

EMPHYEMA OF THE PLEURAL CAVITY.

Some observations on the diagnosis and
treatment of 30 cases

by

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The study of Empyema of the pleural cavity is one which offers many fascinations. Occupying, as it does, a kind of "half way house" between the regions of medicine and surgery, its treatment falls to the lot of physician and surgeon alike.

The more one considers the subject, the more is one impressed by the difficulties of the situation. One is called upon to treat an abscess in the pleural cavity i.e. a collection of pus within the cavity of the thorax, and occupying a region which normally contains lung. The experience of the surgeon, in his treatment of abscesses in other parts of the body leads him to apply the same rules here. He would immediately make an incision and evacuate the pus and debris; cleanse the abscess cavity by irrigating with some bland or else highly irritating antiseptic as his taste may be; he then provides some form of drainage in the shape of tube or gauze, and closes or partially closes the wound. This is, roughly speaking, the treatment he adopts with every abscess in any part of the body, adopting certain modifications according to the anatomy of the part. In all cases he endeavours to remove the existing cause of the disturbance be it Pyo Salpinx or gangrenous appendix in the abdomen, diseased Mastoid cells in the head, or foreign body in the shape of shrapnel or clothing causing an abscess in /

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in the subcutaneous tissues.

But apply these rules to the pleural abscess and we are met at once with difficulties. To begin with, the incision, - does it not seem against all natural laws that we should make an artificial opening in the chest wall and thus allow an in-rush of air to the pleural cavity? - bad enough for the patient to have the dangers of an Empyema to fight but it would appear that we would give him the further embarrassment of a Pyo-PneumoThorax. That the lung is already incapacitated by the positive pressure of the lung pressing in all directions is the ready answer, but we have no proof that its work is not going to be harder when we substitute atmospheric pressure for pus; nor that this new obstacle may not affect a much more extensive area including lung which was previously unaffected by the pus and acting normally.

Passing to the conditions under which the incision is to be made, we fall upon the question of anaesthetic. That such is required is in almost all cases undisputed; this is no mere prick with a knife over deadened and already yielding structures but an incision of at least one inch in length through layers of healthy sensitive tissues, including, in many instances, the removal of a portion of healthy bone. Even if one chooses the local novocain infiltration method /

method of anaesthesia - which is possible only in adults and how many of our Empyema patients are in infancy or adolescence? - the position of the patient is one fraught with danger; for he must, almost of necessity, lie on his sound side thus greatly embarrassing the remaining healthy lung which is already strained to its utmost in its endeavour to perform the work of two. The mere fact of assuming this position preliminary to operation was enough to contribute to the immediate death of one patient (Case 12) before any anaesthetic either general or local was applied. The alternative position of allowing the patient to lie on his back with the side projecting over the table may be possible in some cases, but forces the operator to work more or less in the dark, and under most unfavourable conditions. With the additional embarrassment of a general anaesthetic, the danger to the patient becomes much greater as may readily be imagined - be the anaesthetic chloroform or Ether each of which has its disadvantages.

Thus we find our patient much endangered by the anaesthetic, the position he must assume and the immediate effect of the incision; and, at best, he is in no fit state to stand further strain. Usually he has just come through a sharp attack of Pneumonia, when, after a week or two of slow convalescence, he takes /

takes a turn backward and has, what his friends term, a relapse. Perhaps he has had no convalescence at all, but has dragged on for several weeks or even months with high temperatures and rigors; in very few cases does one find that the patient has been ill for less than four weeks.

Having made the incision and arrived safely inside the thoracic cavity, the next step is the evacuation of the pus. One generally finds that the abscess cavity is never-ending and pus seems to pour out as long as one cares to watch. At this stage the patient is generally coming out of the anaesthetic by common consent of anaesthetist and operator, and one's chief aim is to get finished as soon as possible now that the chief dangers have been successfully passed. The effect of this haste is that the abscess in many cases is incompletely evacuated and one must now rely on the perfection of drainage and skill in the after-treatment. Any attempt at washing out the cavity is discountenanced owing to the short time at our disposal and the immediate risk thereby incurred by the patient; for fistulous openings into lung or bronchus are not uncommon, and the immediate fatal effect of fluid entering the lung by this method has been known. Good results have certainly been claimed in recent years for the irrigation and immediate closure method but /

but the dangers thereby incurred are not to be lightly despised. Drainage is effected by means of a stiff rubber tube - perhaps more than one - a dressing is applied and the patient returned to bed.

The after treatment of this imperfectly treated abscess extends usually over some months. The tendency to "pocket pus" causing relapses and rises of temperature is necessarily very great when one considers that every portion of lung need not recover its normal position at one and the same time and under such circumstances parts of the abscess cavity may be shut off from their means of drainage.

Let us now consider what means are at the disposal of the physician when he is confronted with the treatment of a purulent effusion in the pleural cavity. That he must get rid of it in some way is imperative when he considers that the patient is running the immediate risk of suffocation, owing to the pus suddenly invading a bronchus and flooding the lung, or of the inflammation spreading to opposite pleura or pericardium; while the less immediate risk of a permanently damaged and non-resisting lung falling to the prey of Koch's bacillus must also be present in his mind. Let him stand aside and watch nature if he will, and what does he find? That in the few favourable cases that manage to steer safely past the first immediate /

immediate dangers, after months of suffering and ill-health nature succeeds in forcing an exit for the pus towards the front of the chest-wall; eventually operative interference is sought to close the discharging sinus but the chest is permanently damaged.

The physician will, naturally, first seek to remove the pus by aspiration; this has been tried frequently by generations of physicians and proved ineffectual except in occasional cases. In comparatively few cases is it indeed possible when one considers the inspissated masses of pus and debris which present and are with difficulty evacuated through a two inch wound. He will then in all probability turn to the newer branches of medicine for assistance; what help can vaccines or serum give is his question, but he is doomed to disappointment in this respect also. The stage of perfection of vaccine treatment has not yet been reached for suppurating mastoid or gangrenous appendix when operation can be entirely dispensed with - let us hope that a time may come when such treatment is possible but meantime we must use cruder methods. In the after treatment of Empyema vaccines are constantly being used; with what effect is still a matter for each observer to form his opinion. In none of the following cases where vaccine therapy was used did it to any great extent contribute to the recovery of the patient, in three cases a prolonged course /

course of autogenous vaccine administration was ineffectual. The use of serum appeared to give rather better results although no outstanding successes. In the words of a former "Chief" Empyemas may be "coaxed" by serums but will not be "whipped" by vaccines.

Let us next review the everyday weapons of the physician; what drug can he employ to battle with the Empyema? In the Salicylates we have a specific for Poynton and Paines Bacillus; with the Quinine group we can attack with confidence the Malarial parasite; but the pus forming organisms have not yet found their master in drugs. There seems no other way but to submit to the scalpel with its attendant disadvantages.

The treatment of Empyema is, then, a subject which calls upon the resources of medicine and surgery alike. Operation, and "letting out the pus" is imperative. This should be done as early as possible - certainly within twelve hours of making certain of the existence of pus within the pleural cavity. It should be done hastily and thoroughly, but the thoroughness must give way to haste in many cases where the condition of the patient becomes critical; in these cases we are forced to depend on the efficiency of the after-treatment. Several of the following cases have certainly benefited by the use of a Cathcart's drainage tube (commonly used/

used for Supra-Pubic drainage) for the first few days. One end of a fairly long tube - about 4" or longer - is left in the pleural cavity and to the other end is attached the Cathcart's apparatus; the constant flow of pus which this promotes prevents stagnation of the abscess cavity contents and encourages the lung to expand. The patient lies - almost of necessity - on his sound side, another encouragement to the disabled lung to renew its activities. So much depends on the efficiency of drainage in the first few days that the slight extra trouble of employing a "Cathcart" is discountenanced. The possible dangers are hardly worth considering; Fagge in writing of a similar method of continuous drainage for Empyema states that the walls of the abscess cavity are liable to become congested and oedematous; one may reply that a condition of Hyperaemia at least is to be aimed at for the wall of any abscess cavity during its treatment. Again, there is the possibility of fluid entering the pleura through some mismanagement of the Cathcart apparatus; this, if it occurred at all, would only occur in small quantity and need cause no alarm if the fluid used be sterile water or a mild antiseptic solution. The Cathcart drainage need not be continued after the fifth day when a tube of smaller length and calibre may be substituted; it is advisable to have a /

a second and smaller tube beside the Cathcart tube for the first forty eight hours that a sufficiently large sinus may be made.

One may expect during the first few days following operation that the temperature chart should show a very great improvement to the chart of the days before operation; in fact that the rigors, sweatings and irregular rises of temperature indicating septic absorption should give place to an even chart. There is also another valuable sign of sepsis which frequently persists even when the temperature has subsided, and this is a persistent increase in the pulse rate; during the first twenty four hours it may certainly be attributed to post-operative shock, but after that it should be regarded as a definite sign of septic absorption. One may try the usual remedy for slowing the pulse which physicians fly to with confidence - that is Digitalis. But in this case it is of no avail - illustrating very aptly what MacKenzie points out with regard to the uselessness of Digitalis in dealing with Tachycardias of septic origin, and accompanying this persistent increase in the pulse-rate, one will generally find on examining the blood a leucocytosis varying from 12,000 to 30,000 leucocytes - another indication that, in spite of the exit supplied for the pus, a stiff battle is still in progress between the tissues and the invading organisms.

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And there is one drug which proves of great help in treating this degree of post-operative sepsis and that is Sodium Salicylate. Several of the following cases have apparently benefited by its administration; given in doses of grX to grXX every four hours, the temperature if not already normal, subsides, the pulse rate lessens and the leucocytosis decreases. It is difficult to give any adequate reason as to why this should be; the action of Sodium Salicylate - apart from its specific action on the Rheumatic organism - is not as yet thoroughly understood. It certainly appears to have some very depressing and devitalizing action on every living organism probably in this case acting on the invading bacteria and thus, by performing their work, rendering unnecessary the presence of armies of leucocytes.

The further treatment of Empyema should occupy from four to twelve weeks and consists in gradually closing the sinus when one is satisfied that the abscess cavity is completely emptied. Some of the difficulties have already been considered and amongst these "pocketing of pus" should take a foremost place. In 90% of cases where the temperature, after a normal interval, rises to 100° or more, and remains raised for several days, the cause will be found to be insufficient drainage causing "pocketing" and septic absorption;

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the diagnosis will be clinched by finding a pronounced leucocytosis. The treatment, of course should be prophylactic so far as possible i.e. one must not attempt to close the sinus while quantities of pus are being discharged; the tube should be shortened at intervals of four or five days and a smaller tube substituted for the large one; another good method is to irrigate the cavity daily through a soft rubber catheter. But even with the greatest care it is sometimes difficult to prevent "pocketing"; when this occurs to a slight extent it can generally be put right by inserting a gloved finger and breaking down adhesions; more severe cases will necessitate making a way for freer drainage at a second operation. And one should never hesitate to recommend a second operation, no matter how unwilling be the patient or his friends, when the temperature chart and general condition indicate that there is insufficient drainage; that is when the temperature chart shows an evening rise of anything over 99° for longer than a week's time and there is no obvious reason to account for it. One may rely on nature for much, and if left to herself she will in many cases work her own remedy, but this is clearly a case where nature can be assisted. One might perhaps mention here the necessity of excluding other causes of raised temperature and the advisability of /

of waiting some time - at least a week - before diagnosing the condition as due to insufficient drainage.

The patient suffering from Empyema is peculiarly susceptible to intercurrent disease, and in a general hospital ward is one of the first to succumb to an epidemic of Measles, Scarlet Fever or Tonsillitis. He also seems to have an extremely sensitive and irritable skin giving rise to so called "septic rashes" and leading to great difficulties in diagnosis.

There are, of course, other possible causes of continuous fever in the convalescent Empyema patient and these are the complications of which we are taught to be aware; these generally show some diagnostic signs or symptoms in the course of a few days. And during those few days one must be on the alert for such signs as the development of an effusion at the opposite side of the chest, serous or purulent; the appearance of varying murmurs in the heart indicating the onset of endocarditis; or the occurrence of pericardial friction. Neither must a daily examination of the urine be neglected, as the occurrence of Post Empyemal Nephritis is not unknown. The diagnosis of abscess of the lung and that of Sub phrenic abscess are matters which present difficulties and tax all one's powers to the utmost. One must consider whether a leucocytosis be present, whether the discharge from /

from the wound or the sputum be fetid, the position of the liver, dulness and also what assistance can be given by a radiograph^{or} of the chest. The importance of diagnosing the existence of a Sub-Phrenic abscess is very great indeed, and will probably cost the patient his life if the condition goes undiagnosed. The existence of a lung abscess can for some time be inferred only by the fetid character of the sputum and the absence of any other complication; later on it may be made certain of by actual localisation by X-Rays or by exploratory puncture. In both these latter conditions a cultural examination of the blood should not be omitted; certainly in the case of the lung abscess a good result may be anticipated from the use of an autogenous vaccine if the offending organism can be separated from the blood. Lastly one must not forget that a foreign body may be the means of prolonging the fever and keeping up the discharge. When one considers the tremendous "suction power" of the sinus, the small thin tubes often used which easily become detached from their guardian safety-pin, and the frequency with which dressings are changed by a night-nurse with insufficient light, it is not difficult to imagine how such accidents may happen.

The following cases - thirty in number - were all treated at the North Stafford Infirmary Stoke-on-Trent during /

during the year 1919-1920 and came under the writer's charge as House Physician. They are not in any way chosen or picked cases but simply recorded as they occurred. The twenty adult cases contrast the difference between Pneumococcal and Streptococcal infection,- twelve were of Streptococcal origin, and of these, nine had a definite Influenzal history. The only two fatal cases were suffering from Streptococcal infection; one (Post Influenzal) died from the development of an undiagnosed Sub-phrenic abscess; in the other case the Empyema was a complication of Lead Poisoning and Kidney Disease. Amongst the ten cases of children, only one was fatal, and that was the only one suffering from Streptococcal infection. The longest duration in the Medical Wards was seven months, whilst the shortest was three weeks,- giving an average of 2.3 months. The Streptococcal cases were much more "toxic" - more tedious in convalescence and had more complications. Out of the twelve cases of Streptococcal infection eight developed complications during their convalescence and two of them died of such. Of the remaining eight cases (not Streptococcal) two were neglected cases; one, the Empyema Necessitas, made a very good recovery, whilst the other (Case 16) in which there was a decided suspicion of Tubercle, was unsuccessful and was ultimately transferred to a surgical ward for Estlanders Operation. The remaining six /

six cases were Pneumococcal and progressed favourably except the one (Case 13) which developed Scarlet Fever shortly before discharge. Amongst the nine cases of Pneumococcal infection in children "pocketing" of pus, as evidenced by rise of Temperature and pulse-rate occurring in the second and third week was frequent and occurred in five cases. There was one case complicated by Nephritis. The average duration of the convalescence was 2.2 months.

Cases.

Case I.

Mrs S. aet 27 admitted on March 4th had been ailing for three weeks previously with a severe attack of Influenza; signs of an effusion developing at the left base, an exploring needle was introduced and revealed pus. On admission patient was given a general anaesthetic (Chol & Ether) portion of a rib resected - the gloved finger introduced to the cavity to separate adhesions and quantities of thin pus evacuated; two stiff rubber tubes were introduced; Bacteriological examination of the pus showed a Streptococcal origin. The temperature chart showed a rise of 99° to 100° each evening for the first two weeks in spite of free discharge of pus from the wound, and daily irrigation with weak Eusol solution; the second tube was not removed till the third week (although taken out /

out each day to be cleaned and reinserted) and after that the sinus was kept open by daily irrigation through a rubber catheter. On April 5th Arthritis of both wrist-joints developed, temperature and pulse-rate remained irregular for two weeks longer, then a large collection of pus (about a pint) burst spontaneously through the sinus with the result that pulse-rate and temperature fell to normal. The Arthritis made rapid improvement and the patient was discharged three weeks later on May 24th in good condition with the wound quite healed.

In this case is an illustration of the difficulties of obtaining efficient drainage in spite of a large opening - two good sized stiff rubber tubes and daily irrigation; it also shows the extreme virulence of the ~~St~~Streptococcal infection. The septic absorption continuing during seven weeks showed itself by the irregular temperature, frequent pulse-rate and septic arthritis. Had a second operation been performed in the second or third week, the convalescence would, in all probability, have been hastened; but Nature left to herself fortunately worked her own cure in her own time.

Case II.

B.W. male aet 16 was admitted on April 5th with a history of right sided Pneumonia during the previous four /

- four weeks - the lung condition showing no signs of resolving. On admission the breathing was very laboured; there was very extensive dullness at the right base and distant tubular breathing, the apex beat was not displaced. Two and a half ounces of clear fluid were withdrawn by aspiration without giving much improvement in the character of the respirations. During the ensuing five weeks the patient made no improvement, the dullness and tubular breathing remained constant, a loud aortic systolic murmur developed and well marked capillary pulsation. The chest was explored in three different sites with negative result and the impression given by the physical signs was rather that of a solid lung which might perhaps be the site of neoplastic growth; - this view was taken by the Honorary Physician in attendance in view of the rapid cachexia of the patient, the physical signs and negative results to pleural puncture; - the cardiac signs he attributed to some obstruction of the lumen of the Aorta; the temperature varied from 99° to 102° and the pulse-rate from 120 to 140. In the fifth week a final exploration was performed at a slightly higher level with the result that a collection of thick pus was struck; the pus on examination was found to be Streptococcal. On the same day a portion of rib was resected under general /

general anaesthesia (CHCl_3 + Ether) the pus let out and a thick tube inserted. The patient made an uninterrupted recovery, temperature chart became even and cardiac murmurs disappeared. He was discharged four weeks later on June 25th in good condition with the wound quite healed. The interest of this case lies chiefly in the diagnosis and shows the fallacy of depending entirely on the negative result of chest exploration. The fact that pus is not found is never a proof of its non-existence. This fact is also well illustrated by the case following.

Case III.

A.W. male aet 7 was admitted to hospital on September 11th. The history was rather chronic in character; patient had "not been well" for the past month or two, he had had a slight cough, occasional vomiting and wasting. During the previous two weeks the cough had become worse and the vomiting had increased, patient was very "feverish" and drowsy showing great irritability when roused. The case was sent to hospital as a possible Tubercular Meningitis. On examination there were no very evident cerebral signs, Kerning negative, knee-jerks not increased and no tache cerebrale. There was marked dulness over an area of the right lung and diminished breath-sounds, but, beyond an occasional irritating cough, the patient suffered no embarrassment in respiration; - a needle inserted /

- inserted in the dull area gave a negative result.

During the next fortnight the patient's condition remained stationary; temperature ranged from 99° to 101° every evening; he still remained drowsy but no cerebral symptoms developed. The chest was explored repeatedly with negative results. During the third week the patient appeared to become markedly weaker rigors and profuse sweatings occurred followed by prostration; the Von *Pirquet* test was negative and a leucocytosis of 20,000 was present. In view of these signs and the very definite and increasing dullness in the chest it was advised by the Honorary Physician that an anaesthetic be given in order to make an exploratory incision over the dull area. This was done on October 3rd under CHCl_3 and Ether anaesthesia and, after cutting through very dense adhesions a quantity of thick inspissated pus with masses of debris was reached. A portion of rib was resected and a thick tube introduced. For some days the Temperature was uneven, rising on the eighth day to 104°; the wound appeared to be draining well through a good sized opening which was irrigated twice a day. On the eighth day a course of Sodium Salicylate was commenced, - gr four hourly and from that day the patient made rapid progress, - temperature and pulse-rate falling to normal. Patient was discharged in very fit condition with the wound quite /

quite healed on November 11th. The course followed by this case showed that one was quite justified in taking the risk of operating although no pus had been found by the exploring needle. Even although a needle of very thick calibre had been used, it was quite easy to understand the failure of puncture to give a positive result when one encountered at the operation the dense adhesions and then the large masses of thickened debris. The diagnosis was also rendered difficult by the fact that although the abscess was defined and small the dulness produced by thickened pleura was extensive and simulated a dry- probably Tubercular - Pleurisy. The after-treatment showed post-operative septic absorption - probably due to inefficient drainage - successfully combated by the aid of Sodium Salicylate.

Case IV.

W.D. male aet 13 was admitted to hospital on April 20th with a history of acute onset of jaundice and pain in the right side two weeks previous. Signs of effusion having developed at the right lung an exploratory puncture had been made and a syringe full of pure bright red blood withdrawn. On admission patient showed well marked jaundice with clay coloured stools and quantities of bile in the urine, the whole of the right lung was dull and was explored with the same result i.e. the withdrawal /

withdrawal of pure blood. During the ensuing week the jaundice improved, the temperature rose to 102° most evenings and respirations were seldom fewer than forty per min. At the end of the week the exploring needle was again inserted and some thin grumous looking sanguineous fluid withdrawn; a Potain's Aspirator was used and 3x withdrawn. On examination the fluid appeared to be blood turning purulent and containing chains of Streptococci. During the next week the jaundice continued to improve and the next exploration revealed creamy pus. A portion of rib was resected under Chol₂ and Ether anaesthesia, a large quantity of creamy pus evacuated along with masses of caseous material - probably breaking down blood clot, and a thick drainage tube inserted. The convalescence was uneventful, - after two or three days the temperature subsided, the wound healed and patient was discharged as cured on June 24th. In this case the primary condition seems to have been an acute Haemorrhagic effusion associated with Jaundice apparently of an infective type. The effusion eventually became infected possibly from the blood-stream by the same organism which caused the jaundice; - this can be only surmise; a bacteriological examination of the blood was not made. That the infection was introduced by the exploring needle is a possibility but unlikely in view of the acute uniform character of the illness throughout /

out its course.

Case V.

A.B. female aet 14 was admitted on April 10th with a two weeks history of Influenza and left-sided Pleurisy. Signs of effusion having developed, an exploring needle was introduced on the morning before admission and revealed the presence of pus; on examination, the pus was found to be *Streptococcal*. On admission patient appeared to be thoroughly "toxic"; the temperature was only 101° and pulse rate 136. An incision was made under *Chloroform* and Ether anaesthetic - a quantity of thin pus let out and a thick tube inserted; the rib was not resected as there appeared to be adequate drainage without resorting to this measure. For the first week the temperature rose to 100° most evenings, the wound discharged well and was daily irrigated through a soft rubber catheter. During the second week the temperature showed no signs of subsiding; the chart was very irregular varying from 100° to 102° every evening. In addition to this was a very persistent increase of pulse rate - very seldom below 140 per min. Frequent doses of Digitalis were tried (Nativelle's Digitalein gr $\frac{1}{240}$ t.i.d) without the slightest improvement. *Anti-Streptococcal* serum in doses of 10 c.c.s injected four hourly into the Gluteal Muscles produced only a temporary benefit after forty-eight hours. /

hours. At the end of the fourth week (May 6th) the discharge from the wound was becoming gradually less, and there was increasing difficulty in daily irrigation owing to the tendency of the sinus to close. An exploring needle was inserted in the interspace below the wound and pus was revealed; ten ounces were aspirated by a *Potain's* aspirator. Three days later (May 9th) as there was no marked improvement, the patient was again anaesthetised and a portion of rib resected. At the operation the rib was found to be softened and bent at the place where the tube had pressed; the inside of the bone was disorganised and pus oozed out when it was cut. A small collection of pus slightly lower than the original wound was reached and a tube inserted. After three days the temperature and pulse fell to normal and the patient made an uninterrupted recovery and was discharged on June 5th. This case like case I is another example of the virulence of *Streptococcal* infection of the pleura. Added to this was the fact of insufficient drainage, evidenced from the first week by the persistent elevation of temperature and increase of pulse-rate both of which signs were soon remedied by a second operation giving more efficient drainage.

Case VI.

Mrs S. aet 31 was admitted to hospital on April 15th.

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The history was of Influenzal Pneumonia lasting three weeks and showing no sign of resolving; the patient was six months advanced in pregnancy. The whole of the left side of the chest was dull and distant tubular breathing was heard on *auscultation*. A needle was inserted, and a syringe full of thin pus - which proved to be *Streptococcus* - was drawn off. Under $CHCl_3$ and Ether anaesthesia an incision was made, a receiver full of thin pus evacuated and a stout tube inserted. No rib was resected as a good sized tube was easily introduced through an interspace. After two days the pulse and temperature fell to normal and remained normal during the ensuing three weeks till the patient was discharged with wound quite healed. From this case one may learn that a resection of rib is not always necessary. At the same time there is no doubt that one can obtain much freer access to the abscess cavity by the removal of a portion of rib. The argument is sometimes put forward against resection of rib that it is unwise to expose two cut surfaces of bone to the infection of pus, but the fact that the bone is already infected is shown in numerous instances - notably in Case V. The sinus left by a simple pleurotomy seems to heal much more quickly; - there is no possibility of sequestra keeping up the discharge for months or even years. Another advantage is that

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one has still a powerful weapon for combating post-operative sepsis in performing a second operation and resecting a portion of rib. The favourable course taken by this case may have been due in some respect to some modifying effects produced by the pregnancy.

Case VII.

Mrs W. aet 19 was admitted on March 18th. She had been ailing for three weeks with Influenzal Pneumonia culminating with a purulent effusion of the left Pleura as diagnosed by the help of the exploring needle on the afternoon before admission. The patient in addition was five months advanced in pregnancy. Under general anaesthesia a portion of rib was resected - a large quantity of thin pus evacuated and two tubes inserted. The pus on examination proved to be *Streptococcal*. The convalescence was uneventful: During the second week the temperature was raised to 100° on several successive evenings and some "pocketing of pus" was suspected. The temperature subsided when irrigation of the wound with weak Eusol was commenced, and the patient was discharged on May 8th with the wound cured. The fact that this case was also satisfactory during the convalescence - in spite of the *Streptococcal* infection - may also have been due to a favourable influence exerted by pregnancy.

Case VIII.

J.R. female aet 24 was admitted on December 30th with
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a history of Influenzal Pneumonia of two week's duration. An effusion having developed on the left side, the exploring needle was introduced and the presence of pus made certain. On the day of admission patient was anaesthetised, a portion of rib resected, large quantity of pus evacuated and two tubes introduced. For the first week the patient's condition was satisfactory; after the first two days the temperature and pulse fell to normal. On January 9th the temperature rose to 103° and continued to show this rise on succeeding evenings. The wound appeared to be draining ~~very~~ well - there was a wide sinus which was daily irrigated through a soft catheter. In spite of this treatment and the administration of Quinine Sulphate the patient's condition became rapidly more serious. Blowing systolic murmurs developed in all cardiac areas and the apex beat was displaced outwards while the rigors and profuse sweatings were gradually rendering the patient prostrate; the onset of Infective Endocarditis was suspected and two hourly stimulants in the shape of Brandy Champagne and Strychnine were administered. On January 25th the patient became much worse, respirations embarrassed and pulse almost imperceptible; some signs of fluid became evident at the right base and, on a needle being inserted pus was revealed; 45 oz. of thin pus were immediately /

immediately aspirated, - the patient's condition did not warrant any stronger measures. An immediate slight improvement from the almost moribund condition took place and five days later on January 31st the patient was well enough to stand a second operation at which, under general anaesthesia of $CHCl_3$ and Ether a portion of rib was resected on the opposite side to the original wound, pus evacuated and two tubes inserted. The further progress was straight forward and the patient was discharged on April 12th with both wounds quite healed and the lungs expanding well. As an assistance to the deficient expansion the patient used to blow soap bubbles for several hours a day. In this case is an illustration of the difficulties of diagnosing the presence of an effusion in the opposite lung; until the effusion was large enough to cause suffocative symptoms, the signs were marked by the condition of the left lung.

Case IX.

A.M. female (Staff) aet 23 was admitted to the ward on March 16th with Influenza; during the ensuing week a patch of Pneumonia developed in the left lung. The temperature continued high - 103° - 104° over two weeks and, as signs of fluid became evident, a needle was inserted and thick pus revealed. Under $CHCl_3$ and Ether anaesthesia a portion of rib was resected,

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- a quantity of pus let out and a tube introduced; films of pus were stained and showed chains of *Streptococci* but "no growth" was the result of cultural examination. Whether this was due to the organism dying "en route" or not can only be conjectured; it was at the moment not possible to examine the pus for growth on the spot; so called "sterile Empyemas" are generally supposed to be Tubercular in nature but there was no such evidence in this case. The temperature showed slight variations for the first two weeks and then settled to normal. Convalescence was slightly delayed by an acute "weeping" Eczema of the face which supervened but eventually cleared up. The patient was discharged on June 6th.

Case X.

Nurse H. aet 22 was admitted to the ward on March 4th with symptoms of Influenza. During the following days the temperature became very high - 105° to 106° ; - under the influence of injections (Intra muscular) of Quinine Ureate it fell to 102° ; signs of consolidation developed in the lower lobe of the left lung. After two weeks the temperature had not subsided and still rose to 102° or 103° each evening; signs of effusion were developing at the left base, blowing systolic murmurs in all cardiac areas, and the apex beat displaced outwards in the sixth Intercostal space. A

Potain's Aspirator was used and 12 oz. of straw coloured fluid removed. The fluid showed on examination chains of Diplo and *Streptococci*. For the following two weeks the patient made very slow progress - the temperature remained high and effusion again increased. The Aspirator was again used and 16 oz. of turbid fluid removed. The patient continued in much the same condition in spite of doses of Quin Sulph gr four hourly - Sodium Salicylate g xx four hourly and Nativelle's Digitalein gr $\frac{1}{240}$ four hourly; the latter drug made no difference to the pulse rate which varied from 120 - 140 per minute. On April 4th under *Chloroform* and Ether anaesthesia a portion of rib was resected, a large quantity of very thin pus removed and two tubes inserted. The wound was daily irrigated with weak Eusol and after a week, temperature and pulse fell to normal. Patient was discharged on June 11th with chest well expanded and wound healed. The last two cases were of interest in that they were under observation in the ward from the very commencement of their illness; they each made a straightforward convalescence after operation.

Case XI.

L.C. female aet 15 was admitted on April 4th with the history that she had been suffering from Influenza for the previous six weeks; within the last few days signs /

signs of fluid had developed in the right side of chest and on exploration some thin pus was revealed; patient was a thin girl and very tall, there was no history of previous illness (except tonsillectomy twelve months previous when she had suffered from severe haemorrhage) and no unfavourable family history was obtained. On admission a portion of rib was resected under CH_2 and Ether anaesthesia, a large quantity of thin pus removed and two thick tubes introduced. For the first two weeks following operation the temperature and pulse-rate remained very variable, never completely dropping to normal - the temperature usually rising to 99° or 100° in the evening; the wound discharged copious quantities of thin pus which was found to give a ~~pure~~^{pure} culture of *Streptococci*. In the third week the discharge became gradually less, but no attempt was made to close the sinus in view of the increasing temperature - 102° to 103° each night. The discharge was not foul, the sinus was irrigated twice daily and a tube still kept in place. An exploring needle was introduced to the interspaces close by the wound with a negative result, nor were there any physical signs of a fresh collection of pus at any other area. During the following week a hectic type of temperature was still present and there were frequent rigors and sweats. A Von Pirquet test was negative. Quinine Salicylate in doses of /

of gx four hourly had no effect on the temperature - nor had Sodium Salicylate. Antistreptococcal Serum (10 ccs) injected intramuscularly at intervals of four hours produced a transient abatement of the fever but after four days it likewise proved ineffectual. A tentative diagnosis of Infective Endocarditis was made in view of the presence of loud cardiac bruits but these showed no variability nor did any embolic signs develop. A sample of blood was taken in the hope of finding the offending organism and preparing a vaccine; unfortunately the tube was carelessly packed and arrived unfit for examination, and it was not possible to procure another specimen. The patient's condition was becoming increasingly worse and she was obviously suffering from severe septicaemia; the wound was by this time quite dry and it was impossible to procure even a smear from which to prepare a vaccine. The parents took a very hopeless view of the case and at this point - much against advice - insisted on removing the patient home to die. The subsequent history of the case was furnished by the kindness of the Doctor in attendance. The patient became increasingly worse and developed several Pyaemia abscesses in different parts of the body. She became gradually weaker, and died two weeks after the removal from hospital. A partial post-mortem examination was obtained; this resulted in the finding of a large subphrenic /

phrenic abscess containing several pints of pus. The sinus was practically dry and did not communicate with the abscess. The interest of this case lies chiefly in the diagnosis; - the condition was possibly missed at the beginning and the original illness may have been an attack of suppurative appendicitis leading to a circumscribed Sub-Phrenic abscess and causing - secondarily - the chest complications. Of this we can now have no certainty - the appendix was not examined post-mortem. During the period under observation the patient had no abdominal symptoms - no tenderness nor rigidity and the liver dulness was not obviously enlarged. Vomiting was very occasional and accompanying a rigor; the patient was carefully examined on two occasions at least by two consulting Physicians of the hospital. One point omitted, which might have given a great deal of enlightenment was an X-Ray examination of the chest. This might have been difficult considering the extreme illness of the patient, but should certainly have been attempted.

Case XII.

A.W. male aet 34 was admitted on August 24th with a history of some weeks duration. His occupation as Pottery worker, involved the handling of lead and ^{he} was believed to be suffering from chronic Lead Poisoning causing chronic Interstitial Nephritis, Cardiac Hypertrophy /

Hypertrophy and Dilatation and slight "drop-wrist"; the urine contained .2% of albumen with blood and epithelial casts and there was evidence of Chronic Bronchitis in the lungs; the blood showed no signs of Basophilia. For the first few weeks the cough became increasingly worse and the temperature - which had seldom been lower than 99° - steadily increased to 102° and 103° each evening; on September 20th an effusion developed at the left base and about half a pint of straw coloured fluid was removed by aspiration. The lung showed no signs of clearing nor the temperature of subsiding; the patient's condition gradually became more critical, loud cardiac bruits were present at all areas and the apex beat displaced to the sixth Intercostal space at the nipple line; the whole of the left side of the chest and left axilla were dull on percussion and the pulse was very irregular and feeble. On October 2nd the aspirating needle was again introduced and 26 oz. of fluid withdrawn. This time, however, the fluid was thin greenish pus and gave a pure culture of Streptococci on examination. It was now evident that operative interference was imperative but the patient's condition was so critical that it was feared to run the risk of a general anaesthetic. On October 4th preparations were made to operate under local anaesthetic; the site was prepared and the patient /

patient moved as gently as possible on to his sound side. This caused immediate cessation of respiration which proved fatal in spite of injections of Strychnine, administration of Oxygen and artificial respiration. A Post-mortem examination was performed at which the left pleura was found to contain a large quantity of thin green pus; the heart was much enlarged and the pericardium also contained several ounces of pus; the Kidneys showed evidence of Chronic Interstitial Nephritis and the vessels were thickened and calcareous. The fatal termination of this case was no doubt immediately due to heart failure following the Pericarditis. This condition and like-wise the Empyema were both undoubtedly terminal conditions. As is well known the patient suffering from Chronic Interstitial Nephritis falls an easy prey to the Diplococcal and *Streptococcal* organisms.

Case XIII.

A.S. female aet 24 was admitted to hospital on January 4th. The history was that she had been ailing "off and on" for one year, never completely confined to bed but never able to do much. She had been in hospital one year previously suffering from dry Pleurisy; the chest had been then explored and no fluid found. She had put on weight and been discharged as "much improved". During the year the chest pain had frequently /

frequently recurred and for the past four weeks it had been very much worse, practically constant and accompanied by cough and considerable embarrassment in respiration. On admission the left side of the chest was dull with diminished breath-sounds, -the apex beat was not displaced. An exploring needle was introduced and revealed thick pus which proved, on examination to be Pneumococcal in character. The leucocytecount was 26,000. Under Chcl_3 and Ether anaesthesia an incision was made, rib resected and two tubes introduced, a large quantity of thick pus being evacuated. One tube was left slightly longer and to it was attached a Cathcart drain apparatus when the patient was returned to bed. For the first two days the wound drained very well; on the third day the temperature was still normal but the pulse-rate varied from 120 - 130 per minute. The blood showed a leucocytosis of 23,000. The patient was given doses of Sodium Salicylate (gx four hourly) and two days later the pulse was normal and leucocytes 12,000. The Cathcart tube was removed on the fifth day and replaced by a smaller tube. The patient progressed extremely well until February 8th. At that date the wound was almost healed and the chest expanding well but the patient unfortunately developed a bright scarlet rash accompanied by typical signs of Scarlet Fever; she was removed /

removed to an Isolation Hospital where, it was learned she progressed favourably.

Case XIV.

A.C. female aet 15 was admitted on January 20th with a discharging sinus from an Empyema wound. The history was that patient had one year previously suffered from a very severe Post-Influenzal Empyema. The discharge after operation had been very foul, almost foetid, and an autogenous vaccine containing Staphylococci and Streptococci had been prepared and administered. No Bacilli Coli were found although the odour seemed to suggest their presence. The sinus had been very tedious in closing but had eventually healed shortly before the patient's discharge from hospital; only to open again, however, in the following week, and during practically a whole year the patient had been attending as an Out-Patient for dressings, - the discharge being always very foul. There was also a note on the previous chart that some time before the patient's discharge there had been a suspicion that a small tube had been sucked into the sinus as the tube was not to be found when the wound was dressed in the morning. The patient was X-Rayed and screened but nothing was found and the incident forgotten. On admission the patient was explored in the interspace below the sinus and some thick very foul pus revealed. Under ChCl_3 and Ether anaesthesia the sinus was probed and /

and slit open. Portions of two ribs were resected in order to explore the sinus with the finger. A small pocket of pus was reached about 2" within, and coiled up inside the abscess was found a small thin rubber tube. The sinus was drained by two stout tubes and the patient returned to bed. She made an uninterrupted recovery till February 10th when unfortunately she developed typical symptoms of Scarlet Fever and had to be removed. The last two cases are examples of the ease with which the Empyema patient falls a prey to infection. In a ward containing twenty-five patients a patient was admitted for Endocarditis and later was found to be desquamating and suffering from the after-effects of Scarlet Fever. The patient was removed as soon as possible but the damage had been done; two patients - the only Empyema patients in the ward and placed in different corners - developed symptoms within two days of each other. No other patients were attacked.

Case XV.

B.E. female aet 14 was admitted on the 24th of August complaining of chronic pain in the left side of the chest accompanied by cough and purulent expectoration. The history was of nine months duration and dated from an attack of Pneumonia the convalescence of which had been prolonged; after severe pain in the left side (about /

(about four weeks after the "crisis") an abscess had "burst" and about a pint of pus issued forth. Since then patient had been in very poor health; she had no appetite, showed rapid loss of weight and had severe night-sweats; there was the opening of a small sinus present above the third rib about 1" from the Mid-sternal line which constantly discharged a small quantity of pus. The whole of the left side of chest was dull and breath-sounds were absent; the chest was explored at the left base and thick pus found. Cultural examination of the pus gave a negative result - no organism found in smears or culture; the sputum was examined for Tb. Bacilli but only Streptococci and Staphylococci found; a Von Pirquet test was negative. It was decided to delay operation in the meantime in view of the patient's weak condition and the possibility of a Tubercular infection being present. Accordingly the chest was aspirated and 12 oz of thick pus removed; this was repeated three times at intervals of ten days an autogenous vaccine was prepared from the sputum and administered in graduated doses. The temperature was never raised above 99° but the pulse-rate was always very quick. After six weeks of this treatment combined with the administration of Iron and Cod Liver Oil, rest in bed and nourishing diet, the patient's general condition was much improved but the lung was in /

in much the same state and the sinus showed no signs of closing. On October 11th under $CHCl_3$ and Ether anaesthesia the sinus was probed and scraped and some Bismuth and Iodoform paste rubbed in; at the same time a portion of rib was resected from behind, a quantity of pus let out and two tubes inserted. To one of the tubes a Cathcart drain was attached. For the first few days a measurement of 10 oz of pus approximately every twelve hours was recorded; the Cathcart tube was then replaced by a smaller tube and daily irrigated with Eusol. The patient was discharged on December 2nd in a very fit condition. The sinus in front was completely healed also the wound behind. Patient had put on weight and looked rosy and plump while the left side of the chest was gradually showing more and more expansion.

Case XVI.

M.M. male aet 9 was admitted on April 30th with a history of cough and pain in the chest during the previous seven months. Patient had been treated for some months in a sanatorium and had been discharged a short time before admission to hospital with a very bad prognosis; several members of the family were afflicted with Tuberculosis of the lung. On admission the whole of the left side of the chest was found to be dull and breath sounds were entirely absent, - there were no active /

active signs of Tubercle in the other lung. An exploring needle was used and a syringe of thick creamy pus withdrawn. Under general anaesthetic a portion of rib was resected and a large quantity of very foul thick pus was removed. On exploration with the gloved finger there was found to be a very large cavity and no expanding lung could be felt; two tubes were introduced and the patient returned to bed. The pus was found, on examination to contain Pneumococci and *Staphylococci*. The patient was very collapsed after operation and took some days to rally. For the first few weeks the temperature chart was very uneven; the wound "poured" with pus which was so foul as to be trying for the other occupants of the ward. Partly for this reason and partly for his own benefit patient was placed outside alone in a wooden hut. The tube was removed at the end of the third week and the wound daily irrigated with Eusol. The quantity of pus seemed in no way lessening, a second bacteriological examination of the pus revealed no organisms, although *Bacillus Coli* was strongly suspected from the odour. Small injections of Iodoform Emulsion were commenced, injected into the sinus every day after irrigation with Eusol. Under this treatment, the quantity of the pus diminished considerably and its extreme foetor disappeared; the patient improved in general health and was /

was able to get up every day; during the summer months the wound still discharged and required to be dressed twice a day. The whole of the left chest was collapsed and apparently the lung was not functioning. The temperature still showed an evening rise of one or two degrees. An exploring needle inserted in an interspace below the sinus revealed thick creamy pus. On these grounds the question of an Estlander's operation was considered advisable and on November 5th patient was transferred to a surgical ward. The operation was performed on the following day; about 3" of six ribs were resected, and a large quantity of foul-smelling pus let out; a small shrunken-up lung was palpated much bound down by adhesions. The wound discharged profusely during two months and had not completely dried up when patient was discharged from hospital in January two months later, .

Case XVII.

E.J. male aet 8 was admitted on February 26th. He had been ailing for two months with right-sided Pneumonia and an exploring needle introduced on the morning of admission had revealed pus. Under general anaesthetic a portion of rib was resected, a quantity of pus removed and two tubes inserted. The pus proved to be Pneumococcal in character. The temperature and pulse fell to normal and remained so till March 20th when the /

the temperature rose to 102°. It remained raised for three days; a gloved finger was then inserted into the wound and some adhesions broken down followed by the discharge of a pocket of pus. After this the patient made a satisfactory convalescence and was discharged as cured on April 9th.

Case XVIII.

C.O. female aet 10 was admitted on June 8th. She had been ailing for two weeks with Pneumonia giving rise to Empyema which had been discovered on the day before admission. Under general anaesthesia a portion of rib was resected, pus (*Pneumococcus*) removed, and a tube inserted. Convalescence was satisfactory till the third week when the temperature shot up to 102° and remained so for four days. On the second day a gloved finger was inserted into the wound but no "pocket" of pus was located. Two days later, however a quantity of pus was discharged from the wound and the temperature fell to normal. Patient was discharged cured on July 16th. The last two cases illustrate the commonest complication of Empyema i.e. "pocketing" of pus; the tendency for this to happen is very great and must always be thought of when during the convalescence an unexpected rise of temperature occurs.

Case XIX.

L.S. male aet 6 was admitted to hospital on January 20th /

20th. He had been ailing for three weeks with Pneumonia and as the lung was not resolving satisfactorily an exploring needle was introduced and pus revealed; the pus was found on examination to be *Pneumococcus*. On admission the whole of the left side of the chest was dull and breath-sounds were absent. Respirations were very laboured, the leucocytes were 20,000. Under CHCl_3 and Ether anaesthesia a portion of rib was resected, a large quantity of pus let out and two tubes inserted - one of the tubes being attached to a Cathartic drain. For the first two weeks temperature and pulse were normal and the wound discharged freely. In the third week the temperature rose to 102° accompanied by a corresponding increase in the pulse rate and a Measly eruption developed. The diagnosis of Measles was for some days suspected, but the signs were not typical, the leucocyte count was raised, and no other case appeared in the ward. Doses of Sodium Salicylate (gr vii four hourly) were administered and the temperature fell to normal in a few days; there was no evidence of "pocketing"; the presumption was that the fever was caused by toxic products being absorbed into the circulation. The patient was discharged cured on February 11th.

Case XX.

Mrs H. aet 38 was admitted on March 21st with a history of /

of Influenza of five weeks duration. Within the previous few days signs of effusion developed in the right lung and an exploring needle introduced showed the presence of pus. On admission patient was extremely ill, and appeared to be suffering from an advanced degree of toxæmia; the temperature was 100° and pulse-rate varied from 130-160 very frequent and intermittent. Under CHCl_3 and Ether anaesthesia a portion of rib was resected, a very large quantity of thin greenish pus - which proved to be *Streptococcal* - was removed, and two tubes inserted. For the first few days patient was in a very critical state owing partly to shock and partly toxæmia. Towards the end of the first week she rallied, but the temperature and pulse-rate continued to show an evening rise; the wound discharged copiously and was irrigated twice daily with Eusol. During the ensuing months the patient's general condition improved considerably and she was not confined wholly to bed in spite of the evening rise of temperature. The wound showed no signs of closing and continued to discharge copiously. In July an autogenous vaccine was prepared from the wound and graduated doses were administered subcutaneously at intervals of three days. This was continued for three months and Digitalis was also administered for some time; at the end of that time the wound was still discharging /

discharging and requiring frequent dressings; a possibility of Sub-phrenic abscess was suspected but an X-Ray photograph showed no typical shadow, nor was the liver displaced. It was considered advisable to attempt by another operation to give more adequate drainage. The patient, however, refused to stand such another strain, and, as she felt in comparatively good health, proposed going for some convalescence to her home which was situated in a healthy part of the country. This was done and, after six months, patient came up to show herself with the wound at last healed.

This case is another example of the virulence of *Streptococcus Empyemata* occurring in the Influenza epidemic. Although the convalescence was long and tedious, and there appeared to be evidence that adequate drainage had never been secured, one must remember that in dealing with an Empyema - as in the parallel cases of suppurative appendicitis and strangulated hernia, one's first aim is to save life; the long convalescence is for the moment a minor consideration.

Case XXI. (Children)

L.G. female aet 1 year and nine months was admitted on February 4th. She had a history of cough accompanied by "loss of weight" of eight weeks duration following an attack of Pneumonia. On admission the right lung was stony dull and the apex beat was displaced outwards; there was absence of breath sounds over /

over the dull area. The chest was explored and pus revealed which was found on examination to contain *Pneumococci*. Under $CHCl_3$ and Ether anaesthesia a portion of rib was resected, a quantity of thick pus and caseous material removed and two tubes inserted. The patient did very well till the fifth week when the temperature pulse-rate and respirations rose and remained elevated for five or six days; there was no evidence of pocketing nor other symptom beyond the very frequent - even laboured-Respirations and the condition was thought to be due to an undiscovered patch of Pneumonia. After this the patient progressed well and was discharged with the lung acting well and the wound healed on April 26th. This case is an example of the difficulties of diagnosing an unexplained rise of temperature. It is very probable that these unexplained "rises" are frequently due to patches of inflammatory reaction in the lung. The signs are very difficult to elicit as they are obscured by the dulness due to adhesions already present.

Case XXII.

A.G. male aet 4 was admitted on May 30th. The history was that he was gradually "going down-hill" and wasting. He had a short troublesome cough which had been evident for the past six weeks. There was a definite Tubercular family history and the parents were /

were of opinion - backed by previous medical advice - that the child was suffering from "consumption". The left lung showed unmistakable signs of a large effusion and on exploration a syringe full of thick pus was withdrawn - found later to contain *Pneumococci*. Under general anaesthesia a portion of rib was resected, a quantity of thick pus liberated and some dense adhesions separated; the lung was found to be much bound down but made some effort to expand, two tubes were inserted and the patient returned to bed. For the first week patient was very ill with irregular temperature and frequent pulse-rate. After the first two weeks the temperature subsided and patient made a very complete convalescence. He was discharged on July 13th his general condition enormously improved looking fat and rosy; the chest was expanding well and the wound closed.

Case XXIII.

E.J. female aet 7 was admitted from the Out-Patient Department on April 18th. Her mother brought her up for "failing health and wasting" since an attack of Pneumonia two months previous. The child was emaciated and irritable and had well marked cervical adenitis; at the right base there was a patch of dulness with distant tubular breathing; on admission the dull region was explored and a syringe full of pus /

pus withdrawn. Under $CHCl_3$ and Ether anaesthesia the Empyema was evacuated, rib resected and a tube introduced; the pus was found to be *Pneumococcal*. The convalescence was uneventful beyond occasional rises of temperature to 100° on isolated evenings. The last two cases have a similar interest as in each of them there were grounds for suspicion that the condition was due to the Tubercle Bacillus.

Case XXIV.

E.J. female aet 1 year and 6 months was admitted on July 29th with a history of three weeks duration of Pneumonia; the presence of an Empyema had been diagnosed the day previous to admission. A section of rib was resected under general anaesthesia, a large quantity of thick pus removed and two tubes inserted. The pus proved to be *Pneumococcal* in origin. During the convalescence the temperature rose on two occasions to 100° . Irrigation of the wound with Eusol brought it to normal; the patient made a good recovery and was discharged cured on October 7th.

Case XXV.

A.W. male aet 4 was admitted on July 4th, after an attack of Pneumonia lasting three weeks. The lung did not clear and in spite of the presence of stoney dulness and the absence of breath sounds, an exploration of the chest gave a negative result. On admission the chest was again explored in two places without /

- without finding pus. On the following day the needle was again inserted and pus located. Under general anaesthesia a portion of rib was resected, a quantity of pus and masses of debris (into which the exploring needle had in all probability penetrated on the unsuccessful occasions) removed; two tubes were introduced and the patient returned to bed. The convalescence progressed favourably till the third week when a slight "pocketing" occurred giving rise to a slight degree of fever during three days. There were no further hindrances to recovery and patient was discharged cured on September 7th.

Case XXVI.

A.N. male aet 4 was admitted on February 16th with a history of Influenza of two weeks duration, signs of Pneumonia having developed in the previous few days. On admission patient was in a critical condition and appeared to be suffering from a marked degree of toxæmia. The pulse was very frequent and at times imperceptible and respirations were laboured and rapid; the face was grey and anxious and beads of perspiration stood out on the brow. The right lung yielded impaired resonance and diminished breath sounds; an exploring needle was introduced and a syringe of thin greenish pus drawn off. When examined the pus was found to be *Streptococcal* in nature. The patient was given normal saline /

saline injections subcutaneously and per rectum and stimulants were administered freely; after some hours a portion of rib was resected under Ether anaesthesia, pus removed, and two tubes introduced. Patient appeared to rally for the first few hours under the influence of frequent stimulants. It soon became evident however that the fight was in vain; he died late in the evening of the same day. This is the only fatality amongst children in the series and is likewise the only Empyema of Streptococcal origin. The infection must have been of a very virulent character as the child was well nourished and healthy and not undermined by previous illnesses. He had been well enough to be "running about playing" two weeks before admission.

Case XXVII.

A.W. female aet 7 was admitted on June 6th. She had been ailing for two weeks previously with Pneumonia and on admission was acutely ill with temperature 105° Respiration 44 and Pulse-rate 180. She was given a general anaesthetic in bed and her condition being so critical a simple Pleurotomy was done, a quantity of pus removed and two tubes inserted; the pus was found to be Pneumococcal. After the first week the temperature dropped to normal, the wound discharged well - it was irrigated daily with Eusol - and the patient's general /

general condition improved. The pulse-rate however always kept very frequent. The sinus showed a great reluctance to close, and, after two months, was still discharging copiously. It was decided to try the effect of an autogenous vaccine, and this was commenced on August 17th and administered in graduated doses twice weekly for two months. At the end of this time the discharge was certainly less but not markedly so. An anaesthetic (Ether) was given with the intention of resecting a portion of rib to give more adequate drainage. As on the previous occasion, however, the patient took the anaesthetic very badly and one was forced to conclude with probing and scraping of the sinus. The patient was discharged on October 9th with the wound still slightly discharging; being advised to come back later for enucleation of tonsils and a further operation on the chest wall if necessary.

Case XXVIII.

E.W. female aet 2 years was admitted on April 26th with a history of Pneumonia of one month's duration. The right side of the chest was explored and thick pus found which on examination proved to be *Pneumococcal*

. Under general anaesthesia a portion of rib was resected, pus evacuated and two tubes inserted. The patient made a satisfactory recovery; in the second week /



week the Temperature was raised to 101° for some days without ascertainable cause, and toxic absorption was suspected; the wound at the time was draining copiously. Patient was discharged on June 10th with the wound healed and chest well expanded.

XXIX.

E.F. female aet two years and six months admitted on February 13th had been ailing for the previous three weeks with Pneumonia. Patient was a sturdy, well nourished little girl, her eyes were rather "puffy" and the legs were slightly oedematous. Some albumen and casts were present in the urine. The left side of the chest showed signs of an effusion, and on exploration thick pus was revealed. The pus, on examination, showed chains of *Pneumococci*. Under Ether anaesthesia a portion of rib was resected, pus evacuated and two tubes introduced. Patient made an uneventful recovery. At the end of a week the oedema had disappeared and the urine was free from albumen. Patient was discharged cured on April 15th. This is the only example of Nephritis complicating Empyema but is, however, not an uncommon complication.

Case XXX.

A.H. male aet 2 admitted on July 14th had been ailing for four weeks with slight cough and "wasting". A patch of dulness was present at the right base and distant /

distant tubular breathing was heard. The area was explored and some thick pus found. On examination this proved to be *Pneumococcal*. Under $CHCl_3$ and Ether anaesthesia a portion of rib was resected, pus evacuated and two tubes introduced. The temperature rose occasionally during the convalescence but the general condition improved greatly and patient was discharged on September 24th with a slight discharge from the wound still present.