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EMPYEMA AND DELAYED RESOLUTION IN LOBAR
PNEUMONIA.

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In every large series of lobar pneumonia we can count on having a certain number of instances of delayed resolution and empyema. How disturbing these are requires no emphasis. They worry the patient, but often much more the physician. Their early recognition means much to the patient, for if empyema be recognized early, operation offers the chance of almost certain recovery with good restoration of function, while delayed recognition and late operation increase the chance of a fatal result and almost ensure some permanent damage and deformity. In delayed resolution, a prompt recognition of the condition probably enables us to carry out a treatment which promises good results and lessens the danger of permanent injury to the lung.

With a view especially to a study of the physical signs and their bearing on early diagnosis a review of the cases in the Johns Hopkins Hospital was undertaken.¹ This impressed especially on the writer the variability of the physical signs in both of these conditions as will be shown later. To those of us who are teachers the question often arises as to how dogmatic our teaching should be. Shall we state exceptions to our students, knowing how prone they are to fasten on the exception and forget the rule? Some hold that if they are taught the rules they will learn the exceptions themselves. Certainly if they get hold of the exceptions first the rules are not apt to follow. Let anyone decide as to what he would regard on *a priori* grounds as the condition of the vocal fremitus in delayed resolution and empyema and compare the findings in this series.²

1 A more extended account will be found in The Johns Hopkins Hospital Reports, 1909, vol. XVIII.

2 The question of complications, etc., is not discussed here; special attention is given to the discussion of the physical signs.

Incidence.—During a period of eighteen years (1889 to 1907) there were 805 cases of pneumonia in the medical service of the Johns Hopkins Hospital. Among these were 29 cases of empyema (3.6 per cent.) and 30 of delayed resolution (3.7 per cent.), showing an almost equal incidence of the two conditions. In addition there are 10 other cases of delayed resolution admitted after the attack of pneumonia was over, so that 40 are available for study.

Occurrence.—A point of interest is the number of cases in various years. This shows a much smaller number of cases in the first half of the eighteen year period. Thus from 1889 to 1898 there were 5 cases of empyema and 8 of delayed resolution, while in the next nine years there were 24 of empyema and 22 of delayed resolution. An explanation of this is not easy to give. An increase in the occurrence of empyema has been ascribed to the frequency of influenza, but the years of the great influenza epidemic show very few cases of empyema in this clinic. One striking thing is the agreement in the occurrence of empyema and pericarditis. The years with the maximum figures (1900 and 1905) were the same in each, which rather suggests some special strain of the causal organism as an important factor.

The question arises as to whether empyema should be regarded as a complication or sequel of lobar pneumonia. The study of this series suggests that the former is the rule in the majority, although it may sometimes be a sequel and arise long after the pneumonia is over. The points suggesting that empyema is usually a complication and present before the termination of the pneumonia are: (1) Its recognition during the progress of the pneumonia, as in three cases of this series, one being recognized by aspiration and two at autopsy. (2) The study of the temperature charts, which showed that in only one patient was there normal temperature for more than twenty-four hours after the termination of the pneumonia before the fever due to the empyema began. This interval was only three days and in the majority the temperature never reached normal. (3) The physical signs, if carefully followed with empyema in mind, may show changes suggestive of it at the end of the attack of pneumonia.

Etiology.—As to the real causes which determine either condition we know little. The wonder is not that empyema occurs but that it does not occur more frequently, when we remember that pneumococci are probably always present in the pleural cavity. Delayed resolution depends on the absence of the ferment action which usually liquifies the exudate and so allows its absorption. Why this is lacking we do not

know, and what is especially puzzling is why resolution may occur normally in one lobe and be delayed in another.

Age.—The figures for the two conditions are as follows:

Age.	Empyema.	Delayed Resolution.
1-10	6	0
11-20	4	4
21-30	12	18
31-40	6	8
41-50	1	9
51-60	0	1

These figures are from a clinic to which relatively few children are admitted. That advanced age was a factor in delayed resolution does not seem to be supported, although it is usually so stated. The number of the aged with pneumonia who are left to have delayed resolution is comparatively small.

Sex.—There was no striking relative difference except that the figures for males in delayed resolution were relatively higher than for females.

Color.—These show a marked difference in the relative incidence of delayed resolution in the white and colored races. There were 19 white and 10 colored patients with empyema and 17 white and 23 colored with delayed resolution. The colored patients show also a relatively high proportion of the total admissions for pneumonia. They comprise about 16 per cent. of the total medical admissions, 40 per cent. of the admissions for pneumonia, 34 per cent. of the cases of empyema, and 57 per cent. of the cases of delayed resolution. As to why this should be we do not know.

Alcoholism, cachexia and cardiac disease.—Many accounts of delayed resolution place emphasis on these as contributing factors, an opinion which is not borne out by this series. There was a slightly higher percentage of alcoholics than in the whole pneumonia series, but no instance of cachexia or cardiac disease of any moment. Only one patient had been bled during the pneumonia.

Character of the attack of pneumonia.—On the whole the impression is obtained that empyema usually followed severe attacks, but it is difficult to state this in statistics. Nor could any special irregularity be made out in the pneumonia which was followed by delayed resolution. One point of importance is as to the extent of the lung involvement. In only three cases of the empyema series was one lobe involved alone, the figures being one lobe, 3 cases; two lobes, 16; three lobes, 8; and four lobes in 2. The total lobe involvement was 22 on the right and 18 on the left.

The empyema was on the right side in 14 and on the left in 15 cases. *In every instance there was involvement of a lower lobe* in the attack of pneumonia. Turning to delayed resolution the figures are of interest because emphasis is often laid on this occurring especially with apical involvement. There was a marked preponderance of involvement of the right side in the attack of pneumonia, this being on the right side in 23, on the left in 12 and on both sides in 5 cases. One lobe was involved in 20 cases, two lobes in 11 and three or more in 9 cases. The number of times each lobe was involved in the pneumonia was, lower right 23, lower left 16, upper right 14, middle right 10, and upper left 5. The lower lobes were much more frequently involved, in the proportion of 37 to 19. There is also more frequent involvement of the right side (23 to 12 when the process was on one side only and 45 to 21 when the total number of lobes is counted). There was also greater frequency of involvement of the lower lobes (14 lower to 6 upper when one lobe only was involved, and 37 lower to 19 upper when the total number of times each lobe was involved is counted).

Taking up the *lobe involved in the delayed resolution*, we find about the same relative preponderance of the right side as was found in the attack of pneumonia (right side in 27, left in 11, and both sides in 2 cases). In 36 cases one lobe only was involved (25 right and 11 left), in 2 cases the upper and lower right lobes and in 2 cases both lower lobes. Taking the total lobes involved the figures are 31 for the right and 13 for the left side, while for the upper and lower lobes they are 27 for the lower and 9 for the upper when one lobe only was involved. There are two points which attract attention in these figures, the frequency with which the right side was affected and the rarity with which more than one lobe was involved. Why should one lobe clear and another not? One lobe only was involved in the attack of pneumonia in just half of the cases but in 36 of 40 with delayed resolution. That is, of 20 cases with pneumonic involvement in two or more lobes, in 16 delayed resolution occurred in only one of these lobes, the others clearing in about the usual time.

There is another point brought out, and this is the relative frequency of delayed resolution in the lower right lobe. Taking the total number of times each lobe was involved in the whole pneumonia series and comparing this with the number of times delayed resolution occurred, we find that in the upper right lobe delayed resolution occurred in 1 of 27.5, lower right, 1 in 16.2, upper left, 1 in 31.6, and lower left, 1 in 27.3 cases. Only one instance of delayed resolution occurred in the middle right lobe and this involved only a part of it. These figures

bring out the much greater relative frequency of the process in the lower right lobe. The upper right and both left lobes showed delayed resolution about once in thirty cases but the lower right about twice in thirty cases. It is difficult to give any explanation of the greater relative frequency of delayed resolution in the lower right lobe. The circulation cannot be regarded as having any influence, and it is difficult to understand why there should be any difference in ferment action on the two sides. Thus one patient had involvement of both lower lobes with a termination by lysis on the eighth day. By the seventeenth day the left side had cleared entirely but there was no sign of resolution in the right side. It may be suggested that the anatomical relations may have some influence, and it would be interesting to determine whether expansion returns more rapidly after involvement of the lower left than of the lower right lobe.

Taking the whole question of the etiology of delayed resolution it will be noted that the factors often given, such as advanced age, apical involvement, cachexia, etc., cannot be regarded as being important in this series. Two points stand out—the greater frequency in the colored race, and when the lung involvement is considered the more marked frequency in the lower right lobe.

Pathology.—It is not proposed to discuss this in any detail, the most important point from the clinical aspect being the character of the changes which occur and the rapidity with which they appear. There can be no doubt that every day a patient is allowed to go with empyema or with an unresolved lung after pneumonia, the greater is the danger of permanent change occurring. In the instances of empyema which came to autopsy there was evidence of marked early change; thus in one patient in whom the pleura was drained on the tenth day from the onset of the pneumonia, death occurred on the twenty-fourth day from streptococcus septicaemia and the pleura was found to be markedly thickened. In another patient, in whom the empyema was drained on the twentieth day, death from myocarditis occurred on the forty-sixth day and at autopsy the pleura was everywhere adherent, with adhesions so firm that they were separated with difficulty. Changes in the lung may also develop with great rapidity; thus in one patient dying on the twenty-fourth day from the onset of the pneumonia there was marked thickening of the pleura and decided fibroid change in the lung. Turning to delayed resolution we find that with this the development of permanent change may be very rapid; thus in one patient dying on the twenty-fifth day with suppurative pericarditis, the pleura was adherent, the adhesions showing marked signs of organization with evidence of fibroid changes

in the lung. In the second case with death on the fifty-seventh day there was a very marked increase in the fibroid tissue in the lung and the pleura also showed considerable thickening. However, so far as one can tell clinically some patients have delayed resolution for longer periods than these and recover entirely as far as ordinary examination can decide.

The lesson to be learned from the rapidity with which these changes may appear is the importance of early diagnosis. Every day that the empyema goes untreated or that delayed resolution persists increases the likelihood of permanent damage which cannot be recovered from as regards function. Another point of importance in empyema is the danger of complications. Naturally it is difficult to say whether the empyema had any special influence, yet when meningitis, pericarditis or endocarditis appears in a patient with empyema some time after the pneumonic attack the question arises as to whether this may not have been secondary to the empyema. For example, in one patient empyema was recognized on the twelfth day, at a time when the pneumonia was still extending, and operation was done on the fifteenth day; pericarditis appeared later and death occurred on the twenty-fourth day. In such a case it does not seem probable that earlier operation would have made any difference. In another case the empyema was recognized on the seventeenth day and was operated on at once. Death occurred on the fortieth day with endocarditis and meningitis. In another instance in which operation was done on the twentieth day the pleural condition was satisfactory but the patient died on the forty-sixth day with myocarditis and infarction of the lung. While it is doubtful how much effect the persistence of the empyema may have, yet there can be no question that early operation diminishes the risk of later complications, such as endocarditis and meningitis.

Symptoms.—Onset. There is very little to be said regarding this in either empyema or delayed resolution. As has been said, the study of this series suggests that empyema is usually present at the termination of the attack of pneumonia and hence the symptoms of the two will be more or less continuous. No special features such as a chill or increased pain, which might be regarded as due to the onset of the empyema, were recognized. In the majority of the cases the temperature never reached normal, or, if it did, this was only for a few hours.

In delayed resolution it is also evident that there is little to be said regarding the onset, although there is one group of patients in which the temperature falls either by crisis or lysis and the patient feels fairly well for a time, to complain later of other symptoms. When this was

the case the most common complaints were of thoracic pain, cough, respiratory distress and weakness. These were especially evident in patients who had had the attack of pneumonia outside of the hospital, recovered as they thought and then came to the hospital on account of the return of symptoms. In these patients the complaint of weakness was perhaps the most common. Some of them had gone back to work but had been compelled to give up on account of lack of strength. As regards the complaint of pain, it may be noted that sudden pain sometimes appeared during the course of delayed resolution and was generally associated with the finding of a friction rub.

It is very evident that the general picture shown by these two conditions may be much the same. There may be little change from the condition shown in the attack of pneumonia, or, as is commoner, there is some improvement for a few days, but the fever, some symptoms and physical signs persist. There may be a certain amount of distress and dyspnoea in both conditions, and the patient may emaciate, lose color and gradually become weaker. It is perhaps best to consider the various features separately.

Fever.—This was the most common symptom in empyema, being present in every patient and in only two was it slight. There are all kinds of variations in the fever course, the most common picture being a certain amount of irregularity—the temperature varying from 99° to 102° or 103° . In delayed resolution the occurrence of fever was not as constant, there being five cases in which it fell to normal after the pneumonia and remained there. As a rule the degree of fever was less than in empyema, as in the largest number it varied from 99° to 101° . The duration of fever is very different in the two conditions. As a rule it continues in empyema until the pus is evacuated, although in a few cases it declined steadily and almost reached normal, even with pus present. In delayed resolution, on the contrary, the tendency is for the temperature to return to normal. There is, however, a great variation in the duration.

Pulse.—In the largest number of the empyema cases the rapid rate during the pneumonia persisted with the complication. In 4 it fell to normal at the end of the pneumonia and then rose gradually; in 3 it was rapid during the pneumonia and then fell to normal during the empyema. In delayed resolution the rate was usually lower; in only one case was it over 120 and in the majority it was not over 100. Bradycardia occurred in 3 cases during delayed resolution.

Respiration.—This showed more constant change than did the pulse. In the majority of the empyema cases the rate was rapid, never reach-

ing normal after the pneumonia, but did not show any increase over that seen during the pneumonia. The same rapidity was noted in delayed resolution and was rather more constant, as in only 5 cases was the rate below twenty-four and in 14 it was over thirty. In one instance the increased rate persisted after the lung had cleared entirely.

Leucocytes.—An increase was practically constant in empyema, as in only one patient did they fail to reach 15,000 per cmm. This was in a patient dying on the ninth day of the pneumonia with a very severe infection. The largest number showed a count between 20,000 and 30,000; the highest count was 63,000. In delayed resolution the variations were more marked. In 7 cases the leucocytes were not over 9,000 and in 3 others not over 12,000. The largest number had counts between 12,000 and 25,000; the highest count was 50,000. It was not possible to associate the number of leucocytes with the course of resolution, the persistence of signs, or the degree of fever. Some patients showed great variations from day to day. Thus in one case, they were about 25,000 during the pneumonia and fell to 12,000 by the twentieth day; the lung cleared from the twentieth to the thirtieth day but on the twenty-seventh day the leucocytes were 27,000.

The results of this series show that leucocytosis is more constant in empyema than in delayed resolution, so that with the diagnosis between the two, the absence of leucocytosis would speak against empyema.

Sputum.—Except in the instances in which an empyema ruptured into a bronchus, the sputum showed no special features. In delayed resolution it varied greatly but as a rule was muco-purulent and tenacious. The tenacious character may persist for some time. Prune juice sputum, very foul sputum, bloody sputum, abundant frothy sputum, were all observed. One point of interest in delayed resolution is the occurrence in the sputum of casts of the bronchi, as was seen in 3 cases. In one patient a large fibrinous cast of the bronchi was brought up in the fourth week, a very unusual happening.

Physical signs.—It is to the study of these that special interest belongs, but as will be found the results are not such as to encourage the belief that typical findings are to be expected in either condition. In discussing the signs in empyema, it has to be remembered that those in empyema complicating lobar pneumonia may be very different from those in a primary empyema. The extent of consolidation, amount of lung involved, and the rapidity of resolution may all influence the signs. In delayed resolution the presence of exudation in the pleural cavity may have a marked modifying effect on the signs.

Inspection.—This does not seem of special importance as the appear-

ance of the chest and the decreased movement usually do not differ from that seen in the pneumonia. In a few instances of empyema the intercostal spaces may show slight bulging. In no case of this series was the apex beat displaced.

Palpation.—By ordinary rules we should consider the results of this to be the most reliable means of distinguishing between pleural effusion and consolidation. The findings of this series, however, showed many anomalous observations. In empyema there were ten cases in which the vocal fremitus was present although diminished. It may be said that in only one of these was the empyema encapsulated, as proved by operation, and only one was in a patient below the age of fifteen years (in children, of course, the physical signs of empyema are very variable). In two cases with wooden dullness the vocal fremitus was well marked. In one case it was well marked on the fifteenth day and absent on the seventeenth day. In delayed resolution we find the same puzzling findings. Among 32 cases with careful notes on the vocal fremitus, in 8 it was about normal, in 13 it was increased, in 10 it was definitely diminished, in one being almost absent, and in one it was entirely absent. Thus in one-third of the cases there was a marked decrease in the vocal fremitus when we should expect practically always an increase.

When we seek for an explanation of these findings, there are several points which must be considered. In empyema with lobar pneumonia, there is sometimes a consolidated lung which cannot retract and which transmits the fremitus more strongly than normal. In several of these cases at operation it was found that the lung was adherent to the diaphragm. Conditions of tension may be present which permit of the conveyance of the vibrations as is sometimes seen in a massive pleural effusion. In delayed resolution there are several possible factors. The presence of casts in the bronchi may be the explanation of the decreased vocal fremitus in a few cases: in others the condition of the lung tissue may be a cause, some cells being free of exudate while others contain it. But probably by far the most frequent cause is the presence of exudate on the pleura which may be of sufficient thickness to prevent the transmissions of vibrations. In some cases of this series there was a friction rub present at the time of the reduced fremitus.

Local tenderness on palpation was made out only in one case. There may be a certain amount of resistance made out by palpation, but this is usually better perceived on percussion.

Percussion.—In both conditions this may show but little difference from the note during the pneumonia, or, especially in empyema, it may be followed by increasing dullness and a gradual change in the character

of the note which becomes duller and more wooden in quality. Distinct movable dullness was obtained only in one case of empyema. In delayed resolution the note varied from dullness to flatness, but there was no evidence that importance could be laid on any special quality of the note. The point of greatest interest is the occurrence of *tympany*. This was obtained over the area of delayed resolution in seven cases. In one case there was tympany over the adjoining portion of the next lobe which had not been affected in the pneumonia. In one case of delayed resolution in a lower lobe there was a small area of marked tympany at the angle of the scapula. On the whole it may be said that the percussion note over an area of delayed resolution is not as dull and rarely shows the wooden quality so often obtained in empyema.

Auscultation.—The results showed much diversity and were often difficult to explain. In empyema it may be said that the most helpful signs for diagnosis were obtained on auscultation. In 5 cases no breath sounds could be heard and in the remainder they were diminished, in some distant feeble breath sounds being heard and in others distant tubular breathing. Rales were heard with the breath sounds in 4 cases. It was frequently noted that the boundaries of the area over which the breath sounds were diminished or absent were very sharp, and that moving the stethoscope a short distance gave a very different finding. But even of more value than the character of the breath sounds were the voice sounds. The commonest change was a curious nasal quality often very sharply limited as to area and boundaries, in many cases the transition to normal voice sounds being very sharply marked. Of all the means of diagnosis—except the use of the needle—this character of the sounds was the most useful.

In delayed resolution the signs showed great variation. During the period of delayed resolution feeble tubular breathing without any rales was heard in 6 cases and with rales in 11 cases. Tubular breathing of moderate intensity was heard in 6 cases, in 3 with rales. There was intense tubular breathing in 6 cases only, in 3 with rales. In 9 cases there was no tubular breathing but sounds which varied from feeble breathing to harsh vesicular sounds. When these observations were made there were no signs of clearing, unless the disappearance of tubular breathing be regarded as such. The voice sounds were usually conveyed more loudly than normal, but this bore no relationship to the character of the breath sounds.

The signs during clearing were if anything more diverse. The most common change was that the tubular breathing became less marked and rales appeared. In others rales were not heard at any time. In 9

cases the breath sounds became enfeebled during the clearing, in 5 no rales being heard. There was a great variety, in some the breath sounds becoming harsher, with or without rales, in others the change was from harsh sounds to normal ones. In some cases a pleural friction rub appeared during resolution. The occurrence of this was rather irregular, in one case being heard first on the twenty-eighth day.

Signs on clearing.—It is not always easy to say what is the first sign of resolution. As a rule some change in the percussion note was most evident. Usually the note became more resonant and often a tympanitic quality became apparent. In the cases in which fever persisted there were usually signs of clearing before the temperature dropped to normal. Of the auscultatory signs, in 15 cases the first change was that the tubular breathing became less intense, with or without the appearance of rales. In 16 cases the breath sounds became feebler and more distant. With this the tubular quality became less marked, but the feeble distant character of the breath sounds was the most striking feature. As the clearing advanced the breath sounds gradually returned to normal, but in several patients they were feebler than normal after all other signs had disappeared. This feeble character of the breath sounds is difficult of explanation. Plugging of the bronchi and increase in the pleural exudate may explain some of the cases.

Duration of resolution.—When this could be accurately estimated, from the time when signs of clearing were first evident until the lung seemed normal, the period was about ten days in 5 cases, about fifteen days in 8 cases, about twenty days in 5 cases, about twenty-five days in 7 cases, about thirty days in 5 cases and about fifty days in 2 cases.

Diagnosis.—It is evident from the study of the physical signs that there is no one which is pathognomonic and no combination which can be expected with any regularity. Early diagnosis means much to the patient in both conditions, every day an empyema is left increases the danger of a complication and makes the probable resulting deformity and pleural and lung changes more marked. In delayed resolution the early institution of proper treatment may result in complete restoration without permanent changes in the lung.

The study of the symptoms and signs shows that there is no one which is always present or which can be regarded as pathognomonic. In fact, sometimes they may be decidedly misleading, as for example the presence of vocal fremitus in empyema or its marked decrease in delayed resolution. Neither the presence nor absence of any sign can make or not make the diagnosis of either condition. How important it is, therefore, to study all the features thoroughly and make the diagnosis not from

any combination of signs but from the whole picture. Naturally it is the early diagnosis of empyema to which reference is specially made; with a large amount of exudate the diagnosis is rarely in doubt.

Perhaps the best plan is to consider all the possibilities and proceed by exclusion. Even then it may be necessary to wait, but with proper daily examination and especially not taking things for granted, the condition should rarely be in doubt very long. Seeing a patient day after day it is easy to overlook what seems so clear, and to go over familiar ground with a seeing eye seems to be sometimes impossible to the best of us. Certainly for one of these conditions—empyema—there is no excuse for the delay in recognition so often seen. The records of any large hospital will show a surprising number of cases brought in with empyema weeks and sometimes months after it should have been recognized. I heard a consultant say recently: "Why should any man have to call me in to recognize a pleura full of pus?" If we kept in mind the fact that fever after an attack of lobar pneumonia means something which should be recognized, and realized that every day a complication goes unrecognized may mean serious harm to the patient, we might be stirred up to greater diligence.

The conditions which have to be considered are (1) empyema, (2) delayed resolution, (3) tuberculosis, either co-existent with lobar pneumonia, or present as a tuberculous pneumonia, wrongly diagnosed, (4) some complication, such as abscess or gangrene, (5) a slight gradual extension of the pneumonic process, and (6) the condition sometimes termed a chronic pneumonia.

(1) *Empyema*.—As no one feature is always present, we must expect the physical signs rather to excite our suspicions than to confirm our fears. Of the physical signs, decrease in the vocal fremitus, changes in the percussion note and especially alterations in the breath and voice sounds are the most important. But it has been pointed out that decrease in the vocal fremitus may not be marked at first and that no great weight should be attached to its presence in deciding against empyema. Of all the findings probably the signs on auscultation give the greatest aid. Suppression of the breath sounds and a peculiar nasal quality of the voice sounds are of much value if found.

With this uncertainty as to the physical signs, it is evident that we should employ much more frequently our most certain means of diagnosis, the exploring needle. This should be used without any hesitation and always when there is any doubt. We should be as ready to introduce a needle as to do a blood count, and if properly done one does not involve much more pain than the other. It is well to use a small needle

because one is less likely to hesitate about using it frequently. In the early stages the fluid is rarely very thick and difficulty from plugging of the needle is rare. Aspiration should be done with the needle at varying depths. Early in the empyema there is probably only a thin layer of fluid between the two layers of the pleura and it is easy to put the needle through this and into the lung, with a negative result. This would be avoided if the advisability of trying to aspirate just inside the parietal pleura was kept in mind. The need of care to avoid any infection should always be observed. In some cases the x-rays may be of aid, but in the early stages too much should not be expected from them.

In the diagnosis between empyema and delayed resolution the absence of leucocytosis speaks against empyema.

(2) *Delayed resolution.*—This diagnosis must often be arrived at by exclusion and should be the last to be made instead of the first, as is too often done, empyema being not infrequently considered to be delayed resolution. The variability of the physical signs must be kept in mind, but one point which aids is the fact that they rarely advance as in empyema; for example, the degree of dullness does not increase. Here again in doubtful cases the use of the exploring needle is of help, and this is useful not only on account of what is obtained by puncture but especially through the information obtained by the feeling communicated by the needle entering solid lung. The use of the x-rays may be of help in some cases.

(3) *Tuberculosis.*—This may give considerable difficulty both in regard to the diagnosis from empyema and delayed resolution. As a rule empyema may be excluded by results of puncture. This is especially the case when a thickened pleura may be present with tuberculosis. The difficulty is perhaps greater in distinguishing delayed resolution. A picture of acute lobar pneumonia may be given by tuberculous pneumonia and it is only the long persistence of signs that finally arouses suspicion. Probably the tendency is rather to regard tuberculous pneumonia as delayed resolution than the contrary. The general condition may be of some aid, for generally with tuberculous pneumonia this does not improve, whereas in delayed resolution despite the persistence of the local condition the patient may improve and gain weight. By far the most important aid is the daily systematic examination of the sputum, but here again bacilli may not be present until some time after the onset; still persistent negative findings day after day must be considered as one of the most important points against tuberculous pneumonia. Sometimes delayed resolution after lobar pneumonia may occur in a

patient who has also pulmonary tuberculosis. This condition is not easy to recognize until time makes the correct diagnosis possible.

(4) *Complications* should rarely be a cause of confusion, although it is evident that abscess or gangrene might suggest empyema. This, however, is of no moment as the treatment is the same. Such complications as endocarditis or pericarditis should be easily recognized and can rarely cause confusion.

(5) If the patient has been carefully examined from day to day and accurate notes made it is not likely that a slow extension of the process will give much difficulty. The general features of the pneumonia will probably remain well marked and the changes in the physical signs should make the matter clear. In some cases the question of (6) the so-called chronic pneumonia may arise, especially in regard to delayed resolution. It is difficult at an early stage to distinguish these two conditions, for as far as physical signs go they are the same.

Prognosis.—This has to be considered both as regards life and restoration of function in the lung. Seven of the twenty-nine patients with empyema died (24.1%). Two of these died during the attack of pneumonia, and one from streptococcus septicæmia. The other four died of some complication, one of pericarditis, one of pericarditis and meningitis, one of endocarditis and meningitis, and one of myocarditis and infarction of the lung. These complications came on after the empyema had been drained, but it seems reasonable to hold that the earlier operation is done the less is the chance of them appearing. The death rate in empyema did not differ materially from that of the whole pneumonia series.

The ultimate results in the patients who recovered were good, and so far as known there was no instance of bronchiectasis or marked fibroid change. There was usually some shrinking of the affected side, but the average difference was not over one inch, with drooping of the shoulder, slight dulness and diminished breath sounds at the base. However, some patients showed no change, as one who had empyema on the right side in 1890 and returned with a second attack of pneumonia in the same lobe in 1895.

How frequently is an empyema absorbed either without interference or after tapping? There was one instance in this series in which recovery followed aspiration. The signs were rather unusual and aspiration was done on the fourth day, turbid fluid being obtained which contained pus cells and pneumococci. The aspiration was repeated the next day with the same results. The temperature fell by lysis from the eighth to the tenth day and recovery was uninterrupted. The signs over

the lung were normal on discharge. Such cases are to be regarded as exceptional and should not be used as an argument against operation.

Delayed resolution does not involve much danger to life, but there are always chances of permanent change in the lung. In this series two patients died (5%), one having empyema with pericarditis, the other endocarditis. The ultimate result in the lung may be hard to estimate. When one remembers that in one of the patients coming to autopsy on the twenty-fifth day from the onset of the attack there was definite change in the lung, the rapidity of progress of this is realized. It is impossible to be certain in any given case that some permanent change will not be left in the lung.

Treatment.—This requires little discussion. In empyema thorough drainage should be done at the earliest possible time. To wait for absorption or to delay, hoping that aspiration may be effectual, are both to be condemned. In delayed resolution it seems difficult to understand how any drugs or local measures can be of great aid. Our best aid is in the use of the x-rays. These should only be used after all signs of inflammatory progress have disappeared. It is important to exclude tuberculous pneumonia, for in case of this the x-ray treatment will do harm. For delayed resolution four exposures to the extent of four or five minutes each may be given on alternate days.

Conclusions.—The points specially brought out by the study of this series of empyema were:

1. In the majority of instances empyema may be regarded as a complication of pneumonia, rather than a sequel.

2. It occurs relatively much more often in the colored than in the white race.

3. Fever was the only manifestation always present.

4. The physical signs are variable, and it is well to remember that vocal fremitus may be retained, even with a considerable amount of exudate.

5. Of the physical signs, changes in the breath and voice sounds were the most useful single manifestation in diagnosis.

6. The importance of the repeated use of the needle in all doubtful cases.

The study of this series of delayed resolution suggests the following conclusions:

1. That the factors usually considered to be of importance as affecting its occurrence, such as apical involvement, advanced age, debility, and cachexia, did not seem to have any influence.

2. As regards age, three quarters of the patients were between the ages of seventeen and forty years.

3. The conditions which did seem to affect the incidence especially were (a) color and (b) involvement of the lower right lobe. The colored showed a relative high incidence as compared with the white race. The lower lobe of the right lung was concerned much more frequently than any other, both in the total number of cases and relatively in proportion to the number of cases in which it was involved in the pneumonic process. The cause of this is obscure, unless it be diminished movement on account of the relationship to the liver.

4. The physical signs show great variation and no general description can be given of them. This applies both to the signs during the continuance of the delayed resolution and during clearing.

5. The diagnosis must frequently offer difficulty and can often only be made by exclusion of other possibilities. Empyema and tuberculous pneumonia are the conditions which give the greatest trouble.

6. As regards prognosis, while the danger to life is not great, it is never safe to predict absolute restoration in the lung. Permanent change may appear in a short time.

7. The use of the x-rays is the most hopeful therapeutic measure, but these must always be used with caution and only after the diagnosis is positive.

METASTATIC GONORRHOEAL CONJUNCTIVITIS:—DEMONSTRATION OF THE GONOCOCCUS IN SMEAR AND CULTURE.*

BY

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We recognise to-day two distinct forms of gonorrhœal infection of the conjunctiva: (1) Gonorrhœal ophthalmia due to the direct transfer of virulent pus to the conjunctiva, (2) Metastatic gonorrhœal conjunctivitis, a form which occurs in subjects with systemic gonorrhœa, and which is due to infection carried to the eye by some internal means.

The course and results of gonorrhœal ophthalmia in infants and adults are only too well known. Bacteriology has placed our knowledge of its cause on a sound basis, thanks to the work of Neisser and Píringer. The second type has been known for many years; in fact, metastatic was the first of these forms to be recognised, and at one time all cases

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of gonorrhoeal conjunctivitis were attributed to infection by metastasis. It has a characteristic clinical appearance. Early in the course of a gonorrhoea, or after some months, or during a relapse, the patient suddenly finds both eyes inflamed, with more or less muco-purulent discharge. Shortly after this, gonorrhoeal rheumatism makes its appearance. The inflammation occurs among males, tends to recur, may remain a conjunctivitis, or involve other parts of the eye.

While metastatic conjunctivitis has been well understood clinically, its aetiology has been the subject of much speculation and discussion. Bacteriological work has been practised to a very limited degree, and in the great majority of cases has consisted in the examination of a prepared smear. Many of these cases, too, were reported before we were acquainted with the pathogenic conjunctival organisms and before conjunctival bacteriology had been brought to its present standard. As was to be expected, the results were largely negative, to such an extent, in fact, that the presence or absence of the gonococcus has been taken as the important point in the differential diagnosis of the metastatic from the direct infection.

If not due to the gonococcus, to what, then, shall we attribute it? According to Carroll, there are three theories. Axenfeld, in discussing Van Moll's paper at the Congress in Utrecht, in 1899, advanced the theory that this form was not due to the gonococcus, but rather to the action of the gonotoxin on the conjunctival tissue.

A second theory is that the inflammation is due to a mixed infection. That the gonococcus, or its toxin, prepares the way for the ordinary pyogenic bacteria, so frequently found in the conjunctiva, to set up an inflammation. The third theory is, that the infection is a true metastasis, that the inflammation is set up by the gonococcus, carried by the blood-vessels to the conjunctiva, as we know it can be carried to different parts of the body. The evidence in favour of this view consists in Lipski, Morax, Van Moll, Burchardt, Kurka, and Knapp having found the gonococcus in the conjunctival secretion. Whether differentiation from the other Gram-negative diplococci took place or not in these cases, I am unable to say.

The diagnosis of metastatic conjunctivitis depends largely upon clinical evidence.—E. B., a young man, age 18 years, was referred to me by Dr. C. W. Vipond, on Monday night, November 2nd, for treatment for gonorrhoeal conjunctivitis. He had been under treatment for some months for gonorrhoea, but in spite of that had spent Thursday night, October 29th, in sexual excess. On Friday his eyes felt peculiar, and he

noticed they were blood-shot. During the following two days, the redness increased, and on the next evening he came to consultation.

He complained that his eyes were painful, especially the right, although both eyes had become involved simultaneously. There was no swelling of the lids, and but very slight chemosis of the bulbar conjunctiva of the right eye. Intense congestion of both palpebral and bulbar conjunctiva was present, although a ring about the corneo-sclerotic margin was of normal colour and contrasted very markedly with the rest of the conjunctiva. There was a profuse muco-purulent discharge, especially from the right eye. The whole furnished a typical picture of a severe acute catarrhal conjunctivitis of pneumococcus or Koch-Weeks' type. After examining the media, fundi, and vision, which were normal, slides were examined, and media inoculated. His eyes were then washed out with warm boric acid solution. He was given some powdered boric acid to use, and told to return the next day.

When he returned the following morning, there was no appreciable difference in the conjunctivitis, but he complained that upon arising that morning, his left big toe was so swollen and painful he was unable to put his shoe on and had a slipper on his left foot. The next day, his foot was so painful that the family physician was called to see him. His diagnosis was gonorrhoeal rheumatism, and he advised removal to hospital, where the patient was admitted to the Eye and Ear ward, Nov. 4th, when the following notes were made: Patient is a well nourished and developed young man, with sallow complexion. There is at present no urethral discharge. He had had a discharge for three months, but with the onset of the inflammation in his eyes, this had stopped. There is no evidence of scar on the penis, no pain on micturition, but there is a large quantity of pus in the urine. There is marked swelling and redness of the metatarso-phalangeal joint of the great toe of the left foot, great pain on movement of the foot, and marked tenderness over the joint. The other joints of the body are normal. He has in both eyes a severe catarrhal conjunctivitis. Previous history negative. The treatment ordered was irrigation of the conjunctival sac, with warm boracic solution, with local applications to the painful joint.

Nov. 5th.—Eyes show marked improvement. The conjunctival congestion is much less, as is the discharge. He spent a restless night. The pain in the great toe was very severe, and to-day he complains of pain in the left ankle and left temporo-maxillary joints. Nov. 6th.—Eyes continue to improve. The great toe of the left foot is not so painful, but both temporo-maxillary joints are involved, and the right knee joint swollen and very painful. Nov. 7th.—Patient had a restless night.

T. 103° F. Bulbar conjunctivæ normal, palpebral shows some congestion, but is practically normal. Was transferred to-day to the medical ward. Four days after beginning treatment, which consisted only of washing the eyes with boracic solution, and eight days after the eye symptoms began, his conjunctivæ were in a normal condition. Nov. 8th.—Eyes normal. Nov. 10th.—Eyes normal. Left knee painful. Nov. 14th.—Right and left knee very painful. T. 103° F. Conjunctivitis present again in the right eye. Nov. 15th.—Eye better. Nov. 16th.—Knees very painful. Urethral discharge to-day from which the gonococcus was obtained. Nov. 19th.—Left the hospital.

The patient was seen at his home at intervals up to December 10th. Up to this time his eyes had remained quiet and his rheumatism had been steadily improving. On December 10th, however, his knees and elbows became freshly involved. His eyes became "like balls of fire" and there was again some discharge. The conjunctivitis continued three or four days, but as the rheumatism made no improvement, he was sent again into hospital, December 15th.

Since that date his eyes have received no treatment, and have remained well. The patient was seen January 3rd and again at a later date in January. His eyes had remained well and his rheumatism had progressed satisfactorily.

The diagnosis of metastatic conjunctivitis was made from: (1) The onset and course of the inflammation. (2) The absence of clinical signs of exogenous infection. (3) The coincidence of the conjunctivitis with other systemic gonorrhœal manifestations. (4) The bacteriological report.

Bacteriology.—When the patient was first seen, one slide after another was prepared and examined, until in one, three Gram-negative diplococci were seen, either within or upon three leucocytes. Eighteen slides had been carefully prepared and searched through before this result was obtained. Tubes of plain agar, blood-serum, hemoglobin, and hydrocele agar were then inoculated. After 20 hours in the incubator, they were examined. No growth was perceptible. Twenty-four hours later they were examined again. In the tube of hemoglobin agar a profuse growth was seen. The surface was thickly dotted with small raised colonies of whitish colour, which upon examination were seen to be the bacillus xerosis. In the midst of this growth, two colonies of different appearance were seen. They were larger, moist looking, and colourless. Upon examination, these were found to be Gram-negative diplococci. These two moist colonies with the surrounding growth necessary, were then transferred to other tubes of hemoglobin agar. From day to day the

growth of the Gram-negative diplococcus increased, so that, at the end of seven days, we had a profuse mixed growth of the Gram-negative diplococcus and the bacillus xerosis. They were then easily obtained in pure culture. Blood cultures were taken upon two occasions. The first was negative. The second, taken at a time when the systemic infection was marked by severe pain and high temperature, gave us, after 48 hours, tiny points over the hemoglobin agar. These were found, upon examination, to be Gram-negative diplococci, which, however, we were unable to transfer.

The Gram-negative diplococcus obtained from the conjunctival secretion was compared with a micrococcus catarrhalis, obtained from the nose, a meningococcus from the cerebrospinal fluid, and a gonococcus from the urethra. It grew only at the body temperature, did not grow on plain agar, gelatine, blood serum, bouillon or milk. Grew well on hemoglobin agar, with typical appearance. It fermented dextrose. So that in morphology, cultural features, sugar reaction, this diplococcus was differentiated from the meningococcus, the micrococcus catarrhalis, and saprophytic Gram-negative diplococci.

The micrococcus catarrhalis and other Gram-negative diplococci are frequently found on the normal and inflamed conjunctiva. This makes differentiation necessary. The Gram-negative diplococci found on the conjunctiva in purulent ophthalmia are not always gonococci, or those on the conjunctiva, in meningitis cases, not always meningococci. Every case of catarrhal conjunctivitis occurring in a patient with systemic gonorrhoea is not metastatic. Careful bacteriological examination is necessary and where Gram-negative diplococci are found, careful differentiation.

Pathology.—A snipping from the palpebral conjunctiva was taken, fixed in Zenker and cut in paraffin. Examination of the tissue showed the following:—The epithelium is studded with polymorphonuclear leucocytes. The subepithelial tissue shows oedema of the vessels, some perivascular infiltration, with lymphoid and plasma cells. The lymphatics are dilated. Immediately beneath the epithelium the vessels are engorged, and contain numbers of polymorphonuclear leucocytes, which can be traced in an unbroken path to the epithelium. The presence of this large number of polynuclears in the blood vessels may be of some significance, as it is believed the gonococci in metastasis are carried as emboli to the seat of the inflammation.

A search through a series of sections specially stained for micro-organisms gave negative results. Kurka examined tissue from a case and was also unable to find pathogenic organisms. During the last three

years I have examined a great many conjunctival sections for organisms. Snippings from cases due to the Morax-Axenfeld diplo-bacillus, the pneumococcus, bacillus influenzae, and other organisms were taken, where, in the secretion, these were found in large numbers. Often a search for them in the tissue proved negative. Under such circumstances, it is not surprising that search for the gonococcus in the tissue in metastatic conjunctivitis has upon these two occasions given negative results.

But it may be asked, why, with gonococci in the conjunctival sac, was there such a mild clinical course? Stock has shown organisms causing a metastatic inflammation produce a much milder form than when introduced in some other way. Again, if gonococci were present in smear and culture, why call the conjunctivitis metastatic? The clinical history and course answers this. The endogenous type of gonorrhoeal ophthalmia varies considerably in severity. The virulence of the urethral infection may have been attenuated before the eye became inoculated. Mild cases undoubtedly occur, but it is to be remembered that some of these mild infections are not due to the gonococcus, but to the micrococcus catarrhalis and other causes.

The interesting points in this case, which gives us a classical picture of a metastatic conjunctivitis in gonorrhoea, are as follows:—The retro-pulsion of the old writers was very definite, although urethral discharge had been present from three to four months, with the onset of the eye symptoms, the discharge stopped. Subjective symptoms were present from three to four days. The onset of the conjunctivitis was indefinite, and simultaneously in both eyes, following sexual excess. The previous history of the patient was good, no rheumatism. The clinical picture and the course of the conjunctivitis, almost without treatment, were mild, as compared with the exogenous type. The tendency of the conjunctivitis was to recur, and to remain a conjunctivitis, as it does in 65% of the cases. The rheumatism occurred shortly after the conjunctivitis, and ran a typical course. Our interest, however, in the present case centres around the bacteriological report. As has been stated, some writers give the absence of the gonococcus in the secretion as an important point in the differential diagnosis, and attribute the metastatic inflammation to a toxin. More likely the gonococci were present, but through faulty methods were not found. The organisms must necessarily be few in number, and a bacteriological report from the examination of one or two slides shows one how easily error may creep in. In this case eighteen slides were examined before any definite result was obtained.

That I was able to cultivate the gonococcus I attribute to having seen the case in its early stage, and to having used media upon which the gonococcus would grow as profusely as would the contaminator. That I obtained it in pure culture was due to frequent transplanting for days, when I really felt the task hopeless.

Axenfeld says: — "Axenfeld-Morax in his exact bacteriological research stated that scattered gonococci may be found in such cases, Parinaud made the same observation, and their results were confirmed by Van Moll. We must not, therefore, conclude from a negative examination for gonococci, that the inflammation is due to a pure toxin metastasis, and not metastasis of the organisms themselves, though the former cannot definitely be excluded. Certain proof, however, is not yet available."

I believe that the present case makes proof available, that metastatic conjunctivitis is not due to a mixed infection, is not caused alone by the gonotoxin, but that it is a true metastasis of the gonococcus.

NOTES ON THE PATHOLOGICAL ANATOMY OF CONGENITAL HIP DISLOCATION.*

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The idea of presenting some notes on the pathological anatomy of congenital hip dislocation is to bring to your attention certain facts which greatly influence the treatment and prognosis in certain cases and in order that the reduction of the condition may not be viewed from the point of traumatic luxation alone.

Before the so-called "bloodless reduction" came into vogue in select cases, in many of the great clinics the "open reduction" was practised following the Hoffa-Lorenz operation.

Historical Note.

The condition of congenital dislocation was recognized from very early times. Hippocrates mentions it. Ambrose Paré, in 1678 described the symptomatology. Verduc, of Paris, in 1701 reduced congenital dislocation by traction, but found that recurrence always was a sequel shortly after traction was abandoned. Thus the attempts continued with slight improvement of results by the open reduction method, until 1895, when Lorenz presented his method of reduction and retention. Many other surgeons practised in the early times the traction method—Dupuytren,

* Read before the American Orthopedic Association in Chicago, June, 1908.

Malgaigne, Pravaz, Paci, and many others. The proper fixation of the head of the femur after reduction in the acetabulum and a rational method of reductions were the crucial points.

After the first work of Lorenz the extreme abduction or rectangular position was adopted. This, with certain modifications, is now generally practised. However, many relapses were reported and the percentage of anatomically perfect results was relatively small, anterior reposition and relapses being frequent. This leads me to examine and review many of the causes of these failures.

Classification of Types.

From observation of cases and not taking into account the secondary differences in very adult cases, Lorenz and Reiner give three main varieties of this condition.

1. This case, *in utero*, marked flexion of the legs being present, the head of the femur is below and behind the cavity of the acetabulum. At delivery and with extension of the legs the head of the femur becomes superior and posterior immediately, thus a superior and posterior position, secondary to an inferior and posterior.

2. *In utero*, the head of the femur lies below and slightly behind the acetabulum, but on delivery comes to rest, owing to laxness of capsule or probably some deficiency in the bony skeleton, not in the axis of the acetabulum, but against the superior lip of the same (*vide* Fig. 1, healthy side).

3. Primary, supracotyloid dislocation. The head of the femur is felt in position according to the anatomical condition of the neck of the femur, deformed or normal. Thus either a subspinous in anteverted femoral neck (as in Case IV), or directly above the acetabulum as in Case II.

Clinically, a good working classification is as follows:

- I. Anterior or subspinous,
- II. Supracotyloid,
- III. Posterior or iliac,
- IV. A form presenting a combination of I and II, or I and III, according to the position of the femur in flexion or extension.

Anatomically, we find that there are three separate bones combining to form the os innominatum. These three all converge in the Y cartilage of the acetabulum. Here some primary differences are found in cases of congenital dislocation. Heusmer and Saintons have described cases of newly-born, and the former a six months fetus. In these were found a slight deficiency of the upper rim and marked diminution in the size of the acetabulum as compared with the other side. Other observers have

confirmed the fact, and that on the pathological side the cavity is made still more shallow by fibrous tissue and fat deposit. I myself well remember a case I saw in a Paris clinic of a new-born child in which there was a marked posterior or iliac dislocation. In this case there was a deficiency in the rim in its posterior and upper segment.

The condition of the acetabulum has been frequently confirmed, in fact Hoffa reports that in every case which he treated by the open method he found a definite cavity, always big enough to receive the tip of his index finger. Here, then, we have a primary very important point, a shallow acetabulum and in some cases, before and at birth, a slight deficiency of the rim of the acetabulum in its upper and posterior parts. This may be very slight, as seen in the sound side of Case I. Besides this the shallowness of the cavity is not regular, but rather triangular in shape, base downward, the upper half being more affected than the lower. Also a ridge gradually forms running vertically from the tip of the ilium downward to the posterior border of the acetabulum. A specimen in Joachimsthal's clinic shows this very well.

In the progressive cases this factor must be remembered. Some very good specimens, which may be studied in the Dupuytren Musée, Paris, and in the Berlin and Vienna collections quite confirm this.

Naturally, further changes are produced in older patients, especially when body weight becomes a factor. Where the head rests a new depression is found (Cases III, IV, V and VI). Where the head of the femur finds no fixed place to play in, there may be a slipping around of the head and still another depression formed. The Dupuytren Museum has a specimen where three such new cavities are present, one above the other. Nelaton also describes a specimen in which the head of the femur worked freely according to posture in two such cavities, but a persistent new joint is not common as the opportunity for the same is not favourable (Ludloff). The anterior or the subspinous position is the form presenting the most favourable chances as is seen in specimens 4 and 5. This is due to the fact that the femoral head is firmly held and prevented from uprising by its subspinous position and the Y ligament of Bigelow.

In the head of the femur there are many different forms presented. Of clinical and practical interest the most important, apart from the closely allied to normal form, is the so-called "anteverted head." This Lange claims to be due to a torsion of the femur; others, however, say that it is due to a bending forward of the head, the torsion being a very slight factor. Clinically, to recognize this form is very important, as, if treated in the ordinary method of first and second flexion, an anterior reposition is sure to result (Case III).

Another form of the femoral head is the "mushroom form," not very uncommon. More uncommon is the "knob-shaped head" (as in Fig. 4), or the "upturned one" (as in Case II).

The important factor as regards fixation is to remember the axis of the neck and head of the femur, and retain the same in that point of your acetabulum. In the pelvis, in general, unilateral luxation causes a deformed cavity as seen in specimen. This is the most important change. The capsule becomes thickened and varies in form. In the anterior position the Bigelow Y ligament plays a very important rôle; the head is held and prevented from slipping further upward by this important band.

In the secondary posterior variety the capsule assumes an hour-glass form, and becomes twisted on itself, due to the new position of the head. The muscle changes are due to the altered relationship between the origin and insertions; thus we have in general the distance between the ilium and trochanter shortened. On the other hand, the distance between the os pubis and femur is lengthened. The diagram explains this far more clearly.

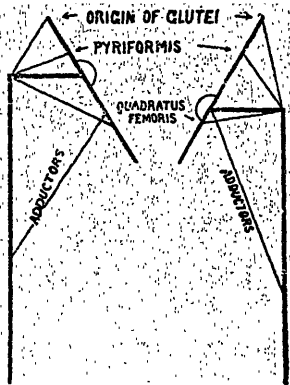


Chart showing altered muscle relations due to upward displacement of femur.

Here mention must be made of the Trendelenburg symptom. As is known, this consists as follows: The patient, standing with his back to the observer, flexes his thigh first on one side, then on the other. If there is any factor causing loss of tone in the pelvitrochanteric muscles of one side, whether due to alteration in length or to some lesion, and which at the same time permits weight-bearing, the side of the pelvis opposite to the lesion drops when the thigh of the same side is flexed. Whereas, on testing the other side, in contradistinction, it rises. This is readily ex-

plained by the diagram of the principle of the lever. The symptom is of distinct value in cases of congenital luxation, coxa vara, and coxitis.

Functionally, a very important rôle is played by the iliopsoas muscle. In the posterior variety this muscle and its tendon practically act as a sling to the pelvis and prevent further upridding of the head on the dorsum of the ilium (Lange). Naturally, on the affected side there is marked diminution in the tone and power of the muscles. This is very well demonstrated clinically by the Trendelenburg test. In the Class I of Lorenz's classification, where on erect posture there is an anterior position, but when much weight is thrown on the limb or flexion is present it assumes the dorsal or iliac position; here we usually find the neck is twisted and the head is in the anteverted position with the epiphysis eccentric from the line of the normal shaft neck angle.

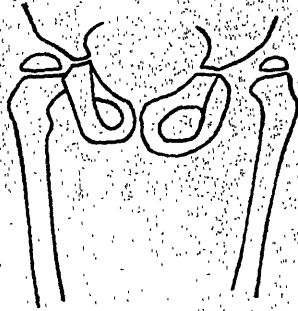
What is to be done? Naturally, the reduction is the first treatment, and the original first position, as laid down by Lorenz, practised. This allows for contracture also of the posterior and inferior capsule and periarticular support (muscles, etc.). Slightly also is the superior capsule shortened. The head now, though replaced, also assumes a partial anterior reposition owing to the deformity present. If the operator feels that he can replace the head and fix it in that position, at the same time bringing the femur down to a position of 45 degrees abduction, well and good. Should, however, this not be obtainable, it is wise to fix the same for a month or six weeks in extreme axillary abduction, as advised by Werndorff. This assures the position of the head in the acetabulum, and also assists in the contracture of the superior and anterior periarticular support. The choice must be made between this position and the position of internal rotation with 45 degrees abduction. Then the next fixation must be carried out with the femur sufficiently internally rotated to replace the head, and at the same time in 45 degrees abduction of the shaft, in order to assure the concentric position of the femoral head in the acetabulum.

The question of weight-bearing depends entirely on whether the operator feels confident enough of his fixation to allow it. Personally, I do not agree to it, except in very selected cases. Naturally, in all fixations, the same must not be carried out for too long—to allow contractures to fix the limb in a pathological condition.

From my own practice and from the clinic at the Royal Victoria Hospital, I have selected examples of these varying conditions.

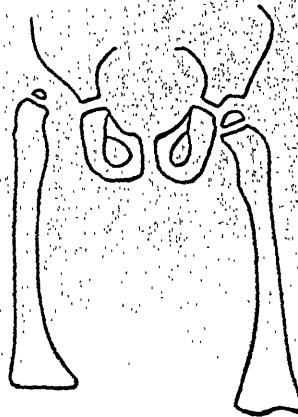
Case I.—This presents a combination of two types mentioned. In the first place, on the apparently sound side, we see a distinct defect in the contour of the upper rim of the acetabulum. This is seen in most cases of

so-called subluxation. Besides this, the epiphysis is set on the neck in an eccentric position; thus, on weight-bearing the head does not lie in the axis of the cavity, but on the upper and outer lip which, combined with the deficiency above noted and the laxness of the ligament—as shown by the position of the head—readily explains some of those cases which



CASE I.—Note dislocation on left side—complete—anteverted upturned head.
Subluxation on right side.

gradually develop as the weight-bearing in walking increases. These cases are not uncommon, and for a time observers, especially in Paris, held that this was always the primary condition—that it was not congenital, but progressive. This is certainly not so, however, in all cases, as is proved in Case II.

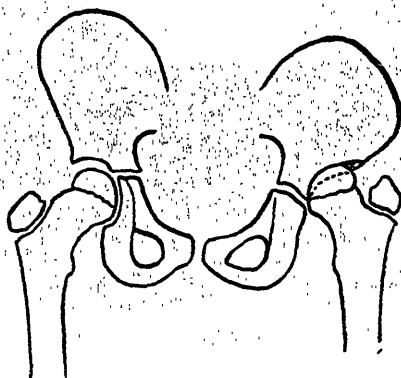


CASE II.—Note rudimentary acetabulum—supracotyloid dislocation—superior rim of cavity so deficient that auxiliary fixation was indicated—almost no shaft neck angle.

Case II.—This case is of interest as the luxation was present before any weight-bearing to my certain knowledge. The influence of heredity presents a predisposition in this case, the mother had a so-called double-

jointed condition of shoulder and hip, besides very marked hyperextension of fingers and hands. Here we find almost rudimentary acetabulum; there is a very deficient upper lip, and the head of the femur is best seen in the diagram directly above the cavity of the joint. There is a marked deficiency of development in the head of the bone. Almost a total absence of shaft and neck angle may be observed; besides the epiphysis is perched almost on top of the bone. This plainly demonstrates the impossibility of the second fixation being made in the same position as in Case I. This head must be held in the acetabulum until the upper lip develops and the ligamentous structures around the joint have contracted sufficiently to hold the same in place. Naturally, as I observed before, the fixation must not be continued until contractures fix the limb in a pathological condition.

In this case also the radiogram might be misleading, as by it there appears to be a very shallow cavity of the acetabulum, but we must remember that the limb remains completely cartilaginous until the third or fourth year (Ludloff). In this very case on reducing there was found to be a sufficient cartilaginous posterior lip to retain the head in the cavity until



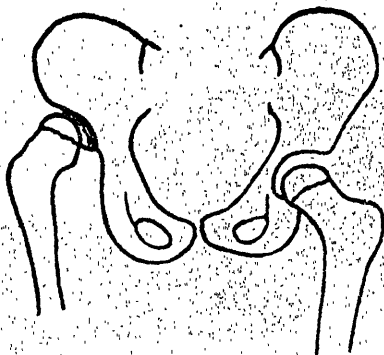
CASE III.—Example of fixation with non-attention to condition of anteverted head present—note new subspinous acetabulum.

a position of about 45 degrees abduction was reached. It then slipped out. How different does this appear from the radiograph probability?

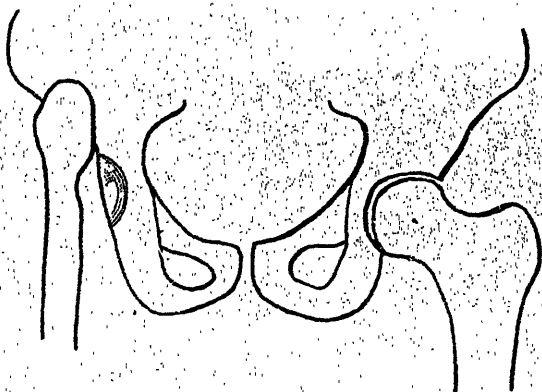
Case III presents an example of non-attention to the anatomical condition of the head when anteversion is present. In this case you can again see the slight eccentric position of the epiphysis on the well side. On the pathological side can be seen the tracing of the new acetabulum subspinous in position. Clinically the head is readily felt there; functionally, the case shows about one inch shortening, some eversion of the foot, and from the present bony purchase there will be no augmentation

or deformity from weight-bearing. But it is a clear example of not paying attention to the anatomical condition at the time of second and third fixation. The head was a distinctly anteverted one reduced in 1903 by Lorenz. The parents then neglected further advice—keeping the cast on for one year, and then allowing child to walk as she could.

Case IV.—Patient aged twelve; walks with eversion and one inch shortening. This case presents a well-marked acetabulum which has



CASE IV.—Note well-marked subspinous acetabulum and constant joint relation. been produced subspinous. This case illustrates very well the contention of Ludloff that this variety alone presents conditions favourable to a stationary joint in a new position. The head of the bone is well held

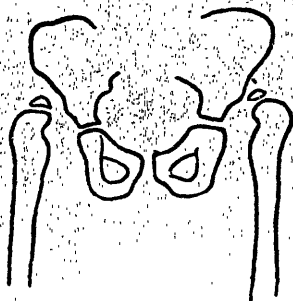


CASE V.—Antithesis of No. 4 Rudimentary Acetabulum. Note flattening of pelvis due to constant weight bearing.

against the ilium by the Y ligament of Bigelow. Clinically, there was absolutely no upriding and a firm new joint was established.

Case V.—Patient, aged twenty-six. This case presents an antithesis to the previous, a very movable condition of the head of the femur. There

is still present a rudimentary acetabulum, but weight-bearing shoves the head well up toward the crest of the ilium posteriorly. The patient, as in all these cases, at times relieves some of the weight by pressing his hand firmly over the right buttock. From the extent of the upridding it would seem probable that the iliopsoas bears up a suspending action. With regard to the pelvis it is interesting to note that on the healthy side there is gradually developed a flattening due to constant weight-bearing on that side. This naturally in the case of the female patient would be of very great importance as tending to cause rotation of the fetal head during parturition. Otherwise the pelvis presents the usual somewhat slightly arrested development on the affected side.

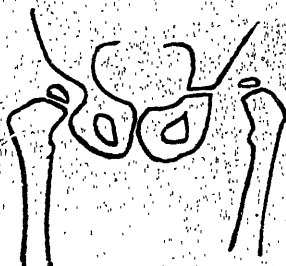


CASE VI.—Typical bilateral dislocation supracotyloid.

Case VI.—This case presents a typical bilateral dislocation. Here there is a slight difference on the two sides, the acetabulum being much better formed on the left than on the right side. The condition was one of typical supracotyloid dislocation, readily reduced, but at the same time showing the rim of the acetabulum to be sufficiently developed that the head might be retained in position until 60 degrees abduction was obtained, it then slipped out. On the right side, however, this rim was very poorly developed, the head dislocating backward when about 40 degrees abduction was obtained. On being reduced, the head of the femur slipped into the acetabulum instead of slipping over a definitely formed rim. Clinically, the patient presented the usual classical symptoms.

Case VII.—This case was a unilateral, left-sided, congenital dislocation, aged eighteen months. The child had not walked. In this case the contour of the trochanters is quite bluntly shown. The shaft neck angle is preserved; however, on the side of the dislocation, the radiogram presents almost no acetabulum. Clinically, this was not entirely confirmed. However, the acetabulum was very deficient superiorly, the head was separated by a rim on testing, but it slipped progressively backward when abduction was practised as though there was practically no obstruction be-

tween the acetabulum and posterior dislocation. This was proved clinically by the readiness with which the posterior dislocation was brought about. In a case such as this extreme rectangular abduction would be indicated as the first position.



CASE VII.—Note rudimentary acetabulum—Relaxation very readily obtained.

CONCLUSIONS.

1. The condition is usually intrauterine in occurrence, relatively seldom resulting from difficult delivery.
2. Some few cases may develop progressively, where there is some deficiency of the upper lip of the acetabulum, combined with relaxed ligaments and loss of tone in the surrounding muscles.
3. Before attempting reduction, the shape and axis of the head of the femur should be ascertained, also condition of acetabulum.
4. In young cases the radiogram may be misleading owing to the predominance of cartilage in the formation of the articulation.
5. Reduction may be carried out either over the posterior rim of the acetabulum or the inferior, according to the experience of the operator.
6. After reduction the "range of retention" in the joint should be ascertained by redislocating and fixation adopted in the position most removed from the recurring point.
7. Malposition, especially that resulting from anteverted head, should be carefully guarded against.
8. Between fixations it is wise to control the position of the head by means of the radiogram.
9. In older cases, after six years of age, the possibility of contractures in a faulty position must be guarded against. Therefore the fixation must not be of too long duration—6 weeks to 2 months.
10. While weight-bearing may stimulate the development of the femoral head and acetabulum, it is not essential and quite contraindicated in a percentage of cases.
11. Owing to muscle changes the convalescent treatment of massage and exercises should be carefully followed until the disappearance of the Trendelenburg symptom.
12. Myorrhesis of the muscles is only occasionally essential.

THE

Montreal Medical Journal.

A Monthly Record of the Progress of Medical and Surgical Science.

EDITED BY

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No. 7.

THE MEDICAL CONVOCATION.

The Convocation of McGill University, which was held in the Royal Victoria College on June 9th, for the purpose of conferring degrees in medicine, was one of the most notable in recent years. The number of graduates was fully up to the usual average; the attendance of professors and members of the staff was unusually large, and the proceedings were characterized by interest and sobriety. The valedictory address on behalf of the Faculty, which was given by Dr. C. F. Martin, was fitly done since it struck at that spirit of pessimism which has been suspected in recent years amongst students, graduates, friends in the community, and even amongst the teachers. "McGill," he said, "was supposed to be descending the autumnal slope of decay while sister universities, with more students, perhaps, and more clamor, had been thought to be superseding her. Those who did not travel much, or who, while travelling, with a limited perspective, saw but superficially, failed to grasp the essential relations between a university and the district of which it is the educational centre. They failed to realize that in an ancient established country, full of traditions, populous and well seasoned, like Germany, the type of medical school was necessarily different from one which exists in a new and less populous land, where the duties and functions of medical men vary, of necessity, to meet the requirements of the country. If they glanced at the history of the faculty for the past fifteen years, they would realize that while even to-day their schools lacked much of the advanced kind of work seen in the European schools yet most remarkable progress had been made."

Dr. Martin then proceeded to recount some of the improvements made in the last few years in the university and its teaching facilities. The reconstruction of the General Hospital, the many additions to the Royal Victoria Hospital, the erection of a magnificent maternity hospital, with material for teaching and study equal to any in the world; the new infectious diseases hospital, the new university buildings, the adoption of a five years' course, and, finally, medical reciprocity with Great Britain, he thought, and we think, too, is final answer to those who affect to believe that the old was better than the new.

Dr. Martin was peculiarly happy in his selection of the model of attainment which he commended to the graduates as an exemplar. We cannot refrain from quoting his words: "The practitioners before you, my colleagues on this faculty, will, I know, unite with me in commending as your type the much-beloved physician of this city, whom illness has but recently incapacitated after so many years of self-denying devotion to the community. Courteous, gentle and forgiving, he possessed all the attributes of the perfect physician, because he combined with his great skill all the qualities of the perfect gentleman. An enemy of pretence and folly, he never allowed the fads and fancies of the irregular practice to sway him; but, with a remarkable faculty for holding to that which is good, he was never carried away by every medical novelty that arose, but saw that the tree was well shaken before he scrambled for the fruit. Sympathetic, generous, helpful to all, he carried out the all-inclusive though simple philosophy of his life to do the decent thing by his neighbour, and attend but to his own affairs. With such an aim, with such an ideal, with such a mission carried out, the world is better for his life and work."

The Dean in his sessional address was full of hope. He remarked that "in spite of the fire of 1907 and the establishment of a five year course, there were sixty new students enrolled in 1907, and eighty-five last session. Though the faculty had been depressed somewhat owing to the fire, things were pointing to an awakened activity. They looked forward to taking possession of the new medical building next year, when they would convince sceptics that McGill was able to hold her own among the finest continental institutions of the present day."

HEALTH CERTIFICATES BEFORE MARRIAGE.

It has lately been stated in the contemporary press that a United States legislature has made it a law that persons marrying in a certain district must present certificates of good health determined by medical inspection. There is something to be said in favor of the scheme and

much to be said against it, and we venture to predict that it will some day appear only as an addendum to some future description of the marriage customs of different races. Practically, the idea is not a workable one because the outcome will be either that certificates will be issued upon insufficient examination or that marriages will be performed elsewhere, to which may be added that the people who would submit to such a law would likely be the ones for whom it is least intended.

It is a fact that there are many people marrying every day who have no more right to marry than they have to be Prime Ministers or Presidents: some of these will see injustice in such a law, without seeing that providential laws with heavier penalties are being put in force against them every day—that their marrying entails penalties of short life, offspring of ill-physique, of low mentality, of absolute unfitness for the struggles of every-day life: if they could come back and see the misery that their selfish thoughtlessness has imposed upon their progeny they would trebly curse their ignorance and their folly. Yet, although this is perfectly true, it is not often that the physician's advice is taken upon such a subject or the physician's veto allowed to interfere. Thus the law which tries to protect a fool against his folly will prove its inadequacy, because there is inherent in fools the quality of folly.

DIAGNOSIS BY RULE OF THUMB.

The story is told of a well-known clinical teacher that coming into his lecture room he was greeted from the back benches by "Professor, give us some good pointers to-day." He paused a moment and then shaking his fist in the direction from which the voice came said, "Pointers, you fool; it is principles you need and not pointers." While we all cheerfully grant the importance of principles yet most of us have a sneaking fondness for pointers. Have we forgotten the euphemistic rhymes and catch phrases by which we fixed various anatomical facts in our early medical intelligences? Truth to tell, some of us remember the rhymes but would be hard put to if we had to give the anatomical points they represented.

However, this habit tends to cling in later years and is partially represented by the man who makes his diagnosis by rule of thumb. To him, only the typical picture carries any enlightenment; a patient who has all the signs of typhoid fever except rose spots cannot have the disease, in his opinion, because this one feature is lacking. It is a good day for a man when the realization of the variability of disease comes home to him, and happy are those who know it early. To them, the shifting pictures

only add interest to their daily study of disease. This attitude of mind is especially shown in the diagnosis of conditions—such as those in the lung or pleura—in which the correct interpretation of physical signs is important. To those who work by rule the typical case may not offer special difficulty, but the atypical ones find them entirely lacking in equipment for their solution. They are on an uncharted sea and have no means of finding their bearings. They do not work by principles but by rule of thumb.

Take the findings described by Dr. Thomas McCrae as brought out by the study of a series of cases of empyema and delayed resolution in lobar pneumonia, in this number. In many cases the physical signs seemed against the rule—for example the character of the vocal fremitus—and if one went only by the rule a correct conclusion would be certainly difficult and often impossible. Yet, at first glance, the diagnosis of these two conditions should not appear to offer any great difficulty. It all agrees with the statement of Locke that “We can have knowledge no farther than we have ideas.” If our ideas in medicine go no farther than working by rule our knowledge must fall far short.

POLLUTION OF WATER.

At the meeting of the Royal Society held in Ottawa on May 25th, 26th and 27th, it was moved in section 3 and a resolution passed and reported from the section to the general meeting of the Society, that the Society memorialize the Federal Government to investigate how the Government could prevent and pass any legislation necessary to prevent any city, town, village, hamlet or any municipality, company, factory or private resident on the banks of any of the water ways of the Dominion from running their sewage into any water way, without that sewage being first treated by some process of purification, and to prevent any effluent water from such a sewage treating plant *entering* any water way, unless it be of a standard of purity to be established by law, and that the Government appoint some authority which will efficiently carry out the necessary legal enactment: also to prevent all companies or individuals, or any other persons whatsoever, from dumping any untreated sewage into the rivers or water ways they are navigating.

This motion was proposed by Dr. Girdwood and seconded by Sir Sandford Fleming at the last meeting, and the Council was instructed to take it up and act upon it.

At the meeting of the Medico-Chirurgical Society of Montreal held on Friday, June 4th, Dr. Girdwood proposed and Dr. Adami seconded the passage of a similar motion for the purpose of supporting the action that the Royal Society might take in the matter.

Reviews and Notices of Books.

PRINCIPLES AND PRACTICE OF PHYSICAL DIAGNOSIS. By JOHN C. D'ACOSTA, M.D. W. B. Saunders.

This work deals only with the thorax and abdomen. As its title implies it is chiefly concerned with physical signs, laboratory technique being omitted with the exception of a few paragraphs bearing on the diagnosis of special lesions.

A great deal of accurate information is compressed within the 500 pages of the book, but much of it is so condensed as to prove difficult reading to the student and uninteresting to the practitioner. This applies particularly to the paragraphs on clinical pathology. The text is extensively illustrated and well printed.

CONSTIPATION AND INTESTINAL OBSTRUCTION. By SAMUEL GOODWIN GRANT, M.D., LL.D., Professor of Diseases of the Rectum and Anus in the New York Post-Graduate Medical School and Hospital; Attending Surgeon for Rectal Diseases at the New York Graduate and St. Mary's Hospitals and the German Polyclinic Dispensary. Published by the W. B. Saunders Company, Philadelphia and London, 1909.

This book is of convenient size, well printed in clear type on smooth paper and abundantly supplied with well chosen illustrations. The volume is divided into 44 chapters which, with a good index, makes reference easy and thereby enhances its value to the busy practitioner. The subjects treated of have been dealt with in a clear, methodical and rational manner. Constipation is properly considered as only a symptom and not a disease *per se*. In one case it may simply indicate some functional disturbance, while in another it may depend upon a great variety of pathological conditions.

The author has clearly pointed out that every case of constipation to be treated successfully must be studied from an etiological standpoint, and he is most emphatic in declaring that there is no routine method of treatment. The drugging of constipated patients is deprecated and held to be pernicious, and very rarely indeed is anything accomplished towards giving permanent relief. In spite of this fact the confession is made that purgatives are frequently resorted to by the author at the request of the patient in order to secure a movement quickly. In the vast majority of cases chronic constipation can be cured without the aid of medicines by means of education, exercise, psychotherapy, dieting, hydrotherapy, massage, mechanical vibration, and electricity.

With a mild apology, and for the benefit and convenience of the general practitioner, who is not familiar with the more rational and safer methods of treatment, two chapters have been devoted to medicinal treatment and the setting forth of a large number of special formulæ calling for purgative pills and mixtures. Much importance is placed upon psychic influences as a potent factor in overcoming the constipated habit: "The large number of undoubted cures from chronic constipation which have been made by Christian Science healers goes far to substantiate the powerful influence of the mind in controlling the bowel movements."

Chapters 2 and 3 deal with the anatomy and physiology of the gastrointestinal tract. They are specially interesting chapters and are admirably illustrated. Chapter 4 deals with classification and general remarks on etiology, where drugs are again held to be one of the most common causes of constipation in this country. The mechanical causes of obstruction are considered at considerable length, and the varying symptoms and differential diagnosis, depending upon the point of obstruction, whether in the small bowel or in the large, are fully discussed. The last two hundred pages of the book are devoted to operative surgery, where the various operations are discussed and the author's preference given for some particular procedure to meet the various pathological conditions met with in cases of intestinal obstruction. The volume taken as a whole makes interesting reading and the reader finds much to praise and little to condemn. The one thing to be regretted is this, namely, that it was thought necessary, or advisable, to duplicate so much matter which has already appeared, in perhaps slightly different words, in so many other text-books and monographs.

F. R. E.

AMERICAN PRACTICE OF SURGERY. A complete system of the science and art of surgery, by representative surgeons of the United States and Canada. Editors: Joseph D. Bryant, M.D., LL.D., and Albert H. Buck, M.D., of New York City. Complete in eight volumes. Profusely Illustrated. Vol. V. New York: William Wood and Company, 1908.

The present volume is very largely devoted to surgical affections of the head and of the cranial nerves; diseases, abnormalities and wounds of the face; hare lip and cleft palate; and the surgical diseases of the eye, ear, pharynx, larynx and trachea.

378 of the 392 pages are devoted to surgical affections of the head. The article is written by Dr. Edward Archibald. It is very full and

comprehensive. Dr. Archibald gives his readers the benefit of the experience of the great masters, Kocher and Sir Victor Horsley, quotes largely from the work of Harvey Cushing and has taken up each subject with great care. The article is remarkably well illustrated, many of the illustrations being taken from the museum of McGill College and from the Montreal General and Royal Victoria Hospitals. It is altogether a very creditable piece of work and reflects great credit on the author. The article perhaps is legitimately subject to the criticism of being verbose, and, in some parts, a little tiresome. 378 pages is rather a long article on the surgical affections of the head, particularly when it does not include the surgery of the cranial nerves, the surgery, diseases, abnormalities and wounds of the face, hare lip and cleft palate, sinus thrombosis of otitic origin, nor the pyogenic diseases of the brain of otitic origin. Yet the reader will find in it a wealth of information and a valuable article for reference.

Chas. H. Frazier writes the article on the surgery of the cranial nerves, and few men can speak on this subject with greater authority. His article is compact, well illustrated, and in it are very clearly and ably set forth most modern views on this important subject.

Surgical diseases, certain abnormalities and wounds of the face, are dealt with by Chas. de Nancrede, of Ann Arbor; it is well written and clearly illustrated.

Hare lip and cleft palate are treated by James Stone, of Boston, in an article which is fully up to date.

Harlan writes the article on diseases and wounds of the eye and ear; John Richards on sinus thrombosis of otitic origin, and suppurative disease of the labyrinth; Reik, pyogenic diseases of the brain, of otitic origin; Chas. Knight, surgical diseases and wounds of the pharynx; James Newcomb, surgical diseases and wounds of the larynx and trachea, and Frank Hartley the article on laryngectomy.

Mechanically, the work is well done, and in the best style of William Wood and Company, publishers.

TREATMENT OF CONSUMPTION. By W. CAMAC WILKINSON, M.D., University of Sydney. Macmillan and Co., London, etc. The Macmillan Company of Canada, Toronto. Price, \$3.00 net.

The text of which this book is an exposition is contained in the introduction in the following words: "Through the profound genius of Koch, and Koch alone, a certain, safe, and trustworthy remedy has been found for the treatment of pulmonary tuberculosis." We take the liberty of contradicting Dr. Wilkinson, and also of affirming that

there is no "certain" remedy for pulmonary tuberculosis. Some patients get well with no treatment: some die in spite of all treatment. There is no disease in which the issue and event of the thing is more uncertain, and when Dr. Wilkinson says to the "profession in every part of the globe," "Go and do thou likewise," we plead that we do not know where to go or what to do. As an act of piety towards commemorating the semi-jubilee of Professor Koch's discovery of March 24th, 1908, the publication of this book is praiseworthy; as an affirmation that a "certain" remedy has been discovered for pulmonary tuberculosis it cannot be allowed to pass. And yet the author sets forth his records upon 80 pages, adorned with such expressions as "almost a miracle," "improved beyond recognition," "picture of health." If the comments which the author makes upon his fellow physicians are justified, the condition of the profession on the other side of the world would appear to be a deplorable one. He cites the cases of Galileo and Harvey on his behalf; yet it is worth remarking that a "discovery" is not necessarily authentic because it is scoffed at. No one who is interested in the prevention or cure of tuberculosis can afford to be ignorant of this book.

PROGRESSIVE MEDICINE. Edited by HOBART AMORY HARE, M.D., and H. R. M. LANDIS, M.D. Lea and Febiger. Philadelphia and New York. Vol. II. June 1st, 1909. Six dollars per annum.

The contributors to this volume are John G. Clark, William B. Coley, Edward Milton Foote, Edward Jackson, and Alfred Stengel. The subjects are, hernia; surgery of the abdomen; gynæcology; diseases of the blood; and ophthalmology. An index completes the volume. The illustrations are remarkable. The art of drawing is revived in all its truthfulness, and we may well hope that the photograph, with its obscurity and falseness, is passing away. The illustrations for Dr. Coley's article on hernia recall the great days of Bell, and the draughtsmen for "Gray's Anatomy." The surgery of the abdomen by Dr. Foote is equally enriched with figures which do really illustrate. The article upon gynæcology is written by Dr. Clark, of Philadelphia, and is in marked contrast with those premature assertions, ingenious though preposterous theories, and extravagant claims which are habitual in writings upon this branch of surgery. Dr. Stengel's consideration of diseases of the blood is marked by that good sense and good style to which we have grown accustomed in his previous work. An admirable summary is made of Dr. Pavy's lectures before the Royal College of Physicians upon the pathology of diabetes, though Dr. Stengel omits to mention that these lectures were published in this Journal concurrently with that in the *Lancet*. Full refer-

ence is made to the "startling view," which Dr. Eccles put forward, of the ætiology of diabetes in the *Medical Record*, May 9th, 1908, under the title "Darwinism and Diabetes." According to this view the excessive production of sugar is a protective agency against a bacterial blood infection, rather than an aimless or destructive one. We commend this volume with respective praise.

Retrospect of Current Literature.

PATHOLOGY.

UNDER THE CHARGE OF DRs. ADAMI, KLOTZ, AND NICHOLLS.

RETROSPECT IN PATHOLOGY FOR 1908.*

- Adami.—Principles of Pathology. Vol. I. 1908. Lea and Febiger.
- Abbott.—Statistics of Congenital Cardiac Disease. *Jour. of Med. Research*, July, 1908, p. 77.
- Also, Vol. IV., Osler's Modern Medicine.
- Aschoff.—Arteriosclerosis and other vascular scleroses. *Beihefte zur med. Klin.*, Wien., 1908, 4 Hft. 1.
- Klotz.—Experimental "Work" Arteriosclerosis. *Montreal Med. Journ.*, March, 1908.
- MacCallum and Voegtlin.—On the Relation of the Parathyroid to Calcium Metabolism and the Nature of Tetany. *Johns Hopk. Hosp. Bull.*, March, 1908.
- Silvestri.—Calcium Salts in the Treatment of Convulsions. *Gazz. degli Osped.*, October 4th, 1908.
- Eppinger, Falta, and Reudiger.—*Zeitschrift f. klin. Med.*, 1908, LXVI.
- Pemberton and Sweet.—*Archiv. Int. Med.*, 1908, I., 628.
- Fleischmann.—*Berl. klin. Woch.*, March 9, 1908.
- Lesser.—*Med. Klin.*, March 1st, 1908.
- Wright.—Vaccine Therapy and Therapeutic Immunization. *Practitioner*, 1908, VI., 565.
- Opie.—The effect of Injected Leucocytes upon the Development of a tuberculous Lesion. *Johns Hopk. Hosp. Bull.*, April, 1908.
- Jochmann.—The Connection between the Proteolytic Ferments of the Leucocytes and general Immunity. *Zeitschr. f. Hyg. und Infektionskr.*, LXI., 71.
- Henry and Rosenberger.—Typhoidal Meningitis. *Proc. Path. Soc., Phila.*, February, 1908, No. 2.
- Lavenson.—*Univ. Penn. Med. Bull.*, April, 1908.
- Adami.—On a giant-celled Rhabdomyosarcoma from a Trout. *Montreal Med Journ.*, March, 1908.
- Klotz.—On the Large White or Soapy Kidney. *Journ. Med. Research. New Series*, Vol. XV., No. 1 (Received for pub. Nov. 2, 1908).

The year 1908 will not take rank as one of startling achievement in the domain of Pathology. No great discoveries are to be chronicled, nor is there much that is new. Important questions, such as the causation of cancer and the production of immunity in tuberculosis, like the will-of-the-wisp, still elude our grasp. Yet, it would be quite wrong to conclude that nothing has been accomplished. Good, solid, earnest work

*Read at the last meeting of the McGill Medical Reporting Club, April 26th.

is still being carried on in all departments and an array of facts is being accumulated that can hardly fail to bear fruit in the long run. It has been eminently a year of trial. Facts have been retried and reaffirmed, theories tested, and our knowledge of many difficult subjects has been placed on a solid basis. Times of this kind are inevitable and are perhaps more truly useful than are the more meteoric displays of knowledge and discovery.

In our survey of the work accomplished during the past year it is gratifying to note the excellent work that has been done right here in Montreal by investigators well known to ourselves, work that ranks with the best. It would be false modesty were we to pass it by without remark, and I shall take occasion in the succeeding pages to refer to more than one study of distinction emanating from our own laboratories.

Leaving aside for the moment the regulation "Arbeiten," the most noteworthy "event," to use a sporting phrase, was the publication of *The Principles of Pathology*, the first volume of which, by Prof. J. G. Adami, appeared last fall. This work is of importance, inasmuch as it indicates a distinct departure in the matter of pathological text-books. It would not become me, on account of my special interest in the work, to criticize it, but I think I may be allowed to draw attention to some of its more particular features. In the words of the author's preface it is an attempt "to place before student or physician in an orderly and reasoned manner the principles of Pathology, the science, as distinct from the practice of medicine: the science upon which that practice is or should be based." The work begins not with a study of the blood, as is customary with most German works on General Pathology, but with a study of the properties of living matter. Like Virchow, the writer commences with the cell, and in the changes undergone by it sees the basis of all pathological study. The book passes, therefore, naturally and logically, from the consideration of the histology, the physiology and chemistry of the cell, cell growth and multiplication, inheritance, to the causes of disease, the morbid and reactive processes, and finally, to the various tissue changes. Thus, it will be seen that the work is unique in that it deals with what may be called the "philosophy" of disease. The only other text-book, with which I am acquainted, that makes any attempt to consider the subject in a broad way, on fundamental principles, is that of Orth, a splendid work that ought to be by the side of every student of pathology. Orth, however, is a voluminous production, so far not translated into English, and in the matter of "principles" is somewhat desultory in treatment, lacking the logical continuity of Adami. Needless to say, the latest book will not appeal to the quiz-

compend man nor to the student desirous of getting at the necessary minimum of facts in the minimum of time and space, but to the thinkers and especially to those who already have a working knowledge of pathology the book comes as an inspiration. Eminently readable, like everything that comes from the pen of its writer, the work is as fascinating as an historical novel.

Another noteworthy production is that of Dr. Maude Abbott on Congenital Cardiac Disease. Her paper on this subject in the July number of the *Journal of Medical Research* is, I take it, but a sketchy presentation of her contribution on the same subject in Vol. IV. of *Osler's Modern Medicine*. This is a monument of careful and thorough research, and inasmuch as, in large part, it is based upon a study of the excellent material in the Pathological Museum of McGill University, may be fairly claimed as coming into the category of Pathological Research. All the facts, up to the present, known in connection with a difficult and somewhat obscure subject are here presented to us in a clear, logical, and complete manner, and are dealt with from various aspects. This work will, no doubt, for many years remain "the last word" on congenital defects of the heart.

ARTERIOSCLEROSIS.

The subject of arteriosclerosis has a special interest for us here in Montreal, inasmuch as not a little of the most important work has been done by one of ourselves (Klotz), work which has done more than all to put the pathogenesis of an unusually complicated condition on a sound footing. The most recent contribution on this subject is that of Ludwig Aschoff, whose visit to Montreal is still fresh in the minds of some of us, who gives a careful review of the work done on the subject and systematizes our present knowledge. The general result has been somewhat revolutionary. Ten years ago or less, Thoma's view, that the initial change in arteriosclerosis was a weakening of the media, was widely accepted and the theory usually taught in the schools. Now this is given up. The processes, variously described as arteriosclerosis, atheromatosis, endarteritis chronica nodosa seu deformans, and angio-malacia, are now held to be purely degenerative and not inflammatory, as Virchow thought, and to begin with fatty degeneration of the intima. The earlier stages of fatty softening (atheroma) lead to fibrosis and hardening (arteriosclerosis). Aschoff, therefore, strongly supports the proposal of Marchand to rename the whole process "Athero-sclerosis."

The normal thickening of the arteries occurring during bodily growth has been studied especially by Jores and his pupils. This physiological

process takes place mainly by an increase of the elastic tissue about the external elastic layer and to a less extent by increase of the elastic fibres of the intima. There is also a slight increase of the muscle fibres. All these changes result from the increasing tension to which the arterial wall is exposed. This structure remains as a rule unchanged until the age of 35 or 40, when variable senile sclerotic changes occur in the walls, consisting in the end of a further thickening of the intima by the growth of connective tissue. Microscopically, the first visible change is fatty degeneration of the oldest elastic fibres. In some cases there appears to be a new formation of elastic tissue along with the connective tissue, so that it is difficult to say where physiological thickening ends and pathological begins, at least in some cases. In the aorta, the elastic fibres become dissociated owing to solution of the cement substance. The fat thus resulting from the degeneration probably consists of cholesterin esters of fatty acids (Panzer), or cholesterin dissolved in fatty acids (Adami and Aschoff). Later, the cholesterin crystallizes out, and, according to Klotz, the fatty acids combine with calcium to form soaps, and eventually calcification takes place. The connective tissue may also show hyaline degeneration and swelling, resulting in a farther thickening of the intima. This tends to compensate the loss of elasticity that occurs after middle life. With regard to the smaller peripheral arteries, which have proportionately more muscular tissue in them than has the aorta, the senile changes may begin with fatty degeneration and calcification of the muscle fibres of the media. An increase of arterial tension at any age will tend to bring about sclerosis, owing to the loss of elasticity of the elastic and muscular wall.

A second type of arterial change is that met with in local inflammatory conditions, such as syphilis or other infectious diseases, which is of a different nature. The vasa vasorum are infiltrated with round cells, granulomata are found in the media with degeneration and destruction of the muscle fibres.

A third type of sclerosis is the functional physiological sclerosis found in the vessels of the ovary after menstruation and in those of the inner muscular layer of the uterus after pregnancy has taken place.

To throw some light on the causation of arteriosclerosis numerous experiments have been undertaken. These have been chiefly conducted by mechanically injuring the vessels or by injecting toxic agents into the circulation. Substances, such as adrenalin, barium chloride, digitalin, and nicotin, which have the power of raising blood-pressure, are all competent to bring about arterial lesions. Further, it has been shown that certain toxins, of bacterial nature, lead to changes in the vessel walls,

either by inducing degenerative lesions, or by stimulating the proliferation of certain cells. Some doubt has been expressed as to how far arterial lesions thus produced are to be attributed to the direct action of the toxic substances in question upon the tissue cells and how far to the increase of blood pressure. Klotz (*Montreal Medical Journal*, March, 1908) details some experiments with rabbits, which he carried on to determine this point. Taking young healthy rabbits and suspending them head downwards for three minutes daily for a period of about one hundred and thirty days, he was able to produce by physical means alone, hypertrophy of the heart and arteriosclerosis. The lesions were of two types, the one isolated in the media without intimal change and degenerative in nature leading to death of the muscular elements and calcification of the involved areas including the elastic fibres: the other, isolated to the intima, consisting mainly of a proliferation of tissue, which later undergoes a secondary fatty degeneration. His conclusions are that work plays a very important role in the production of arterial sclerosis of different characters, and that even in vessels of differing histological structure sclerotic changes can be brought about by increasing the work of the artery. Further, aneurysms may result as a consequence of degenerative changes in the media owing to increased work.

APPENDICITIS.

An elaborate monograph, by Aschoff also, "Inflammation of the Appendix, a pathologic-histological and pathogenetic Study," demands a few words. To prepare this work, hosts of appendices, normal and abnormal, foetal and adult, have been examined by the method of serial section, and the whole study is an admirable example of German thoroughness and industry. Some of Aschoff's points are striking and even startling. One is, that four-fifths of all individuals who live out the ordinary term of years have passed through the ordeal of appendicitis unharmed. Therefore, he gives his judgment against all surgical interference. Later on, however, he saves the situation by admitting that, if Nature is not successful in dealing with the attack by her own methods after twenty-four hours, the surgeon should be called. Another point, somewhat at variance with our accepted ideas, is that not infrequently the mucosa over a faecal concretion, though put upon the stretch, is comparatively unaltered. He does not think, therefore, that concretions are of much importance in initiating inflammation, though admitting their influence in determining perforation after infection has taken place. In the writer's opinion, the cause of appendicitis is enterogenous

infection starting at the bottom of the crypts. All that is necessary is the minutest loss of substance of the mucosa, thereby permitting the entrance of the offending micro-organisms.

INTERNAL SECRETION.

The subject of the internal secretions has for years past proved to be one of the most fruitful in pathological investigation. It lends itself particularly well to experimental research and is a field as promising as it is fascinating. While much has been accomplished, doubtless there is much more to be yet discovered. The spot-light of the research worker at present seems to be directed upon the parathyroids. These comparatively humble structures appear to have a most important part to play in connection with calcium metabolism.

Clinical studies on such conditions as rickets and osteomalacia have suggested the possible relationship of tetany to disturbances of the calcium metabolism. Loeb and J. B. MacCallum have shown that the injection of various salts will produce muscular twitching, effects which are removed by the exhibition of calcium salts. Parathyroidectomy in dogs is followed by muscular twitchings, spasm, exophthalmos, and rapid breathing. The striking observations of Verstraeten and Vanderlinden, Halstead, and others have shown that an abundant diet of milk, which is rich in calcium, suffices to minimize the symptoms of tetany or perhaps prevent it altogether. MacCallum (W. G.) and Voegelin have shown that in the tetany of parathyroidectomized dogs the calcium content of the blood is only half that of the normal dog on the same constant diet. All the violent symptoms of parathyroidectomy can be instantly cured by the intravenous injection of a calcium salt. Subcutaneous injection or the introduction of the salt into the stomach produce the same beneficial effects but are slower. The injection of magnesium salts has a somewhat similar action, but the results are obscured by its toxic action. On the other hand, the injection of potassium salts intensifies all the symptoms. Calcium and potassium thus appear to be antagonistic. They conclude that in some way the parathyroids control the calcium metabolism, so that on their removal a rapid excretion, possibly associated with inadequate absorption and assimilation, deprives the tissues of calcium salts. There is an analogy with the condition described by Loeb and J. B. MacCallum, who showed that muscular twitching could be produced by the introduction of salts capable of precipitating the calcium in insoluble form, and removed by the addition of fresh soluble calcium. In the case of tetany, however, the central nervous system seems to be especially affected, since muscles isolated from nervous con-

trol showed no twitching during tetany. It is probable that these observations will prove of practical value not only in postoperative tetany, but in the spontaneous tetany of children and the forms arising in connection with infectious diseases, pregnancy and lactation. They suggest that in pregnancy the symptoms may be due to the great drain of calcium in the production of calcium-rich milk, especially in individuals in whom there is some parathyroid insufficiency.

I may remark in connection with these studies that several observers, Silvestri particularly, have treated the convulsions of infancy with calcium salts, apparently with benefit.

A paper of considerable importance in connection with the subject of the internal secretions is one by Eppinger, Falta, and Reudiger, based upon a long series of experiments. They show that the physiological relations of the thyroid gland, the adrenals, and the pancreas are closely connected. The simple direct effect of removal of the thyroid gland in starving dogs manifests itself in the body metabolism by a diminished nitrogen-output. The simple direct effect of hypersecretion of the adrenals, imitated by injections of adrenalin, is seen in the increased excretion of nitrogen and in the production of glycosuria. It was then found that extirpation of the thyroid had an indirect influence upon adrenalin glycosuria, for the latter symptom could not be produced in thyroidectomized dogs. By feeding the animals, however, with thyroid extract they could again be rendered the subjects of adrenalin glycosuria. Further, the injection of adrenalin in dogs deprived of the pancreas produced an excretion of sugar and a nitrogen elimination much in excess of that found in similar animals in whom adrenalin had not been injected. The removal of the thyroid secretion, on the other hand, had precisely the opposite effect on dogs in whom the pancreas had been removed. Preliminary removal of the thyroid decreased the elimination of nitrogen and sugar when the pancreas was lacking. If the two glands were removed simultaneously, the decrease in nitrogen and sugar excretion did not manifest itself until a few days after the operation.

The experiments show that, under normal conditions, the thyroid gland exercises an inhibitory influence upon the internal secretion of the pancreas. When the thyroid is extirpated, the inhibitory influence over the function of the pancreas is done away with, and "hyperpancreatism" is the result. Excessive secretion of the thyroid leads to partial insufficiency of the pancreas and to an increased activity of the adrenals.

The adrenals, also, possess a marked inhibitory influence, even greater than that of the thyroid, upon the pancreas, and moreover appear to increase the action of the thyroid.

The observers think, in the light of further experiments, that the vagus nerve and the sympathetic system are in part at least responsible for the conduction of these influences from gland to gland. They found that the glycosuria produced by puncture of the floor of the fourth ventricle was analogous to adrenalin glycosuria, inasmuch as extirpation of the thyroid gland prevented the appearance of glycosuria following this particular injury to the nervous system. The adrenal glands are well known to have a close relationship to the sympathetic system. Not only the adrenals, but also the thyroid, may act as the direct excitant of the sympathetic nerves, for adrenalin mydriasis could be obtained constantly in normal and even thyroidectomized dogs by the feeding of thyroid extract. The thyroid seems, however, to have a double action and influences the vagus as well as the sympathetic nerves.

Further, it seems probable that the pancreas is not only influenced by but influences the vagus nerves. When the vagus was paralyzed by the administration of pilocarpin, excessive internal secretion of the pancreas was the result, and injections of adrenalin failed to produce glycosuria. On the other hand, injections of atropin seemed to stimulate the vagus. The function of the pancreas was so much depressed that the effect of thyroidectomy was overbalanced, and the injection of adrenalin in thyroidectomized dogs to whom atropin was administered, gave rise to glycosuria.

In this connection, also, may be cited some recent work by Pember-ton and Sweet. They have studied in dogs the effects of the extracts of the adrenal and pituitary body upon the flow of the pancreatic juice after the administration of secretin. Extracts of the adrenals and of the nervous portion of the pituitary body contain some substance that cuts short the flow of pancreatic juice excited by secretin, and prevents the stimulation of the pancreas by secretin when injected before the secretin. Both extracts produce a rise in the blood pressure but the inhibitory action was not due to this factor, for in a few experiments a rise of blood pressure occurred without inhibition of the external secretion of the pancreas. Section of the vagi had no effect upon the action of the adrenal and pituitary extracts. So far as they could see, this inhibitory action upon the pancreas was specific for the adrenal and pituitary body. Injections of extracts of the brain, thyroid, liver, testes, atropin, and digitalis were without effect.

SYPHILIS.

The studies during the year on the various phases of the subject of syphilis are multitudinous. The conclusions arrived at amply confirm

previous work and support Schaudinn's contention that the spirochæta pallida is the specific agent in this disease. The organism has been found constantly present in the primary and secondary lesions of acquired syphilis, as well as in those of the inherited form. It has been found occasionally in the later manifestations and in gummata. The failure to detect the organism in the late lesions simply means that it is scanty in numbers and, therefore, has escaped observation. Further, there is apparently a direct relationship between the number of spirochætes and the severity of the affection. In congenital lues, where the child dies within a few days after birth, and in the more extensive manifestations in the skin and mucous membranes, the tissues are flooded with them. Pure cultures have not yet been obtained, so that Koch's postulates cannot be complied with in their entirety, but there can hardly be a reasonable doubt that in the spirochæta pallida we have the causal agent in syphilis.

Two points bearing on the diagnosis of syphilis may be referred to in passing. Two or three observers have pointed out that in chronic inflammations of the brain and cord of syphilitic origin, the cells found in the cerebrospinal fluid are altogether mononuclear. The only other affection in which this is the case is said to be sleeping-sickness, a disease that would not likely lead to any difficulty in diagnosis. In tuberculosis, while at one stage there may be an excess of mononuclears, there is always a considerable number of polymorphonuclears present.

The second point has to do with Wassermann's serum reaction for the diagnosis of syphilis. Wassermann, Neisser, and Bruck utilized for this purpose the phenomenon discovered by Bordet of the deflection of complement by an antigen and its corresponding antibody. They found that an extract of the liver of syphilitic infants, together with the blood serum of syphilitics, was able to prevent the solution of sensitized red blood-cells by means of complement. Later, Marie, Levaditi, Weil, Braun, and others, found that the same deflection or fixation of complement took place when extracts of normal livers, extracts of certain tumours, extracts of guinea-pigs' liver were employed. Wassermann, Porges, and Meier then showed that the active substance in the liver extract was soluble in alcohol, and eventually these extracts were proved to be lipid in nature. Wassermann and his assistants came to the opinion that the substance that caused the phenomenon was lecithin. This would imply that the syphilitic antibody is capable of attaching itself to and causing damage in the cells of the central nervous system, the red blood-cells and other lecithin-containing cells. Fleischmann (Berl. klin. Woch., March 9, 1908) found, on investigating this idea, that lecithin was only

capable of giving a partial reaction as compared with liver extracts. Then, he set himself to determine whether other substances would give the reaction. Mastic emulsion, kaolin, and glycogen gave negative results. Cholesterin and vaseline gave positive results. He concludes that Wasserman's statement that syphilitic products attack lipoid substances still holds good, but that there is no reason for giving lecithin the chief place.

With regard to the diagnostic importance of the test, it seems to be fairly agreed that a positive Wassermann reaction shows an existing syphilitic infection in the body though this is not necessarily progressing. A negative reaction does not contraindicate syphilis. An interesting and important fact is that Lesser, and others, have found a positive reaction in a very large proportion of cases of tabes and general paresis, thus adding great weight to the contention of those who have held that these diseases are usually of syphilitic origin.

TUBERCULOSIS.

The work done in connection with tuberculosis seems largely to have been ploughing over old ground. Questions such as the paths of infection, the effects of tuberculin injection, the diagnosis of the disease by the Calmette ophthamo-tuberculin reaction, vaccination by von Pirquet's method, and the inunction plan of Morro, are still to the fore. The various tests with tuberculin by external application seem to be generally conceded to be valuable aids in the recognition of tuberculosis.

The feature, however, of outstanding importance was the International Congress on Tuberculosis which met in Washington last October. The great Koch was to be there, and inasmuch as his views on the communicability of bovine tuberculosis to human beings are diametrically opposed to those of practically all investigators on this subject, much interest was felt in the position that he would take. He still stuck to his first position, however, and defended his views with great ability and ingenuity. A special conference was held *in camera* to bring about, if possible, some unanimity between Koch and his opponents, but without avail. The general opinion appeared to be that while Koch, from a purely technical point of view, had much reason on his side, yet it would have been more useful if he had come out squarely in favour of maintaining the present restrictions in regard to cattle, instead of weakening the hands of veterinarians and hygienists by emphasizing unduly points in laboratory technique.

Some work is being done now on the effects of the ferments contained in leucocytes upon bacterial action. One of the more noteworthy papers

on this subject is that of Opie, who found that washed leucocytes injected in the pleural cavity of dogs, who were the subjects of pleural tuberculosis, were competent to delay the evolution of the disease, though they could not prevent it.

Jochmann has tried to determine whether the proteolytic ferments of the polymorphonuclear leucocytes are in any way related to bactericidal substances or to the "microcytase bactericidal alexin" of Metchnikoff, which is by the latter observer supposed to be contained in the polymorphonuclear leucocytes. Jochmann found that the enzymes in question had no destructive effect on living bacteria, nor could they hæmolyze living red blood corpuscles. The enzymes do not act as complement nor do they destroy toxins. The enzymes are capable, however, of digesting dead bacteria, and this probably explains the solution of bacteria that are taken up by the phagocytes.

VACCINE THERAPY.

Wright discusses the question of vaccine therapy and auto-inoculation, and gives the conclusions arrived at after extended observation by himself and his pupils. These conclusions are as follows:—(1) Vaccine therapy is applicable not only to localized infections but also to general systemic diseases. (2) Spontaneous auto-inoculation occurs not only in general septicæmic diseases, but also in cases of localized diseases in which the focus of infection has attained a certain development. (3) Auto-inoculation can, in the case of localized disease, be artificially induced by massage, by active and passive movements and by active and passive hyperæmia. (4) Such artificially induced auto-inoculations can be turned to useful account in diagnosis. (5) The success of certain empirical methods of treatment, notably the Bier method, is probably largely dependent upon the fact that they induce adequate and not excessive auto-inoculations. The fact that the determination of the opsonic index requires a more or less tedious manipulation and a degree of skill in the technique, tends with many to minimize the usefulness of the procedure. This leads Wright to consider the feasibility of achieving the desired improvement apart from the determination of the opsonic index. He concludes that it is not wise to employ the injection of bacterial vaccines entirely in the dark. One must take into consideration variations in the potency of the vaccines due to accidental circumstances, and to the susceptibility of the patients in different degrees of infection. Where one has a visible field of control, as in the case of acne, sycosis, and furunculosis one can to some extent gauge the dosage by the effect, though even here, mixed infections may be present and mask the

result. In concealed lesions, the determination of the opsonic index gives useful and accurate information as to the progress of the case. The inconsistent results of other observers are due either to faulty technique or to lack of patience.

MISCELLANEOUS OBSERVATIONS.

Finally, to conclude a somewhat lengthy disquisition, a few curiosities may be mentioned by way of a "bonne bouche."

Henry and Rosenberger and Lavenson record two cases of acute meningitis due to the typhoid bacillus, in the absence of the usual manifestations of the disease.

Adami has recorded a unique example of a tumour composed entirely of embryonic striated muscle cells. It occurred in a speckled trout. So far as is known no similar example has been recorded.

If anything could be taken as settled in the mind of the average morbid anatomist, it is that the so-called "large white kidney" of Bright's disease is a fatty kidney. This belief is about as firmly rooted as the pyramids of Egypt. This confidence is now somewhat rudely dashed, however. Klotz has proved beyond question that one important type of this form of kidney affection is not the result of fatty change but is due to the presence of soaps, hence the appellation "soapy kidney."

A. G. N.

MEDICINE.

UNDER THE CHARGE OF DRs. FINLEY, LAFLEUR, HAMILTON, AND HOWARD.

RETROSPECT IN MEDICINE.

"Acute Myeloid Leukemia."

In a recent number of the *Deutsches Archiv für klinische Medizin* (Bund 96, p. 236, 1909), Dr. F. Port of the Gottingen medical clinic presents a most interesting paper and one worthy of the most careful consideration.

The author points out that until the past decade all cases of acute leukemia were considered to be lymphatic in type, because of the preponderance of the large mononuclear cell with non-granular protoplasm. Recently, however, Naegeli and Schridde have shewn that these large non-granular cells may also be the forerunner of the myelocyte, hence they have termed them 'myeloblast.' In support of this contention Schultze, Meyer and Heinecke, Butterfield and others, have reported cases of acute leukemia with a preponderance of the large mononuclear non-granular cell in the blood, but with the post-mortem anatomical

features of myeloid leukemia, namely hyperplasia of the bone-marrow and the presence of myeloid tissue in the spleen, lymph glands, liver and other viscera.

While pathologically the two types of leukemia can be readily differentiated, clinically there is often difficulty. It is now recognized that no dependence can be placed on the greater enlargement of the spleen or the lymphatic glands. Further, the blood smears themselves are not altogether safe criteria. Port does not agree with Schridde, who claims that by special stains the lymphoblast and myeloblast can be differentiated. Nevertheless, in the acute myeloid group there are usually to be found cells—the “promyelocytes” of Pappenheim—which are intermediate between the myeloblast and the true myelocyte. These promyelocytes present with Ehrlich's triacid stain a finely-dusted appearance, due to the very small neutrophilic granulations which are distinctly smaller than those of the normal full-grown myelocyte: with the May-Grünwald stain (which is very similar to Wright's), these cells appear light red, in marked contrast to the pure blue of the myeloblast.

The author reports the case of a male, 41 years of age, who had been under observation for 14 months for petechial hæmorrhages of the skin, without enlargement of the glands or spleen. Subsequent to a severe hæmorrhage from an injury to a finger, the spleen and glands rapidly enlarged and all the symptoms of a severe, rapidly fatal leukemia developed. The entire course was two months. The blood picture showed, in addition to a severe secondary anæmia, a marked leucocytosis (159,400 and later 522,800 per c.mm.), of which 73 to 61 per cent. were myeloblasts, 11 to 13 per cent. promyelocytes, 6 to 10 per cent. myelocytes, 5 to 8 per cent. polymorphonuclear neutrophiles, 2 to 4 per cent. lymphocytes, and 0.8 per cent. eosinophiles. In addition there were a moderate number of normaloblasts, megaloblasts and basophilic erythroblasts. The myeloblasts were cells three to one and a half times larger than the normal red cell, with a nucleus less basophilic than the protoplasm, round or sometimes oval or indented, and lying concentrically or eccentrically. Some nuclei showed 3 to 4 darker nuclear bodies; the non-granular basophilic protoplasm formed a relatively broad band around the nucleus and sometimes contained vacuoles and pseudopodia-like projections. The promyelocytes were mononuclear cells with a red tone to the protoplasm due to the fine neutrophilic granulations as before described. There were also all stages in development between the non-granular cells and the normal myelocyte. The blood picture was therefore typical of a ‘myeloblastic leukemia.’ The autopsy revealed hyperplasia of the bone-marrow and collections of myeloid tissue in the glands,

spleen, tonsils, liver, lungs and kidneys, in which the myeloblast and promyelocytes were the predominating cell. A moderate number of eosinophilic and neutrophilic myelocytes and erythroblasts were found, with only an occasional polymorphonuclear neutrophile. The lymphatic tissue was everywhere atrophied, and indeed existed only as 'rests' in the glands, spleen and tonsils.

In conclusion the author discusses the origin of the myeloid foci in the viscera. Banti regards these myeloid foci as metastatic from the marrow by means of the blood stream. Schultze, Ziegler and Helly also believe that they originate in the marrow, are carried to the viscera by the blood current and further develop in the viscera without forming a definite infiltrating tumour-like growth. Port, however, regards the foci in the hæmatopoietic organs (spleen, liver and glands) as developments of pre-existing embryonic relics of myeloid tissue which are stimulated to growth by a specific irritant. He admits that there is no proof that the other viscera in embryonic life contain any myeloid tissue. He then discusses the ingenious claim of Schridde, who believes that the endothelial cells of the vessels of the embryo are the mother-cells of the myeloblast and erythroblast, and that post-embryonically the endothelial cells of all the viscera can under certain conditions (e.g. leukemia) develop into myeloblasts and erythroblasts. Port's chief objection to this theory of metaplasia is that in such conditions as pernicious anæmia the hæmatopoietic organs alone develop myeloid tissue from the endothelial cells of the capillaries, and that such organs as the glomeruli of the kidneys, which are very rich in capillaries, show no such changes.

C. P. H.

OTO-LARYNGOLOGY.

UNDER THE CHARGE OF DRs. BIRKETT AND JAMIESON.

RETROSPECT IN OTO-LARYNGOLOGY.

FERNAND LEMAITRE & E. HALPHEN. "Nystagmus and the Internal Ear." *Annales des maladies de l'Oreille et du larynx*, December, 1908.

After a review of the physiology and anatomy of the labyrinth, the authors define vestibular nystagmus as a "bilateral, rhythmical, involuntary and unconscious nystagmus, resulting from two successive ocular movements, namely, a slow movement at first followed by a rapid return." The rapid movement being more marked serves to determine the direction of the nystagmus. Thus, there is nystagmus to the right, when the eyeballs turn slowly to the left, but return suddenly and rapidly to the

right. Following Alexander, three varieties of intensity are described: A mild nystagmus (third degree) only manifested when the eyeballs are in the extreme lateral position: A strong nystagmus (second degree) easily seen when the eyes are in the central position; finally, a very violent nystagmus (first degree) when the turning of the eyeballs towards the extreme lateral position of the opposite side does not cause it to disappear.

The name, "latent nystagmus," is given to this mild nystagmus of the third degree, which in practice is found to be the most common. This latent nystagmus is developed by fixing the gaze, then turning the eyes towards the extreme right or left, and also by looking into distance with the eyes closed or covered with opaque glasses.

As each semi-circular canal reacts after its own fashion, there are three principal varieties of nystagmus, namely: Horizontal, vertical and rotatory.

In the normal condition there is no spontaneous nystagmus, because Deiter's nucleus is not stimulated, or rather the two nuclei, right and left, are equally stimulated, and hence there results a condition of equilibrium, or muscular tone, which influences equally the ocular muscles of both eyes,—but should this equilibrium be broken, then nystagmus will appear, and naturally to the side on which the muscular tone predominates. Thus, when pus first invades the labyrinth nystagmus appears on the diseased side, owing to the increased tone of this side. Later on, when the labyrinth is destroyed, the muscular tone is lost, and consequently there is nystagmus to the healthy or opposite side. At a still later period, the nystagmus disappears altogether, because the healthy labyrinth reduces its tone by exercising an inhibitory function.

In the discussion of mechanically produced nystagmus, Drs. Lemaitre and Halphen base their deductions entirely on Ewald's experiment, which consisted in plugging a horizontal semi-circular canal with lead, and then through an opening in the bony wall, compressing the endolymph, by means of a syringe, and afterwards withdrawing the piston of the syringe, thereby aspirating the endolymph. In the first instance, the direction of the endolymph was towards the ampulla, causing marked nystagmus to the side examined, and in the second instance towards the arc of the canal away from the ampulla, causing a slight nystagmus to the opposite side. The conclusion arrived at was "the direction of the endolymph in a horizontal semi-circular canal from the arc towards the ampulla is a movement of great physiological importance, as it is accompanied by a sharp nystagmus to the stimulated side; whilst the reverse flow, from the ampulla towards the arc, is a movement of not

much physiological importance, as it results in a very mild nystagmus to the opposite side."

It is necessary to be familiar with the above findings to understand the mechanical reflex and to explain the "sign of fistulas." If one exerts a very strong pressure, by means of a Gellé-tube, for example, in an ear, in which the bony labyrinth is intact, there results no movement of the endolymph in the semi-circular canals, and consequently no reflex; but if the bony wall of the semi-circular canal is wanting, if there exists a fistula of this canal, then we obtain a reflex nystagmus; with compression the endolymph flows towards the ampulla, and hence the nystagmus is towards the affected side; with the removal of the pressure, the flow is away from the ampulla, therefore, the nystagmus is towards the healthy side. When the lesion is situated in any other part of the vestibule, instead of in the external semi-circular canal, the sign of the fistulas always exists, but the direction of the nystagmus loses its value. The rotatory, caloric or Barany, and the galvanic methods of eliciting nystagmus are all very minutely described. In the first two methods, the determining factor in producing the nystagmus is the direction of the endolymph current, as in Ewald's experiment. Thus in the rotatory method, in turning a patient from right to left, the endolymph in the right ear is driven towards the ampulla causing a marked nystagmus to the same side, i.e. the right; while in the left ear the endolymph is forced from the ampulla towards the arc, causing a slight nystagmus to the opposite side, i.e. the right, where it joins and reinforces the important nystagmus due to the stimulation of the right labyrinth. Consequently to examine a semi-circular canal, it is necessary to turn the patient towards the opposite side and examine the eyes when rotation ceases. In Barany's test, the temperature of the water determines the direction of the endolymph and consequently the location of the nystagmus. The anterior vertical canal is the one usually affected by the caloric method, and the nystagmus is generally rotatory. Cold irrigation in the neighbourhood of the labyrinth causes the endolymph in the vertical canal to flow towards the ampulla whilst hot irrigation reverses the flow from the ampulla towards the arc. Hence both produce a nystagmus, with cold water to the opposite side, with hot water to the same side. The authors here admit that they are unable to explain the direction of the nystagmus.

In both the above methods, the other semi-circular canals can be tested by altering the position of the head, but it must be remembered that then the direction of the nystagmus varies.

As the actual mechanism of the reflex nystagmus in the galvanic

method is very obscure, it may be dismissed by remarking that the nystagmus appears on the cathode side. Passing on to the suppurative affections of the labyrinth, a great distinction is made between acute suppurative, and acute serous labyrinthitis. In the first case, there is destruction demanding surgical intervention, while in the second case there is only irritation, which can be adequately treated by careful medical measures. Between these two extremes are many intermediate conditions which call for no active treatment other than careful observation.

In chronic suppuration of the internal ear there is no spontaneous nystagmus because the sound labyrinth exerts an inhibitory influence on its muscular tone to equal the changes in tone of the diseased side. The chronic forms of labyrinthitis are divided into chronic suppurative with destruction, and chronic serous with irritation, the treatment of which is similar to that of the acute form.

The integrity of the cochlea is considered a contra indication to trephining the labyrinth, while the following triad of symptoms, viz: absolute deafness, marked loss of equilibrium and the complete abolition of the nystagmus reflex, are a definite indication to open the internal ear.

To differentiate between cerebellar abscess and labyrinthitis it is necessary to try the various tests to elicit the nystagmus reflex. If the findings agree with the clinical signs of a lesion of the labyrinth, then a diagnosis of an internal ear lesion may safely be made; but if, however, the nystagmus reflex is at variance with the vestibular symptoms, then we are forced to a diagnosis of cerebellar abscess.

This differential diagnosis is only possible in the presence of a unilateral auricular disease. The authors further elucidate the above question by hypothetical cases and plates. In non-suppurative affections of the ear, the value of the nystagmus reflex is equally striking. By it, one is able to tell in oto-sclerosis whether the pathological process has or has not invaded the internal as well as the middle ear, and in a case with vertigo, whether this latter is due to intra or extra-auricular causes.

As regards deaf-mutism, there is no vestibular reaction if the lesion is congenital, but a mild reaction if acquired. The important conclusion here is that the congenital deaf-mute can be taught by the system of Abbot-of-Epce, and the acquired deaf-mute by the re-education system.

The importance of developed nystagmus in neurology depends on the fact that it is a reflex, consequently every central lesion that invades the labyrinthine paths, and every peripheral lesion that invades the eight pairs of cranial nerves modifies the nystagmus reflex.

Drs. Lemaitre and Halphen close their paper with the following conclusions:—

1. Elicited nystagmus is a reflex which shows the condition of the vestibular paths, as the patella and achilles reflexes show the condition of the cord and peripheral nerves.

2. It throws a new light on the pathology of the internal ear, and enables one to dispense with the old and vague terms "Ménière's Syndrome," "Raymond's Syndrome" and "Labyrinthism."

3. It permits the use of the words "hyper- hypo- and ana-labyrinthitis" in the cases where the clinical signs are such, that the exact diagnosis of the lesion cannot be determined (acute labyrinthitis, hemorrhage of the labyrinth, etc.).

4. The nystagmus reflex is of the utmost significance to the otologist, neurologist, and medico-legal expert.

The otologist sees the why and wherefore of the old and classical rule not to syringe the ear with hot or cold water; understands better the pathology of, and recognizes at its onset suppuration of the labyrinth; is able to differentiate between cerebellar and internal ear suppuration on the one hand, and congenital and acquired deaf-mutism on the other.

5. The neurologist has a clearer insight into the paralysis of the eight pairs of cranial nerves, and can diagnose between a lesion of its cochlear and vestibular branches; and finally can determine the bulbar or peripheral origin of deafness occurring during the course of tabes.

6. The medico-legal expert possesses an important control test for all the subjective phenomena, as deafness, tinnitus, vertigo, nausea, etc., of involvement of the labyrinth.

As mechanically produced nystagmus is involuntary, it is of great help in the appreciation of cranial injuries.

7. Though this new reflex may not live up to all its promises, but diminish in importance in the future, still it shall have had the merit of reviving the curiosity of the specialist, and of occasioning much patient work and research.

JAMES T. ROGERS.

Society Proceedings.

MONTREAL MEDICO-CHIRURGICAL SOCIETY.

The thirteenth regular meeting of the Society was held Friday evening, April 2nd, 1909. Dr. G. P. Girdwood occupied the chair in the absence of the President.

PATHOLOGICAL SPECIMENS.

THROMBOSIS OF CEREBRAL SINUSES AND VEINS.

OSKAR KLOTZ, M.D. The specimen we have before us was obtained from a young woman, aged nineteen, who had a short time previously been confined. On the day previous to her death, blood cultures were taken, all of which proved to be sterile. At autopsy there was evidence in the uterine wall of small and localized septic processes in the nature of encapsulated abscesses. One of these was directly beneath the serosa on the anterior wall of the uterus and had caused a slight inflammatory exudate between it and the bladder. In other respects the uterus showed nothing remarkable. The blood vessels and various organs showed no evidence of a septicæmic process at the time of autopsy. In the brain, however, a remarkable condition was encountered. The left lateral sinus, beginning at a point half an inch from the descending portion, was thrombosed by a grey clot as far as the torcular Herophyli. From here the thrombus extended into the straight sinus, crossing the tentorium and into the great vein of Galen. From this vessel thrombi could be followed into the various tributary branches which form this vein. Thus it is seen that the left superior cerebellar and the left inferior cerebral veins were occluded, while passing forwards the veins of the choroid plexus and the veins of the corpus striatum were completely plugged. It was also seen that the veins passing over the optic thalamus and caudate nucleus on the left side were occluded. As a result of this extensive thrombosis the corpus callosum throughout its extent was softened and broken down, and nothing but a soft debris remained of the septum lucidum. In the left hemisphere the optic thalamus and the caudate nucleus showed extensive disintegration, and the process of softening was also present in the internal capsule and corpus striatum of this side. On the right side the degenerative processes were not so marked, and beginning softening was only to be noted in the optic thalamus and the corpus callosum. On this side the internal capsule and corpus striatum were undamaged. With the extensive softening that had taken place in the left hemisphere many petechial hæmorrhages and evidence of thrombosed capillaries were to be seen in the substance about the ventricles. And, further, there had been a fair amount of hæmorrhage into the left lateral ventricle. In looking at the left hemisphere from its inner surface the extensive degree of this disintegration of brain substance is readily appreciated.

It is most probable that at a previous date this patient had suffered from a septicæmic process, which had cleared up, save for the localized abscesses in the uterine wall and the progressive thrombi in the sinuses

and veins of the brain. The degenerative processes in the brain substance were of the nature of softening and not abscess.

The autopsy findings in the other organs showed that the patient had also suffered from toxæmia of pregnancy. The liver showed numerous focal necroses in the central and mid. zones of the lobules, while in the kidneys there was evidence of a mild parenchymatous nephritis.

DR. H. M. LITTLE. With reference to this specimen of the septicæmia I would say that the patient came into hospital with almost complete suppression of urine and in the eclamptic state. With a view to emptying the uterus a bougie was introduced and labour pains were started. Dilatation was comparatively easy, and she was delivered without much difficulty. She was given large quantities of water with a view to dilute the toxine, and she apparently recovered from the eclampsia. Possibly the abscess in the wall may have been due to the introduction of the bougie, but her temperature was never high. The condition is extremely interesting; it started as a case of eclampsia, from which the patient completely recovered, and later when she was well and sitting up developed this hemiplegia.

A. LAPHORN SMITH, M.D. Dr. Klotz's specimen of uterus is of interest in that now the view is gradually gaining ground that accouchement forcé is a very dangerous operation, while Cæsarean section has been growing safer and safer until now it has a death rate of only 1 per cent. if done by an expert on women who have not been infected by efforts at delivery. I am only saying this to prepare the mind of the physician to look upon this as the proper thing to do in a dangerous case of eclampsia. The uterus must be emptied as soon as possible, everybody agrees about that; but the former method of treatment by accouchement forcé or with powerful drugs like Chloral Hydrate or Chloroform, which have a high record of deaths on this continent at least, must give way to Cæsarean section, which is so safe that Dr. Barton Cook Hirst told me, about this time last year, that he had performed his seventy-fourth consecutive case without a death. But of course they were done before any injury had occurred to the genital canal. Evidently in the case before us the patient did not die from the eclampsia but from the treatment for that eclampsia; and the sooner that treatment is replaced by Cæsarean section it will be the better for everybody.

1. CARCINOMA OF THE PROSTATE. 2. PRIMARY CARCINOMA OF THE LIVER.

R. P. CAMPBELL, M.D. 1. This specimen was obtained from a patient who had been operated on for hypertrophied prostate by the suprapubic method, and who subsequently came to autopsy when the disease was

found to be carcinoma. The specimen is of interest as showing the manner in which the metastases occurred, that is, between the vesicles, up along the anterior wall of the rectum. It also shows the cavity which occurs after suprapubic enucleation. There is a trabeculated bladder, much inflammation, and hydronephrosis with dilated ureters.

2. Primary cancer of the liver is extremely rare, and we have to rely largely upon the macroscopical findings and a careful search of the body. In this case we were unable to find any primary focus whatever, nor any manifestations of disease other than those in the liver itself. The patient was 67 years of age and died with all the symptoms of portal obstruction. The microscopic sections support the probability of the new growth originating in the liver, but the strongest reason is that after a very careful search in an autopsy, where this was possible, we failed to find any trace of a primary focus.

CONJUNCTIVAL FLAP IN OPHTHALMIC SURGERY.

W. G. M. BYERS, M.D., read the paper of the evening.

G. H. MATHEWSON, M.D. Dr. Byers is to be congratulated on this masterly exposition of this method, which must strike even the general practitioner as being eminently practical. The use of the conjunctival flap in operative procedures on the eyeball, especially in the extraction of cataracts, has been in vogue for a good many years, and in all places where this has been done the results have been ever so much better; the vascular flap adhering almost immediately, which greatly lessens the danger of infection. Dr. Byers mentioned that Dr. Buller did a modification of Mule's operation, employing two sets of sutures, one on the sclera and one in the conjunctiva. Dr. Buller's great point was that instead of leaving a round opening in the sclera he made an oval one, and so got two flat surfaces to be opposed to each other, which united much more readily than if you left a round opening. He used, too, to make a conjunctival opening in performing discission. He used to introduce the needle primarily through the conjunctiva just outside the cornea. These, however, are only details, and I would once more congratulate Dr. Byers on his excellent paper.

FRED. T. TOOKE, M.D. I should like to add how much pleasure I have derived in listening to Dr. Byers' paper. As Dr. Byers admits, there are a number of methods which he can hardly claim as original; yet on the other hand there are other procedures of resecting the conjunctiva which, in so far as I am aware, are entirely original. I have been particularly fortunate in having been associated with Dr. Byers in a number of cases where these methods were particularly called for, and

have been able to appreciate from practical experience a great many of the advantages which a routine practice of the principles laid down in this paper assures. The work on the vascularization of an avascular membrane, for which I believe I am responsible, and to which reference was made, applies quite as well to the conjunctiva as to the iris, and, as anyone interested in ophthalmic pathology will admit, is substantial support to a great many of the practical features which have been brought forward in this paper.
