa the child passes several watery evacuations in the course of the twenty-four hours, while at the same time it vomits curds of undigested milk. If the disease be not checked, the patient in the course of a few very days gradually sinks into a state of stupor, taking no notice of anything, refuses its food, and dies of exhaustion.

Treatment.—If the symptoms are at all acute, milk is stopped entirely for twenty-four or thirty-six hours, its place being taken by such bland and easily absorbed liquids as whey, veal broth, or barley water with the whites of two raw eggs added to each pint. Such a diet does not contain much nourishment, but it provides the child with plenty of fluid, which is very essential when it is losing so much in its stools. Moreover, it gives practically complete rest to the inflamed intestine, which is of the highest importance in its present irritable condition. If the symptoms seem to be abating at the end of twenty-four hours, a little peptonised milk and fresh raw meat juice may be cautiously administered, but the whey or broth should be only gradually discontinued.

As regards the medicinal treatment of these cases, if the child is not collapsed, some doctors consider it advisable to commence with a dose of castor oil, so as to ensure the removal of all irritating matter from the bowel. The further treatment varies according to the individual views of each practitioner. A little opium is frequently given to relieve pain and quiet the intestines. Combined with it is generally administered one of the many drugs which by their antiseptic properties aid in preventing intestinal fermentation and the growth of germs.

Washing out the bowel is certainly a very efficacious way of treating acute diarrhœa in young children, while it has the advantage of frequently enabling one to do without the help of drugs. At least a pint of warm water should be introduced into the intestine by means of a soft rubber catheter and the barrel of a glass syringe. This should be done very slowly, the child's buttocks being well raised, to enable the fluid the more easily to run up the bowel. When it returns, it as a rule brings with it a good deal of mucus and a little fæcal material.

"If a starch and opium enema is to be given for repeated looseness of the bowels it is a good plan to pass a thin strip of lint soaked in a two per cent. solution of cocaine through the anal aperture, leave it in for half a minute, and then give the enema. By this plan the irritability and soreness of the sphincter, which result from continuous diarrhœa, are overcome, and the starch and opium are more likely to be retained."

For the collapse which is induced by the choleraic form of this complaint a bath at a temperature of 100°, gradually raised to 106°, with two teaspoonfuls of mustard carefully stirred to each gallon of water is an excellent remedy. The child should be supported in it till the nurse's arms begin to tingle, then taken out and wrapped in warm blankets. Frequently repeated small doses of brandy are also very useful in this condition. In very severe cases the most urgent indication is to replace without delay the fluid which the child has lost. This is most easily and most certainly done by injecting 6 to 8 ounces of warm saline solution beneath the skin at the side of the chest. The effect is usually immediate and very striking. The child loses its shrivelled appearance, its colour improves, and it often at once falls asleep.

Thrush is a plant, and belongs to the same order (fungi) as the common mildew. It appears as a layer of thin white membrane, or in small white patches on the tongue, palate, cheeks and gums. These patches are easily wiped off. It is apt to appear in young children who have suffered from an exhausting illness of any kind, or from want of sufficient food. It may spread down the gullet into the stomach.

Treatment.—The child requires to be put upon a nourishing and easily digestible diet, and the mouth wiped out after each meal with a piece of lint or soft rag which has been dipped in the glycerine of borax.

Incontinence of Urine.—May be due to a variety of causes. In most cases there is both weakness and irritability of the bladder, so that it empties itself as soon as a small quantity of urine has collected in it.

Treatment is tedious, but must be persevered with, if success is to be achieved. The child should not be given anything to drink for at least an hour before bedtime; it should be roused in the night to pass urine, made to sleep on its side, and the foot of the bed should be slightly raised. This latter measure lessens the pressure of the urine upon the neck of the bladder, and so diminishes the risk of incontinence. Belladonna is the drug that is most commonly given. It acts upon the irritability of the bladder. Above all things, never speak harshly to a child for wetting its bed.

Chorea.—The common name for this complaint is St. Vitus's dance. It occurs for the most part in children, and much more frequently in girls than boys. Fright and mental shock are two of the most common causes.

Symptoms.—Chorea has been defined as an "exaggerated fidgetiness." This expresses very well the character of the complaint. A child who is suffering from it is never still. She is constantly moving some part of her body, rolling her head from one side to the other, making grimaces, throwing her arms about, opening and shutting her hands. The movements are jerky and quite devoid of purpose, and cannot be prevented by the patient. Many children are punished in the early stages for presumed carelessness in breaking things before the cause of their doing so is detected. If a child with chorea is asked to put out her tongue, she does so with a jerk, and then withdraws it suddenly; as she lies in bed she is constantly wriggling about, her speech is irregular, she cannot lift a mugful of milk without spilling some.

Chorea varies much in degree in different patients. There may be only slight twitchings of the face and fingers, or the movements may be so violent as to render keeping the patient in bed a difficult matter. It may affect one side of the body only. In a large proportion of cases symptoms of inflammation of the heart develop during the course of chorea.

It may last from a few weeks to as many months. The vast majority recover, but a few die of exhaustion, the movements in such cases being very violent and the temperature high, while a small number succumb to acute inflammation of the heart.

Treatment.—Rest in bed, which should not face the window, since a strong light tends to increase the movements. Plenty of fresh air and nourishing, easily digested food are both essential. Every care must be taken to avoid doing anything which might startle the child. An immense number of drugs have been tried for the cure of this disease. The most popular, and probably the most beneficial, is arsenic, given in full doses. It acts as a nerve tonic. In very violent cases a water- or air-bed is necessary, while padded boards have to be placed along the sides of the bed to keep the child from falling on to the floor. Such patients should not be allowed to drink out of a glass vessel nor use a fork.

Chorea in adults is fortunately rare, as it is very difficult to cure.

Convulsions are much more common in infants than in older people, and are also of much less serious import. The reason for this is generally held to lie in the much greater excitability of a young child's nervous system. It is very sensitive, and hence easily upset, a convulsion being the result. Convulsions may be started in an infant by a variety of causes, *e.g.* rickets, worms, indigestion, severe diarrhœa, teething, brain disease, epilepsy, and inflammation of the kidneys, or the onset of an acute illness such as pneumonia.

Symptoms.—The face turns pale, the hands stiffen, and the body becomes rigid, the eyes roll upwards, and the lips and eyelids twitch. In a few seconds the convulsion is over. In more severe cases the convulsive movements involve the whole of the body and there is marked lividity of the face. These approach more nearly to the epileptic fit, and indeed many of them are of that nature.

Treatment.—This you should all be acquainted with, as these cases belong to the class of medical emergencies in dealing with which, under certain conditions, a nurse has to rely upon her own resources. The usual treatment is to put the child into a hot bath (T. 100°–105°), and while there wrap a cloth wrung out of cold water round its head. After keeping it in the bath for about three minutes, it is taken out, dried, and put to bed, an ice cap being sometimes then applied to the head. If the bowels are not acting freely, an aperient at the same time is given, a grain or two of calomel being placed upon the tongue. The object of this treatment is to draw blood from the brain, soothe the irritated nervous system, and induce relaxation of the contracted muscles. In severe cases, where there are repeated convulsions, a few whiffs of chloroform are generally administered by the medical attendant.

Croup.—This also is a medical emergency and therefore of interest to you as nurses. There are two forms of croup, the "true" and the "false." True croup is caused by the growth of diphtheritic membrane in the larynx. I have already explained the symptoms and treatment of this condition in Lecture xi.

(*a*) In "*false*" or spurious croup urgent symptoms of apparently impending suffocation come on suddenly, frequently in the middle of the night, the child waking up with marked difficulty of breathing, a barking cough, husky voice, and livid face. These apparently most dangerous symptoms as a rule quickly subside, and the child falls asleep. A similar attack is very likely to occur during the next two or three nights, and subsequently whenever the patient catches cold. The symptoms are probably due to a slight inflammatory swelling of the upper part of the larynx, which during the child's sleep becomes plugged with mucus. Directly this is expelled, the symptoms subside.

Treatment.—Hot fomentations to the neck. Frequently an emetic is administered, since the windpipe and larynx tend to be cleared of anything that is obstructing them when the contents of the stomach are expelled.

(*b*) There is another form of false croup called "*spasmodic*" croup, since its symptoms are due to a sudden spasmodic contraction of the muscles which close the opening into the larynx, so that no air can get into the chest. It is very frequently found in association with rickets. There are several causes of spasmodic croup, among them being crying, indigestion, teething, &c. These all act by irritating the excitable nervous system, the result being a local convulsion in the muscles of the larynx.

Symptoms.—An attack of spasmodic croup is generally preceded by slight crowing sounds when the child draws in its breath. These gradually become more marked. When an attack comes on, breathing suddenly ceases, the child throws its head back, its face becomes livid, and its chest quite fixed and motionless. It seems as if it must die, when suddenly the spasm relaxes, and air enters the larynx with a loud crowing noise. In a few minutes the child is quite itself again. Occasionally the spasm lasts so long that the patient dies.

Treatment.—This is really one form of infantile convulsion, for which the rickets is largely responsible, because it sets up an irritable condition of the nervous system. The immediate treatment for the attack is therefore the same as that for convulsions, viz. a hot bath with cold cloths to the head. After the attack is over, the child's general health and its surroundings should receive careful attention.

Rickets.—This is, among the children of the poor, a most common complaint. It is largely due to want of fresh air and proper food, the latter usually containing too much starch and too little fat.

Symptoms.—A large head and protuberant abdomen, a tendency to bronchitis, convulsions, and diarrhœa, restlessness at night combined with profuse perspiration, tenderness of the limbs so that the child cries when handled, delay in the cutting of its teeth, and certain changes in the bones. These latter are of two kinds. In the first place, the bones are soft, so that they bend easily, and hence tend to become curved, if the child's weight is put upon them. This is most marked in the bones of the legs. Secondly, the ends of the bones become swollen. This is usually very marked in the lower end of each radius at the wrist. It is also well seen where the ribs join their cartilages on the front of the chest. There, down each side of the sternum, a row of small hard swellings may be seen and felt. This is called the "rickety rosary," and the ribs are said to be "beaded," since these little swellings look like a double row of large beads under the skin.

The cause of the bone bending, which is so characteristic of rickets, is as follows. Bone at first consists of gristle or cartilage, which, before the child begins to walk, is gradually rendered hard and unpliable by the mixing with it of salts of lime which are deposited in it by the blood. In rickets the bones contain much too small a quantity of these lime salts, so that, instead of being hard and rigid, they consist very largely of cartilage, and hence are easily bent.

Treatment.—The first thing is to remove the cause of the disease. The child must have good nourishing food, especially a sufficient quantity of fat, and plenty of fresh air. While its bones are soft and liable to bend, it should not be allowed to crawl about. It should be carefully handled, because of the tenderness of the limbs. In bed it should wear a long flannel nightgown coming well below the feet, so that when it kicks the clothes off it may still be protected against a chill.

Empyema is a collection of pus in one of the pleural cavities. It is the result of an attack of acute pleurisy. The pleura is the smooth shining membrane which covers each lung, and also the inner aspect of the chest wall where it is in contact with the lungs. When the pleura is inflamed one of three things may happen :

(*a*) The pleura remains dry, but becomes rough from little masses of lymph which are deposited on it as a result of the inflammation.

(*b*) Clear fluid may collect between the lung and the chest wall.

(*c*) Purulent fluid or pus may collect between the lung and the chest wall, in other words an empyema may form.

In adults when fluid collects in the chest as the result of pleurisy it is more likely to be clear than purulent; in children the reverse holds good.

The chief symptoms of pleurisy are obvious only on an examination of the chest, and therefore do not concern you as nurses. The temperature usually rises at night, but is often very irregular. Young children waste very quickly when suffering from this complaint, become very pale, and sometimes have diarrhœa and marked sweating at nights. As a rule, when the child is lying quietly in bed, there is very little difficulty in breathing, even when there is a large collection of matter within the chest.

Treatment.—This consists in letting out the pus as soon as possible. An opening is made through the chest wall, usually at the back just below the angle of the scapula. In young children the ribs are very close together. About an inch of one is therefore removed so as to make an opening which shall admit a piece of large-sized drainage tube. By placing the opening below the angle of the scapula, the abscess cavity is drained at its lowest part, and thus all the pus it contains more certainly removed.

The reason why an empyema should be opened as soon as possible is that if left it gets larger and larger, pressing upon the lung of that side so that little or no air can enter it, and also upon the heart, pushing the latter organ over towards the other side of the chest, and seriously interfering with its working. Indeed, cases of sudden death have occurred from the heart stopping altogether, as the result of pressure upon it by an empyema. For this reason you should be very careful in handling patients with unopened empyemata. Never sit them up in bed, or do anything which can increase the work of the heart. Such patients generally prefer to lie on the side which contains the empyema, as that gives the unaffected lung a better chance of working. This position should be encouraged after the abscess has been opened, as the cavity will then drain better.

After the operation, our great object is to get the lung which has been pressed upon by the abscess to start working again, so that it may expand and fill up the abscess cavity. The sooner it does this, the sooner will the discharge cease. With this object in view we get these patients up, and, as soon as they are strong enough, encourage them to take a little gentle exercise. This makes them breathe more deeply, and so helps to expand the affected lung. Various devices are also employed to assist in bringing about the same result: such as blowing water from one bottle into another, playing a wind instrument, blowing bubbles, or distending the bladder of a football. A change to the seaside is very beneficial in promoting a cure.

You will frequently notice in children who are recovering from an empyema that the ribs on that side become depressed and drawn in, so that the chest wall is flattened. If it were not for this deformity, which allows the two walls of the abscess cavity to meet and grow together—in other words, to heal—the discharge would continue for a very much longer time, if, indeed, it ever ceased.

Meningitis.—The three principal forms of meningitis are :

(*a*) *Suppurative* meningitis, in which the meninges or membranes which surround the brain are covered with a layer of pus. This is very commonly the result of inflammation of the ear, the infection spreading through the bone into the interior of the skull, and there setting up meningitis.

(*b*) *Tubercular*, in which the tubercle bacillus, the germ which is the cause of consumption in the lungs, sets up an inflammation about the base or under part of the brain.

(*c*) *Cerebro-spinal*, due to a special variety of coccus. It is called epidemic, because it spreads, especially among children. Several hundreds of cases have occurred during an outbreak. Of these three forms of meningitis the tubercular is by far the most common.

Symptoms.—These are more obvious and more rapidly fatal in the suppurative variety. In all you may have persistent sickness, headache, a frequent sharp piercing cry, fever, a strong objection to light and noise, convulsions and retraction of the head, so that it is bent backwards upon the neck. This latter symptom is due to irritation of the nerves which run to the muscles of the neck, which, in consequence, are made to contract.

Treatment.—This, as regards the prospect of cure, is very unsatisfactory, tubercular meningitis being a most fatal disease. A few of the cases which are due to ear disease are cured by operation. The patient must be kept perfectly quiet, and protected from all noise and light. An ice cap is usually applied to the head, which should be carefully supported whenever the child is lifted, and the bowels kept open by aperients. Food will consist of fluids which in the later stages of the illness may have to be given through a nasal tube.

In the cerebro-spinal form the outlook is more promising, though the mortality is always very high. The injection of Flexner's serum into the cerebro-spinal canal after the withdrawal of some of its contents has considerably reduced the death-rate. In this form hot baths are given to relieve the muscular rigidity.

Adenoids.—On the posterior wall of the pharynx there is a certain amount of tissue similar in structure to that of which the lymphatic glands are composed. As a result of repeated colds in the head, or following such a disease as scarlet fever, this lymphoid tissue in the pharynx grows and becomes much more prominent than it normally should be. At the same time the tonsils which are composed of similar tissue also become chronically enlarged.

Symptoms.—These vary with the degree of obstruction to respiration. In a well-marked case in which the back of the nose is blocked by the adenoid growths the child is forced to breathe through its mouth, and its hearing is often impaired, owing to the openings of the Eustachian tubes being encroached upon by the adenoids and enlarged tonsils. The constantly open mouth, combined with partial deafness, give a child the typically vacant expression associated with this condition. It snores when asleep; portions of the chest wall are depressed owing to imperfect filling of the lungs with air, a condition which is one of the causes of "night terrors"; it is very subject to colds in the head, which temporarily increase the already existing deafness; and its general health suffers from want of sleep due to the difficulty of breathing.

Treatment.—A case exhibiting the symptoms I have described calls for complete removal of both adenoids and tonsils. Deafness or earache are generally regarded as special indications for operative treatment, since permanent impairment of the hearing may result if nothing is done. On the other hand, the surgeon has always to bear in mind the fact that adenoids tend to disappear at puberty, consequently if the child's health is not suffering, the chest is not deformed, and the hearing is unaffected he may decide not to operate, but to try the effect of breathing exercises and alkaline washes which the child is taught to sniff up through the nose. The former are especially indicated after the adenoids and tonsils have been removed, it being most important that the habit of mouth breathing should be broken and the child be taught to respire through its nose.

Rheumatism is a disease of the greatest importance in childhood, owing to the large proportion of cases that develop heart disease. Unfortunately, its early detection is much less easy than it is in the case of adults, in whom, as a rule, it affects the joints. In children, on the other hand, it is quite exceptional to meet with marked articular rheumatism. In them it takes the form of obscure aches and pains in the limbs, commonly called "growing pains," stiff neck, tonsillitis, and frequent headaches. The cause of these apparently trivial symptoms is often unrecognised, and when the child is finally taken to a doctor on account of anæmia and wasting, he finds it with a heart already damaged past repair.

Treatment.—It is most important that parents should recognise the serious nature of the symptoms I have mentioned when they occur in a child between five and ten years of age, especially if either father or moth has suffered from rheumatism. Complete rest essential, that the work of the heart may be lightened as much as possible. This is less easy to enforce than it is in the case of an older patient whose joints are so painful that there is no desire to move them. Nevertheless, the child must be persuaded to lie quietly in bed, since the heart has a great tendency to dilate, even when it is not actually inflamed. Rest in bed must be continued for at least two or three weeks after all joint pains have disappeared, while if the heart is affected this treatment may have to be continued for as many months.

Ringworm.—Any nurse who is likely to undertake district or school work ought to have a thorough understanding of the nature and treatment of ringworm, in order that she may bring to the notice of the doctor any suspicious condition of the scalp and be able with intelligence to carry out the treatment prescribed. In country districts, where the X-rays are rarely available, ringworm is a most troublesome disease to cure, and its early detection is most desirable not only for the sake of the patient who has it, but also to prevent the infection of others.

Ringworm belongs to the class of vegetable parasites. It is a fungus or mould, like common mildew, and it not only grows on the outside but also inside the hair, and spreads down it to the swollen root or bulb which is embedded in the skin.

Symptoms.—On the scalp it appears as a scurfy patch on which are seen the short stumps of the diseased hairs which have broken off. There may be one or several patches, or a diffuse ringworm affecting practically the whole of the scalp. On the body it takes the form of round scurfy patches slightly raised and of a pink colour.

Treatment.—Ringworm of the body is easily cured by the application of appropriate ointments after the scales have been removed by the use of soap and water. On the scalp its successful treatment is a much more difficult matter, owing to the way in which the fungus grows inside the hairs and also downwards to their roots. It is consequently very difficult to bring a parasiticide in contact with the ringworm spores.

The only certain way of curing the patient is to remove all diseased hairs. As they are very brittle they must be loosened before they can be drawn out without breaking off. The most efficient method of doing this is by the application of the Röntgen rays. The rays do not kill the fungus, but about a fortnight after their use the hair begins to fall out and by the end of another two weeks that part of the scalp that has been treated is quite bald. If the Röntgen rays are not available, an ointment containing a parasiticide such as mercury, sulphur, or carbolic acid is constantly and regularly applied. This form of treatment must be continued for many months. As a result of the continual rubbing in of the ointment slight inflammation of the scalp is set up, which renders it easy to draw out the hairs without breaking them off.

Before the rays are used, or the application of an ointment commenced, the hair should be cut as short as possible, and the scalp thoroughly scrubbed with soap and water. During the whole time that the child is under treatment it should wear a linen cap covering the whole of the head, lined with grease-proof paper, which requires renewal daily. As a rule the head is washed at least once a day and an ointment applied. In the case of the X-rays this is used to prevent the dissemination of infection by the diseased hairs, and also the further infecting of the patient by himself, since the planting of spores on an unaffected portion of his scalp will start a fresh patch of ringworm as readily as if they had fallen on the head of a child who had hitherto been free from the disease. When the treated area is completely bald the child is free from infection. So long as there is any doubt on this point the child should carefully keep to its own brush and comb and towel, sleep by itself, and never be without its linen cap. This will require boiling at least twice a week if grease-proof paper is worn between it and the scalp, and three times a week if tissue paper is used. A spare cap should therefore always be at hand. There can be no doubt that a district nurse who is thoroughly acquainted with the nature and treatment of ringworm is a valuable asset to the school medical officer who is confronted with an outbreak of this disease among the children under his care.

XIX

MASSAGE

I HAVE chosen this subject for to-day's lecture, not with the idea of teaching you massage, but for the purpose of explaining to you the meaning and possibilities of this method of treatment. Before a nurse can become a skilled masseuse she must acquire a thorough knowledge of the various joints and muscles with the movements they perform in health.

There are two points which you must keep constantly before you, and then you will have no difficulty in understanding the object of massage, and the amount of good that it is likely to achieve.

These two points are—

(1) **The Direction of the Current in the Veins and Lymphatic Vessels.**—Having previously explained this matter to you, I need only remind you of the fact that the *fluid in the veins and lymphatic vessels always flows towards the heart.*

(2) **The Causes of Muscular Exhaustion and Growth.**—A muscle grows by absorbing into itself the nourishment brought to it by the blood. The more blood that passes through a muscle, the more

food does that muscle receive, and, therefore, the more quickly does it grow. When a muscle is working it receives more blood, and, consequently, more food than when it is at rest. That is why men whose lives are spent out of doors in heavy and laborious toil present such a sturdy appearance as compared with those who work in banks and offices; for the muscles of the former are constantly doing hard work, and, therefore, as constantly receiving a large supply of blood; while the muscles of the latter do no hard work at all, unless it be for a short time spent in some form of exercise when office hours are over.

When a muscle works, part of it is used up and converted into what we may call waste material or ash. The loss which it thus suffers is more than made good by the extra food which its labour procures for it, by which it builds itself up again. This waste material or ash is constantly being removed from the muscles by the veins and lymphatics. Sometimes, when hard work is being done, it is produced more quickly than these vessels can take it away, and then the muscle becomes clogged, or choked, by the ash of its own making. It is then said to be *exhausted*, since it has to stop work until its substance has been cleansed of the waste products by the blood. All the different forms of machinery which have been invented by man need similar cleansing, or they, too, would cease working.

Take, too, the case of a fire which is choked with dust and ash, and observe how differently it burns after these have been raked out.

Precisely similar treatment is necessary in the case of the human fire and for the same reason.

Muscular exhaustion, then, *is due to the presence in a muscle of an excessive quantity of that waste material which is the result of its own work.* Directly that is removed, the exhaustion will pass off.

When speaking on the subject of inflammation, I told you that the fluid part of the blood is constantly oozing through the walls of the capillary blood-vessels, and

Fig. 28.

Diagram to explain the effect of massage upon the circulation of a muscle.

soaking into the tissues around them, and that it does so with a twofold object—

(*a*) *To carry food to the tissues.*

(*b*) *To cleanse them,* by taking away the waste material or ash which they have formed when working.

Having done this, part of the fluid returns to the heart by the veins, and part of it by the lymphatic vessels.

The **object of massage** is to hasten the passage of this fluid through the various tissues, especially the muscles, and its removal from them by means of the veins and lymphatics; in other words, to quicken the current in these vessels.

In this diagram (Fig. 28) I have drawn a muscle with an artery entering one end of it, and several vessels, representing veins and lymphatics, leaving the opposite end.

The fluid which escapes from the arterial capillaries slowly filters through the muscle, feeding and cleansing it as it passes, and finally gets into the veins and lymphatics at the other end, and so back to the heart again. Now, if we were to take that muscle, and, starting at its left-hand extremity, slowly squeeze it in the direction in which the arrow points, that is, towards the veins and lymphatics, we should press out of it a good deal of the fluid which it contains. If we squeeze it out of the muscle, we squeeze it into the veins and lymphatics, thereby increasing the speed of the current in those vessels. As we press it out of the muscle, a fresh supply runs in from the artery, so that, by doing this, we increase the amount of fluid passing through the muscle, and, therefore, the quantity of food which it receives. This is what massage aims at effecting.

When a muscle is working on its own account the same thing happens. At each contraction it squeezes a certain amount of fluid out of itself into the veins and lymphatics, thus making room for a fresh supply from the arteries.

Methods of Manipulation employed in Massage.—Since the great object of this treatment is to increase the rapidity of the current in the veins and lymphatics, we must *always rub towards the heart*. This is the cardinal rule and essence of massage. If you were treating one of the lower extremities, you would rub upwards, from the toes towards the groin, never downwards, or you would be going in the opposite direction to the current in the veins and lymphatics, and would, therefore, be obstructing the passage of fluid through those vessels.

Some operators, before commencing massage, grease the part with olive oil ; others prefer a powder, such as a mixture of zinc and starch ; others use nothing at all. As a general rule it is better not to use a lubricant unless the patient's skin is too dry or too moist, or the part to be massaged is much wasted, or the operator's hands are damp or rough.

It would be of little use for me to describe in detail the different movements that are used in the performance of massage. I shall, therefore, only give you a very general idea of what is done.

Let us suppose that one of the lower extremities is to be massaged.

(*a*) Having prepared the limb according to your liking, you start at the toes, and placing one hand on each side of the foot, stroke lightly in an upward direction as far as the knee. You then slide your hands down the limb to the foot, and go up again. After repeating this movement several times, with gradually increasing firmness, you commence at the knee, and operate in a similar manner upon the thigh. By doing this, you empty the superficial veins and lymphatics, and so quicken the current in them, while excessive sensitiveness in the superficial nerves due to recent injury is also allayed.

(*b*) Next, you begin again at the toes, and gradually work up the limb, kneading and rolling the muscles by means of the ball of each thumb and the palms of the hands ; where possible, as in the case of the calf, grasping the muscles and squeezing them in an upward direction. By means of this manipulation, which is gentle at first and gradually increases in force, you act upon the deep-seated veins and lymphatics, and so improve the circulation in the muscles.

(*c*) The next movement consists in tapping or percussing the part with varying degrees of force. This acts principally upon the nerves, though it also affects the capillary circulation.

(*d*) Lastly, commencing with the toes, you take each joint in turn, and bend it backwards and forwards several times, thus sending more blood to it, and at the same time helping to remove from it any excess of fluid which it may contain, while the formation of adhesions is prevented, or, if any are present, they are gradually weakened and broken down.

We have now acted upon the veins and lymphatics of the skin, the muscles and the joints; in other words, of the whole of the limb.

The movements employed by professional rubbers are more numerous and complicated than those that I have described, which are only intended to give you a rough idea of what is done. Remember that *mere rubbing is not massage*, but that much hard work is necessary before a nurse can have any pretensions to regard herself as an expert in this branch of her profession.

I will now give you one or two illustrations, to show what massage can do.

(*a*) **As showing its Power to remove Fatigue.**—Dr. Eccles has recorded a very interesting experiment in which a man was made to grasp a dynamometer (an instrument which measures the power or strength of

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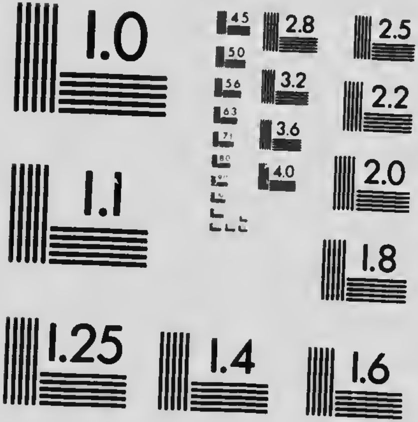

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the grip), until his hand became so tired that it could only exert a pressure of 5 lb. upon the instrument ; to begin with he would, probably, press up to 90 or 100 lb. After a rest of ten minutes he pressed the instrument again, and it registered 10 lb. His arm was then tired again till it only registered 5 lb., and then massaged for ten minutes, after which he was able to exert a pressure of 45 lb. ; so that after ten minutes' massage he was able to do four and a half times as much work as he could after ten minutes' rest.

That was because massage removed, so much more quickly than rest alone was able to, the waste products or ash which had accumulated in the muscles as the result of their previous efforts.

(*b*) **As showing its Power to remove Fluid from a Joint.**—A German observer has recorded some experiments in which he injected a coloured fluid into both knees of a rabbit. One limb only was afterwards massaged, and the animal then killed. On the side which had been manipulated the coloured fluid had left the knee, and was found in the lymphatics of the thigh and glands of the groin. On the unmassaged side it was still in the joint.

When speaking to you on inflammation I told you that the lymphatic vessels acted as drains, to carry off from the various tissues a large portion of the fluid which had escaped from the capillary blood-vessels.

In addition to this, they assist in the removal of those white and red blood-cells which escape from the vessels when a part is inflamed ; in other words, they help to carry off the products of inflammation.

Massage would, of course, never be used on a part that was acutely or subacutely inflamed; but only when the process has become chronic; otherwise, it would do harm.

When, however, the acuteness of an inflammation has quite subsided, and yet the products of it are, owing to their imperfect removal by the lymphatics, still present in the part, massage is most useful.

By means of it one flushes the part with blood, thus helping to wash away some of the above-mentioned products. At the same time, by one's manipulations, some are squeezed out of the tissues, and forced into the mouths of the lymphatics, which, thereupon, carry them off. You will more easily understand this point, if you turn up in your note-books the diagram of the lymphatic vessels which I drew for you when lecturing on "Inflammation."

It is, I hope, clear, after what I have said as to the effect produced upon the tissues by massage, that this method of treatment is most likely to prove beneficial in cases of muscular weakness or wasting, and in chronic inflammatory conditions.

I will now mention a few of the principal complaints in which it is used, explaining, where necessary, why it does good.

(1) **Nervous Exhaustion and Hysterical Wasting.**—These are cases in which there is loss of appetite, marked disinclination for food, and, as a consequence, muscular weakness and wasting, the latter condition being sometimes very marked. Massage does good by exercising the unused muscles, thus improving their nutrition, and also the patient's appetite. For it has been proved by experiment that even healthy individuals eat more

while undergoing a course of rubbing than they previously did.

In these cases of exhaustion and wasting the whole of the body must be massaged. Half an hour daily is sufficient to commence with, and this Dr. Hale White recommends apportioning as follows: five minutes to each extremity, five minutes to the abdomen, and five minutes to the back, which makes thirty minutes in all.

When you are massaging the whole of the body you should *begin with the abdomen*, and do the extremities afterwards, the reason for this being as follows:

Massage, as we have seen, causes the blood-vessels to dilate, and so bring more blood to the part that is being rubbed. Now the veins within the abdomen are very large, large enough to hold all the blood that is in the body. When the abdomen is rubbed they dilate, and, being of such great size, naturally drain a good deal of blood away from the brain and rest of the body. This tends to produce a weakening or depressing effect upon the individual who is being massaged. If, however, you rub the extremities afterwards, their blood vessels will in turn dilate, and draw blood from the abdomen back again to the rest of the body, thus counteracting any depression.

(2) **Paralysis.**—There are, of course, many forms of absolute paraly for which this method of treatment can do nothing. But in cases where there is no more than a partial loss of power it frequently does great good. Take, for instance, the very common disease called "infantile paralysis." In this complaint the affected muscles quickly waste away, almost to nothing. If, however, there are only a few fibres left, massage,

by the way in which it, so to speak, feeds them up, and at the same time exercises them, will, in time, give back to these remnants of a muscle quite a respectable amount of power.

(3) **Insomnia.**—Rubbing has been found by Dr. Eccles to be decidedly efficacious in the treatment of some forms of sleeplessness.

Anything which lessens the amount of blood in the brain tends to promote sleep. When, therefore, a patient is being massaged for insomnia, it is better to *rub the abdomen last;* for, by doing this, you will draw blood away from the brain and extremities, and leave it in the vessels of the abdomen. A hot compress applied to the abdomen directly after massaging will help to keep up the dilatation of the abdominal vessels. For the same reason, a glass of hot water, or grog, promotes sleep, by drawing blood to the stomach from the brain; a hot bottle to the feet acts in the same way through the circulation in the lower extremities.

(4) **Constipation.**—I am not now referring to the ordinary trouble with irregularity of the bowels from which so many people suffer, but to those cases of prolonged and obstinate constipation, lasting for months or years, in which the strongest purgatives or enemas are required in order to produce the slightest action of the bowels.

In such cases it is the large intestine that is at fault. Owing to weakness, or partial paralysis, of the muscular tissue in its walls, it becomes dilated, and has great difficulty in forcing on the solid fæcal material which it contains. Our object in massaging such a case is to increase the strength of the weak intestinal muscle.

In the diagram (Fig. 29) you see the position and course of the large intestine. It lies deep down at the back of the abdominal cavity, being covered over and hidden from view by the coils of the small intestine.

It commences just above the right groin, where you

Fig. 29.

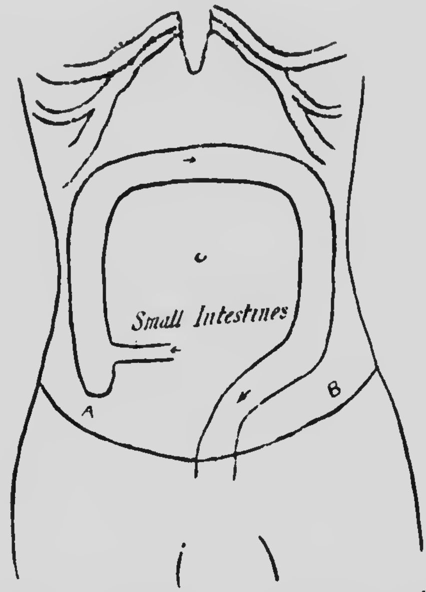

Diagram showing course of large intestine.

see the small intestine entering it. Passing upwards till it nearly reaches the ribs, it bends round, and crosses the abdomen about midway between the navel and the ribs. Having gained the other side it turns downwards, and, when it reaches the pelvis, bends forward over the brim of that cavity and terminates in the rectum. It is about six feet in length, and has different names given to it in the several parts of its course.

In massaging a case of chronic constipation you start just above the right groin, directly over the commencement of the large intestine. You place the three first fingers of your right hand upon the abdomen, and press them downwards with the corresponding fingers of your left hand. Pressing them gently into the abdominal cavity, and keeping them continually in contact with the skin, you slide them gradually upwards, at the same time rotating them (*i.e.* the fingers of the right hand) slightly from side to side: keeping carefully over the course of the large intestine, you cross the abdomen midway between the umbilicus and the ribs, and then descend on the left-hand side.

At first you do not press too firmly, so as to get the patient accustomed to the treatment. After a few minutes, however, you exert as much pressure as you can without giving pain, so as to reach the large intestine at the back of the abdomen.

It is of the highest importance, when massaging such a case, to begin above the right groin, and go in the same direction as the large intestine. For not only does the rubbing stimulate the wall of the bowel, but, if you press firmly enough, you will force some of the contents onwards, and so do part of its work. This treatment should be applied each morning for about ten minutes, just before the patient rises.

Let me relate to you a case in point. Some friends of mine had a little boy, aged three years, living with them, who had had constant trouble with his bowels since birth. He had taken nearly every variety of opening medicine in the Pharmacopœia, but it was with the greatest difficulty that his bowels could be made to act, and then only after the administration of a purgative. or an enema. I showed his aunt, under whose care he then was, the form of massage I have been describing to you, and in a fortnight he was quite freed from his trouble, and has remained so ever since.

Some cases take longer, needing rubbing for a month or six weeks.

(5) **Chronic Inflammation of the Joints.**—Massage is useful in those cases where a joint is stiff as the result of previous inflammation, or where there is fluid remaining in it from the same cause. The experiment which I related to you, in which coloured fluid was removed from a rabbit's knee by massage, proves that rubbing can do good under these circumstances. I need hardly remind you that all acute inflammation will have subsided before this method of treatment is prescribed.

(6) **Fractures and Sprains.**—Massage is now much used in the treatment of recent fractures, especially those involving the wrist and ankle-joints, with the object of preventing the muscular wasting and the formation of crippling adhesions in the neighbourhood of the injury which inevitably result from prolonged fixation of the fracture. Massage is usually begun within two or three days of the injury, the side splints being removed and very gentle stroking movements employed above and below the seat of fracture. Gradually a firmer touch is employed, and pressure movements of the joints begun, the broken bone being carefully supported. These manipulations hasten the removal of inflammatory products, lessen pain, maintain the nutrition of the muscles and prevent the formation of

adhesions. For the same reasons they now form a part of the early treatment of severe sprains.

Similarly, in cases where a nerve has been inflamed as in sciatica, or a muscle, as in muscular rheumatism, massage does good by removing the inflammatory products which are causing pain by gluing together the fibres of the nerve, or muscle, as the case may be.

There are certain conditions under which it is not safe to use massage, as in heart or chronic kidney disease, and phthisis. It has also formed a part of the treatment of many complaints, which it would be a waste of time for me to mention to you.

As I told you at the commencement of this lecture, my object has been, not to teach you massage, but to explain to you why it is done, and also what it can do.

PRECAUTIONS TO BE OBSERVED BY NURSES WHEN ENGAGED IN NURSING CASES OF INFECTIOUS DISEASE

General Directions

1. Never go on duty fasting, because you are far more liable to take infection.

2. Always wash your hands before handling food, or serving meals, or taking food yourself.

3. If you have the slightest sore throat, report yourself at once to the matron. The sore throat, even though slight, may be diphtheritic, and may be the means of communicating a severe attack of diphtheria to one of your patients. Moreover, the successful treatment of d. theria in great measure depends upon the attack being taken in time.

Diphtheria and Scarlet Fever

1. Be careful to keep your mouth s. vhen looking at, or making any application to, a patient's throat, or when attending to the tube in a case of tracheotomy. The patient often coughs on these occasions, and may cough out some membrane, or other infective material. When you notice the patient is about to cough, turn your head away, or shut your eyes and m. th. Purulent ophthalmia is occasionally conveyed by mears

of infected material expectorated directly into the eye.

2. Always have a porringer at hand in which to place the spatula, forceps, or other instrument after use. Do not put instruments down on the nearest locker or table, as would otherwise seem natural.

3. For wiping away discharges from the mouth, nose or ears, use pieces of rag or mops of cotton-wool, which should then be placed in a porringer or dressing tray and later on be burnt.

4. Burn any membrane that may be coughed up. If directed to preserve it, put it in a test-tube with some *plain* water, and plug the tube with cotton-wool.

5. Never kiss a patient who is suffering or convalescent from an attack of scarlet fever, measles, or diphtheria, however mild. The practice is most dangerous.

Enteric Fever

1. Pour a little disinfecting fluid into the bedpan before giving it to a patient, and add some more immediately after use. If the stool is to be k[illegible] for the medical officer's inspection, cover the bedpan with a damp cloth, on which should be sprinkled [illegible] of the disinfectant powder provided. This is me[illegible] done to diminish any unpleasant smell there may be [illegible] ms can escape from the stool.

2. Throw away the stool immediately [illegible] the medical officer has made his round, using gr[illegible] care to thoroughly flush out the bedpan, and the s[illegible] sink down which the stool has been thrown.

3. Keep the latrine thoroughly well ventilated at all times and in all weathers.

4. Linen, when soiled, must be at once placed in the receptacle provided for it and removed from the ward. Keep the patient's skin and his bed-linen scrupulously clear of any contamination by fæces or urine.

5. Never omit to wash your hands after handling soiled linen, however often you have to do it, and ***always do this without fail*** before going to your meals, taking care, at the same time, to brush your nails.

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LTD
Tavistock Street Covent Garden

London