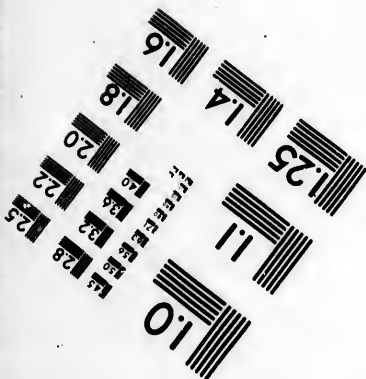
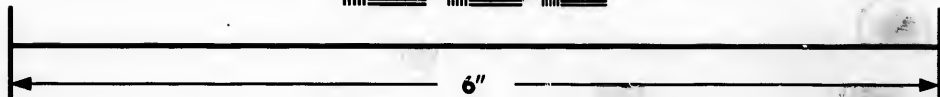
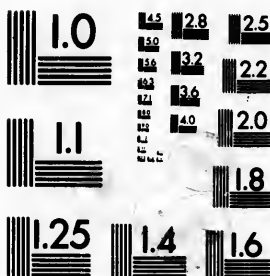


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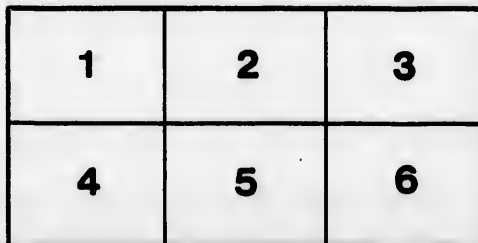
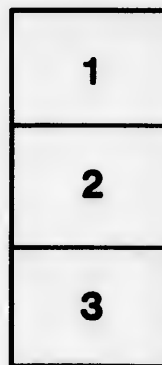
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DIPHTHERIA: ITS TREATMENT AND NURSING

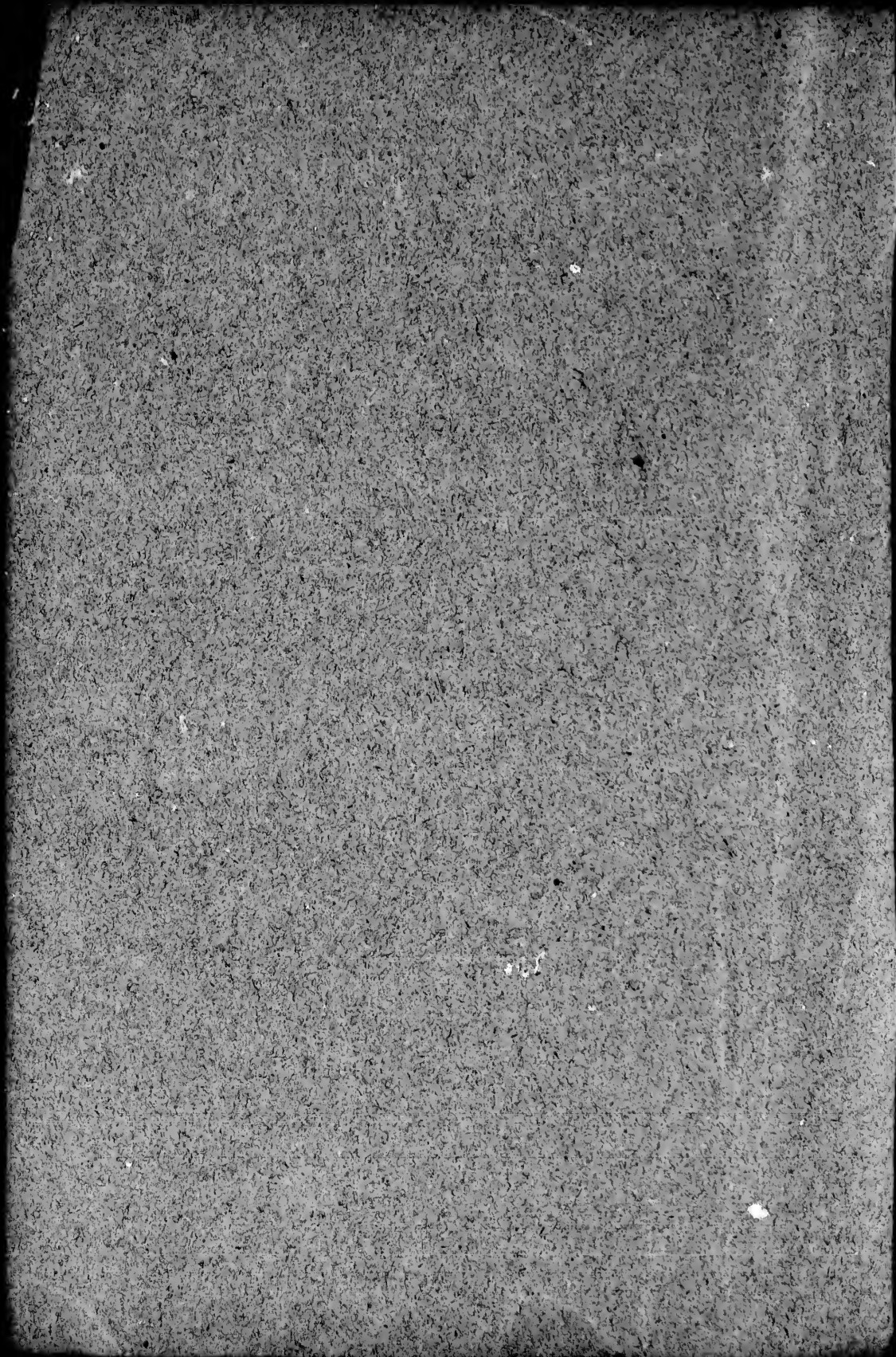
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By

H. S. BIRKETT, M. D.

Professor of Laryngology to McGill University and Laryngologist to the Montreal General Hospital

Reprinted from *Trained Nurse*, April, 1897



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DIPHThERIA: ITS TREATMENT AND NURSING*.

H. S. BIRKETT, M.D.

Professor of Laryngology to McGill University and Laryngologist to the Montreal General Hospital.



IPHThERIA receives its name from one of its most prominent objective symptoms, namely, the production of a tanned-leather-like deposit of membrane upon the affected spot, and may be defined as follows: It is a local specific disease due to the presence of and action of the well-known bacillus, discovered by Klebs and more thoroughly studied by Löffler and now commonly called the Klebs-Löffler bacillus; it is characterized by a deposit of pseudo-membrane at the site of infection, accompanied by constitutional disturbances and followed by nervous symptoms due to the absorption into the circulation of a virulent chemical agent (toxalbumin) which is produced by the local development of the bacilli. As the carrying out of treatment differs according to the part affected, it will therefore be necessary to give a classification when the disease attacks the respiratory tract, which is arranged as follows in the order of the frequency:

1. Pharyngeal.
2. Nasal.
3. Laryngeal.

Diphtheria attacks all ages: it is fairly common under three months and may even attack new-born infants. In some families there seems to be a predisposition to the disease. It is more apt to attack scrofulous children and those with large prominent tonsils and co-existing adenoid growth and those with enlarged glands.

PHARYNGEAL DIPHThERIA.

Pharyngeal diphtheria is by far the commonest form of the disease. The

membrane is found most frequently on the tonsils, less frequently on the back of the throat. From these situations the disease may extend upward, involving the nose, the tear duct and ears, or downward, involving the trachea and its divisions.

The onset is usually that of an ordinary sore throat and if the throat be inspected simple redness may be observed.

These symptoms may be preceded by a sensation of chillness. In children the attack may be ushered in by convulsions. Following the chill and sore throat there is a feeling of lassitude and depression, with pain in the small of the back, a tired feeling in the legs, loss of appetite and restlessness. There may be slight pain and difficulty in swallowing, a rapid pulse and slight elevation of temperature. Albuminuria may appear in any of the forms of diphtheria and is not of itself to be regarded as of serious moment.

As the case progresses examination of the throat shows that the catarrhal stage has been followed by the development of a thin yellowish membrane on the surface of either tonsil or both, or perhaps on the posterior wall of the throat.

This membrane gradually assumes a dirty gray color; its edges are sharply defined, and the surrounding portion of the tonsils or pharynx have a deep red or purplish hue.

Here and there small hæmorrhagic points may be seen in some cases. Fætor of the breath is perceptible. The glands beneath the jaw and at the back of the neck enlarge and become tender. The temperature varies between the normal

* Read before the Canadian Nurses' Association at Montreal.

and 101° F. In ordinary mild cases the pulse is not much altered.

The occurrence of a rash in the course of any form of diphtheria is not unusual. The rash is usually like that seen in scarlet fever, although eruptions sometimes occur similar to those of measles, roseola or urticaria. In the malignant form a purpuric rash is not uncommon. In the pharyngeal form we occasionally meet with gangrene: this condition is rare and always associated with a severe type of the disease. It usually attacks the soft palate and often results in the destruction of the uvula or one of the palatine arches. The tonsils are rarely involved in the gangrenous process.

Delirium does not usually occur in mild cases, but is almost invariably present in the graver forms. It is usually of a mild, wandering character. A severe attack is usually accompanied by rigor; a temperature of 105° to 107° or subnormal and is attended with nervous symptoms, as vomiting, convulsions, etc. If the membrane is forcibly or accidentally removed it is rapidly reproduced. The lymphatics are very quickly involved, and the glandular and peri-glandular structure infiltrated. The neck on the affected side is much swollen, the membrane dark and the odor very offensive. Now we pass to the

NASAL FORM.

This may be either primary or secondary. When secondary the disease has extended up the back of the nose from the pharynx. The invasion of the nasal tract may be suspected when nasal respiration is obstructed and the patient breathes chiefly or wholly through the mouth. A thin, ichorous, muco-purulent discharge appears on one nostril or both; small excoriations and ulcerations form at the entrance to the nares, on the upper lip, or wherever the discharge is

allowed to rest. Nasal diphtheria is especially apt to occur in children who have more or less large collections of adenoid tissue in the vault of the pharynx. Such children are usually mouth breathers or become so when they take the slightest cold. They snore at night and their sleep is restless and broken. When they contract diphtheria it usually spreads rapidly to the nares and seriously complicates the case. Bleeding from the nose is apt to occur and may be the only symptom which may attract attention to the nose.

The next portion of the respiratory tract most likely to be involved is the

LARYNX.

Laryngeal Diphtheria may be either primary or secondary. The more common form is the secondary: it is then an extension of the morbid process from the nose or pharynx downward. The onset of laryngeal diphtheria is recognized by a harsh, dry, shrill or hoarse muffled cough. The voice is husky, weak, and sometimes almost inaudible. Associated with the cough is a spasmodic closure of the narrowest part of the larynx (glottis) and a temporary increase of dyspnoea.

Such being the clinical pictures of the various forms of diphtheria involving the respiratory tract, what are we to do for our patients?

Isolation.—A large airy room should be selected, preferably at the top of the house and on the sunny side: it is difficult or impossible to isolate a patient completely on the lower floors. An open fireplace is an advantage. Carpets, curtains, mats, ornaments and all unnecessary articles of furniture should be removed. A sheet kept wet with a disinfectant solution (such as carbolic 1-20 or bichloride 1-500) should be hung outside the door. No one other than those

directly acting in the case should be permitted in the room.

Dishes, towels, clothing, bedding and utensils used in the room should be kept there and not allowed to be carried through the house or used elsewhere. Dishes and utensils should be washed in the room or in a sink or wash room not used by other members of the household. Soiled clothes should be covered with a boiling disinfectant solution before being taken from the room. The discharges from the nose or mouth should be received in an earthenware or glass utensil containing sublimate solution (1-5000) or in pieces of clean old soft linen which should be burned immediately. The excreta should be received in glazed earthenware utensils containing sublimate solution (1-5000). Cats, birds, dogs, or other household pets should not be allowed in the room for they are often the means of spreading infection. The room should be kept clear of flies, for they too have been accused of having carried infective particles from room to room and from house to house. Food should not be allowed to remain exposed in the sick room; milk is particularly apt to absorb impurities from the air.

Diphtheria is highly contagious, the infective bacilli being present in particles of diphtheritic exudation which are coughed, sneezed or spat up. They are found also in the saliva, nasal mucus and discharges from a diphtheritic patch wherever present. They may even be breathed out and thus infect the air. These infective particles readily attach themselves to the clothing of the patient, the nurse, to the walls, furniture, bedding, dishes, books, papers and pets or may float about in the dust and air of the room. It is manifestly of the utmost importance to collect and destroy immediately those discharges which are the

vehicles of infection, and keep the air pure by thorough ventilation. During convalescence the patient should have a change of apartments, if possible, one for night and another for day, so that the rooms may be aired and fumigated when not in use.

Feeding.—As the tendency of diphtheria is to debilitate, and as recovery often depends upon the strength and staying power of the patient, it is obvious that the greatest care must be taken from the outset to keep up nourishment. As a rule, solids should be avoided and the most nutritious and digestible liquids selected. It is needful sometimes to give nourishment in concentrated form when the stomach is irritable, or to peptonize it, to feed by enemata, or by means of gavage: of this latter method I shall have more to say.

Milk and cream, alternated with beef or chicken broth or jelly, should be given regularly and at frequent intervals. Those foods should be selected which contain much nourishment in small bulk.

Gavage is the method of feeding by means of a tube introduced into the stomach, either through the mouth or through the nose, and is a method which is especially useful in cases of laryngeal diphtheria which have required intubation; in cases of post-diphtheritic paralysis where the ability to swallow is almost nil, and in cases where the child positively refuses to take food in the usual way.

The method of carrying out this way of forced feeding is as follows:

The child is pinned in a blanket so as to prevent any movement of the arms and placed lying on the back. A glass funnel about 4-5 inches in diameter is attached to a Jacques soft rubber catheter with the intervention of a bit of plain

glass tube. The catheter should be from 7° to 15° F., according to the age of the patient, the larger sizes being the more desirable.

The well-oiled catheter is passed quickly but quietly along the floor of the nares. Just as it passes into the oesophagus there is usually slight resistance and gagging, otherwise no trouble is found. A small amount of water is allowed to flow down and without allowing any air to enter, the milk and medicine are immediately poured into the funnel. In withdrawing the catheter it should be pinched, that the few drops remaining may not flow out and irritate the pharynx. In this way the child is fed every four hours, the following amount being given:

Water, 1 oz.; milk, 4 to 6 oz.; brandy, $\frac{1}{2}$ to 2 drachms or more (Jackson).

Another method of feeding the intubated child is that suggested by Waxham. According to his method the child is laid across the nurse's knee in such a way that the head hangs lower than the rest of the body, the food being given to the child in very small quantities at a time, about a little less than a teaspoonful.

Treatment.—There is no disease about the treatment of which more has been written than diphtheria. Drugs and applications innumerable have all had their champion, but all are now relegated to the dark ages, since the brilliant discovery by Roux & Yersin of antitoxin.

This is the recognized medicinal agent in the treatment of diphtheria, and its results are so satisfactorily established by experience that its use is now universally adopted by most medical men. It has been the means of reducing the death rate 50 per cent. in this much dreaded disease and has, in so far as my experience goes, reduced very consider-

ably the necessity for intubation or tracheotomy, especially when used early in the disease.

Antitoxin is administered hypodermically, the dose varying from 500 to 2,000 units, according to the age of the patient and the severity of the case.

In preparing for its administration, the nurse should thoroughly sterilize the syringe and needle to be used for its introduction.

The place where the injection is to be given (by some between the shoulder blades, by others just above the mammary region) should be thoroughly rendered aseptic in the usual way. Just as the needle is to be withdrawn the nurse should be ready with a small piece of adhesive rubber plaster, which should be immediately placed over the site of entrance of the needle after its withdrawal.

A symptom often noticed within four to twelve hours after an injection of antitoxin is a rise of the temperature, varying from 1° to 2°: a diffuse erythematous rash is occasionally met with. Albuminuria is also known to follow an injection of antitoxin and the urine should be carefully examined daily for the presence of albumen, as it may occur independently of the use of the serum.

The advisability of the further use of antitoxin will, of course, rest with the attending physician.

LOCAL TREATMENT.

The best application locally in diphtheria is, in my opinion, a solution of bichloride of mercury (1-5000) and its method of application will depend upon the site of the affected area. Should the membrane be situated on the tonsils or pharynx or both, then the solution should be applied by means of cotton rolled on a wooden stick about the length and size of an ordinary meat

skewer: this should be destroyed after once being used. In making the application it is well to depress the tongue by means of a spoon or tongue depressor and in this way thoroughly bring the affected parts into view; the application should be made hourly and the patient kept in the recumbent posture.

When the nose is affected then the solution may be dropped (two drops in each nostril) by means of a pipette. An atomizer as means of applying this solution is not advisable, as improper use of it may lead to mercurial poisoning.

In making these applications it is well that the nurse protect her own clothing by means of a large piece of cheese-cloth wrung out of a solution of bichloride (1-500) and fastened so as to cover that portion of her clothing which is exposed to the secretion which might be coughed out by the patient.

Should the disease have attacked the larynx then the ordinary methods of making applications are beyond the skill of the nurse and steam inhalations are therefore advisable. The use of steam inhalation is a matter of opinion of the attending physician—for my own part since the introduction of antitoxin I never find them of much service and add only to the discomfort of the patient and to the work of the nurse.

If they are prescribed the drugs most often used are tr. benzoin Cc: oil of eucalyptus, carbolic acid, etc.

About the cot or bed of the patient a tent may be easily extemporized so as to limit the space and thus keep the atmosphere of that space well charged with moisture and the medicinal agent used. The ordinary croup kettle is the means used in volatilizing such remedies, or in place of it a kettle may be kept boiling at a safe distance from the bed

and the steam from it conveyed into the tent by means of a rubber tube.

It is in the laryngeal form of diphtheria that the patient requires the most careful watching. If obstruction to the breathing increases, as evidenced by the aggravation of the symptoms already mentioned, it becomes our duty to interfere and relieve the obstruction mechanically if possible. This may be done in two ways—by intubation or tracheotomy.

For surgical measures to have a fair chance of success early interference is necessary. The patient must not be allowed to drift along into an almost moribund condition before we operate if we expect any good results from the operation.

When the breathing has become stridulous, inspiration difficult, the spaces below the clavicles, the intercostal spaces and abdomen retracted; when the child is tossing about extending its neck in the vain effort to get air; when the lips are cyanotic and the face of an ashen hue—we may give temporary relief by operating, but the chances of ultimate recovery are not as good as if we had interfered before the onset of the graver symptoms.

The operation of intubation is now generally preferred to tracheotomy. It is performed as follows:

First the patient is wrapped in a blanket with the arms close to the sides of the body and the forearms crossed over the abdomen. In this position the blanket is firmly pinned.

The nurse holds the child so that his head lies against her left shoulder; with her left hand the head of the child is steadied in this position; the nurse's right arm holds the body of the child and the legs of the patient are firmly held between the nurse's knees.

As soon as the tube is properly in the

larynx the first thing noticed is that cough sets in which has a decidedly tubal character and once heard is not readily forgotten. The more or less cyanotic condition usually disappears and the child becomes more quiet, in fact, in some cases I have seen the child fall asleep in the nurse's arms before there has been time to place the little patient in his cot.

Some operators leave this string attached to the tube for some time afterwards and in such cases the string must be passed over the child's left ear and retained there by means of a strip of adhesive plaster placed over the cheek. The child is very apt to snatch the string and thus pull the tube out, so that it is better whilst the child has the tube so attached to fasten his hands to his sides, unless he be so obedient as not to require it, but this is not often the case, so careful watching is absolutely necessary.

Personally I strongly object to leaving the string and remove it immediately I am satisfied that the tube is all right, because the string I regard as unnecessary after its duty is fulfilled and it enables the nurse to give her attention to the child in other ways, and its absence allows the child to take its nourishment more easily.

The feeding of intubated children I have already spoken about and given you the methods of carrying these out.

Should the tube be expelled, as it often is during a fit of coughing, it is necessary that you acquaint the medical attendant of this occurrence at once, as the sudden relief noticed after its expulsion may be a lull before the storm which means the onset of an attack of dyspnoea which may perhaps prove fatal.

It is possible that in the expulsion of the tube the child may not spit the tube

out, but swallow it, and it is here that your observation as trained nurses will stand you in good stead. You will at once notice the absence of the tubal character of the breathing, indicating that the tube is out, and if you have not seen the tube, then the child has swallowed it.

Now we consider tracheotomy.—You will prepare the patient and the site of the operation in the usual way and with the strictest attention to asepsis. The subsequent care of the patient is of the greatest importance. The tube must be carefully attended to. The inner one is removed every half hour and thoroughly cleansed by placing it in boiling water.

A piece of cotton wool firmly wrapped on a stick and moistened thoroughly in a solution of bichloride (1-5000) is used to free the outer tube of any adherent secretion or fragments of membrane and immediately burned.

It has happened that a child has expelled the outer tube and unless the nurse has presence of mind what to do at this critical moment the life of the patient may be greatly endangered or even lost. It is always well to have a pair of retractors at hand so that the edges of the tracheotomy wound may be held apart to enable the child to breathe and in the meantime send for skilled assistance to reintroduce the tube.

Should you be left without a pair of retractors bear in mind you have always at hand what will answer the purpose, namely, hairpins. Take two hairpins and bend the rounded end at right angles to the extent of half an inch; introduce them together directly downwards into the wound and separate them; thus you will open the wound and allow the patient to breathe again.

There is no difficulty in feeding patients after tracheotomy, as they take

food in the usual way without the slightest trouble.

During convalescence the patient requires continuous careful nursing.

One important feature which is nearly always present is the tendency to syn- copal attacks. This may be avoided in a great measure by not permitting the patient to rise when being fed, and by keeping him in the recumbent position as much as possible.

All sources of excitement should be excluded; relatives and visitors should be excluded from the room and exciting

conversation and news prohibited. In fact, absolute quiet should be maintained as far as possible.

If the nurse suffer from catarrhal trouble it is wise that she should spray her own nose and throat with a mild alkaline and antiseptic solution, such as Listerine, in the proportion of a teaspoonful to a wineglassful of warm water and use it night and morning.

(The substance of this lecture has largely been drawn from the work I contributed to "Hare's System of Practical Therapeutics.")

