CLINICAL OBSERVATIONS

on

EMPYEMATA in CHILDREN.

Presented by

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In this paper I have put together the facts and impressions gathered from an experience of twenty cases of Empyemata in children, which I had the opportunity of observing while Resident in the Sick Childrens' Hospital Glasgow. The following record being one of personal experience of the above number of cases may be deemed of some value, and more especially perhaps on some points relating to treatment.

I was very much interested in these cases chiefly by the gratifying results obtained compared with the unsatisfactory conditions I had often seen resulting in adults, and I was also struck by their great frequency.

The extraordinary frequency of this affection in childhood is a very remarkable fact. Mackay gives the frequency of suppuration in cases of Pleurisy in children as 40% compared with 5% in adults. Why should effusions, and not only pleural but effusions into any of the serous sac s, in childhood so readily become purulent, while such an occurrence in adults is comparatively rare? Is it that the resistance of the organism and especially of a child labouring under or just recovering

from an acute disease is much less than that of an adult in a similar position, and the Pneumococcus, which undoubtedly per se is a pus producing organism, in the one finds less resistance and is powerful enough to cause necrosis and pus formation, while in the other its action is modified by the resistance of the organism and only a simple serous effusion results. This seems to be the chief reason for the difference in frequency at different ages and this view is strengthened by the fact that the great majority of the cases in children occur before the fifth year, and that debilitated rickety children of the lower classes, who have been brought up in squalid surroundings, supply the large proportion of the cases, it being well known that Empyema is not nearly so frequently seen in Private as in Dispensary or Hospital Practice.

However I think it is on the whole admitted that the disease during childhood is a less serious complaint than during adult life, but this statement does not hold good for all ages of childhood. It will not be denied for instance that the disease is a very ~~serious~~ serious complaint during infant life, that is, when it attacks a child under 2½ years: under a year old the recoveries are few and far between.

From the observation of these cases I am inclined to agree with those who hold that an Empyema is an Empyema from the beginning, that it starts as such, and very seldom as a simple effusion, which

later on becomes purulent. Only in one case did a secondary puncture, and that after the interval of 3 weeks, reveal pus when the first exploration withdrew a syringeful of clear serous fluid. In that case, although on microscopical examination no pus corpuscles were found the fluid was teeming with Pneumococci and one was very suspicious that really the effusion was purulent from the beginning.

Nearly all the Empyemata of infancy and childhood seen in a Hospital for Children are secondary to Diseases of the Lungs and the greatest number can be traced to acute forms of Pneumonia, lobar or bronchopneumonia. An Empyema due to a primary disease of the Pleura alone must be a very rare occurrence, if it does occur, and then it would probably be associated with similar conditions of other serous membranes or with some form of Pyaemia. In the twenty cases of the series, it was not found possible to attribute any one of them to an inital morbid condition of the pleura. In one case (Case X) the history of the onset of the illness suggested a primary pleurisy but inasmuch as recovery took place it was impossible to establish the primary cause. In another case (Case 111) which also suggested a primary pleural inflammation but which unfortunately came to Post-Mortem Examination traces of an associated Pneumonia were found. However it is difficult to understand how the lung could escape implication when the contiguous pleura was diseased or vice versa, and hence it would be practically impossible

to say which was the seat of the primary mischief. But is it not recognized that there are evanescent forms of Pneumonia occurring in children and lasting only a few days? It is easy then to conceive that a pleurisy may have been preceded by such a Pneumonia, the symptoms of the Primary Disease being masked by those of the main condition, the effusion in the chest. On this very important question however our data are still incomplete.

The affection of the pleura manifests itself either concomitantly with the attack of Pneumonia or subsequently to it, this period varying from ten days to three weeks or longer. I shall classify these cases, then from a clinical standpoint into two groups, the "early" or "acute" cases and the "late" or "chronic" cases. Out of the twenty cases there were only four of the acute variety so that the latter group would include 80% of the cases.

In the "acute" cases the signs of fluid in the chest develop along with those of a Pneumonia. The patient from the first is very ill indeed, in fact, we have a picture which differs very little from the onset of an acute uncomplicated pneumonia. The onset is sudden sometimes with a Rigor but more frequently with a convulsion or vomiting. Acute pain in the side or abdomen is a frequent symptom. Dyspepsia is marked, the breathing is hurried, laboured and accompanied by a grunt: the alae nasi work vigorously: the face and lips become dusky: restlessness is very marked: the temperature is raised several degrees 102° - 104° F. and

the pulse is very rapid 120 - 140 per minute. On physical examination one finds over an extensive area, dulness, increased resistance, and loud tubular breathing but towards the base the R.M. is less tubular and not quite so distinct. On puncturing with an exploring needle some thin turbid fluid is withdrawn and on examination of this fluid Pneumococci are found in abundance. When the patient is inder two years (Cases VIII & XIX) an acute case such as this, associated as it generally is in children at that age with broncho-pneumonia, is practically always fatal. The patient may live for a week or two but eventually dies, and death is usually due to extensive consolidation of the lungs or one of the many complications of the serous membranes. When the patient is a little older (Cases VII & XV) the chances are better but the illness is a very serious one. Of this type of case there were only four out of the series of twenty.

In the late or "chronic" group I would include all those in which the signs of fluid develop after a definite recognizable attack of Pneumonia. They may develop immediately after the attack or it may be some weeks afterwards before signs of pus are made out. When they develop immediately after the attack the course of events is as follows:- the patient has an attack of pneumonia with all the characteristic symptoms and signs, the case runs its usual course and towards the end of the week the symptoms improve but

but he fails to have a "crisis". The temperature may come down by a "Pseudo-Lysis" but usually later than the seventh day and then never to the normal range. Physical signs of fluid are detected and on exploration of the chest pus is obtained.

When they develop late i.e. some weeks after the attack of Pneumonia the usual history obtained from the parents is as follows:- that the child had an attack of "Inflammation of the Lungs", "Congestion of the Lungs", Measles or Whooping-Cough" or even "Influenza" or a "Feverish Cold", that he seemed to get over his illness very well and for a few weeks was improving in health but he "took a turn for the worse" and seemed to fall back again. The boy ~~was~~ previously a bright and lively child now took no interest in his games or toys, was fretful and difficult to please, was restless and feverish at nights and seemed to be losing flesh and colour. There may be no history of cough or breathlessness, but when the child is seen and the chest examined the physical signs of fluid are obvious and a syringeful of pus is withdrawn on exploring.

S U M M A R Y.

	Under 2½ years.	Between 2½ & 5 years.	Between 5 years & 7½ years.	Between 7½ & 10 years.	Total.
Number	7	7	3	3	20
Right Side	2	2	2	2	8
Left Side	4	5	1	1	11 } 20
Double	1	-	-	-	1
Males	5	4	2	2	13
Females	2	3	1	1	7 } 20
Well	3	4	3	2	12
Improved	1	2	-	1	4 } 20
Died	3	1	-	-	4

"Well" means the lung was apparently normal and the patient was in good general health.

"Improved" means the general health was good but that some local condition still obtained.

From the above summary it will be seen that 7 of these cases occurred in children under the age of $2\frac{1}{2}$ years, 7 between $2\frac{1}{2}$ and 5 years, 3 between 5 and $7\frac{1}{2}$ years, and 3 between $7\frac{1}{2}$ and 10 years: that 11 were left-sided, 8 right sided and 1 double and that 13 of the children were males and 7 females. The left side seems to be more frequently the seat of the disease and the reason for this seems to be that Pneumonia (lobar) in the left lower lobe is a more frequent affection than in the right. Simmonds in his series of 175 cases gives 103 left while Hofmokl in a series of 60 gives 33 left. The male sex seems to give the larger proportion of cases. Simmonds gives 140 out of 240 while in this series there were 13 out of 20. In 16 patients the primary lesion was a pneumonia, 10 being of the lobar and 6 of the lobular type while in 3 cases the pulmonary lesion was doubtful, and if present it had cleared up before admission. In one case there was no pulmonary lesion detected.

There was a history of a recent attack of Measles in 5 cases and of Whooping-Cough in 2 cases. The fatal cases were all in children under five years.

Examination of the Pus was made in 18 cases and in 16 the Pneumococcus was found. The following were the results:-

Pneumococcus alone	in 13 cases.
Pneumococcus & Streptococcus	in 1 case.
Pneumococcus & Staphylococcus	in 1 case
Pneumococcus with Staphylococcus & Streptococcus	1 case
Staphylococcus alone	1 "
No microorganisms were found	1 "
	18 cases.

Netter states that he found Pneumococcus alone in 53.6% of the cases and with Streptococcus in 3.6%. Koplik found Pneumococcus in 9 out of 15 cases while Holt in a series of 19 cases gives the following results:- Pneumococcus in 14: Pneumococcus & Streptococcus in 1 Streptococcus in 3 and Staphylococcus in 1.

All the cases in which Pneumococci alone were found were secondary to an ordinary lobar or broncho-pneumonia. The case (No.5) in which pneumococci and streptococci were found in combination was a pneumonia case as a sequel to Measles. This mixed infection seems to be a frequent occurrence in cases following Infectious Fevers. The case (No.XVlll) in which staphylococcus was found alone was due to a local extension from a perinephritic abscess. It seems to be the rule that when streptococci or staphylococci alone are found the case in all probability is due either to pyaemia or to the extension of some local

collection of pus.

It was found that in the pneumococcus cases the pus was usually thick and creamy and contained a considerable quantity of lymph masses but as a rule it was not malodorous, while in the mixed infections it had usually a foul odour and was thin and watery.

From statistics it would appear that in children under the seventh year, tubercle is a very rare cause of Empyema. No trace of tubercle was found in any of the five cases, all children under five years, that came to Post Mortem Examination. (Included in this number is one case which came to post-mortem sometime after the cure of the empyema, the cause of death being Pneumonia of the lung of the opposite side). In one of these cases (Case XIII) a careful examination failed to reveal the presence of any microorganisms and following the old established rule, "if no bacteria are found, then tubercle ought to be suspected" the case was considered to be of a tubercular nature; however on post-mortem later no sign of tubercle could be found. Koplik in reference to this subjec t writes, "In many pleuritic effusions, both serous and purulent, the most careful examination of the exudate, fails to give any microbic elements and in these we are left to surmise the etiology. The serum and pus of such cases have been injected into animals without arriving at

any satisfactory conclusion. It is possible that a proportion of these cases are tubercular but it would be a very extreme view to assume that all those cases of pleuritic effusion in which no microorganisms are found are tubercular, for it is at variance with clinical experience and post-mortem results."

According to authorities "when tubercle is found to be associated with Empyema the primary tubercular condition is usually far advanced, in fact a general tubercular infection is usually present." Blaker in 23 necropsies on cases of Empyema found Tubercle in 3 cases and all 3 showed signs of general disease.

The opinion generally is held that, when an Empyema after operation drags on for several weeks or months, it is tubercular in nature. This too is at variance with clinical experience, as in these cases it is generally found that drainage has been imperfect or that the lung has been so damaged as to become incapable of expanding to the chest wall, and if appropriate surgical treatment be applied satisfactory results are obtained.

Some authorities (Ashby & Wright) state that "Subjects of chronic empyemas are apt to become tubercular or in other words patients who suffer from chronic empyema are likely to die of Phthisis". I can find no post-mortem evidence to support this view and I can recollect three patients now about 9 years who have had a discharging sinus for about 3 years and still present no sign of any tubercular lesion.

D I A G N O S I S.

It cannot be said even at the present time with our improved methods of physical examination and diagnosis that the recognition of Empyemata in children is by any means easy, in fact, the disclosure on the post-mortem table of an empyema unsuspected during life is not of infrequent occurrence.

As the auscultatory signs in children are most deceptive, the R.M. at times being heard quite as distinctly over the affected side as over the non-affected side, and the vocal phenomena on which one relies so largely in adults being inapplicable, one has to depend more on our other means of examination to aid us in coming to a diagnosis.

The lack of specific signs is much greater than in adults and the most painstaking, general and physical examination, complemented by exploratory puncture, is necessary to determine positively whether any exudate is present.

The greatest difficulties in diagnosis are encountered in cases of effusion occurring in the course of a Pneumonia.

From the experience of these and other cases I have found the following points of some little diagnostic value.

1. Should a child towards the expected crisis of an an acute pneumonia become restless, sleepless, and at nights slightly delirious, a condition one does not expect at that stage of the illness, one should suspect that there is something more than an ordinary uncomplicated pneumonia and in the majority of cases it will turn out to

an Empyema.

11. One sign that is of valuable assistance in such cases in children is the diminution of the Vocal Fremitus. If in a case of undoubted Pneumonia the Vocal Fremitus is diminished towards the base one has every reason to suspect effusion. This frequently is the only distinctive sign of fluid present but even this in children is not infallible as sometimes even when the effusion is large the Fremitus is considerably increased.

111. Not only over Empyemata but also over simple Pleural Effusions and Pneumonic Consolidations tubularity of the Respiratory Murmur is an auscultatory phenomenon frequently heard. In some cases the character of the tubularity heard over an effusion is indistinguishable from that detected over a consolidation but in the majority of cases it has not the same high pitched expiratory murmur and is more distant. The similarity of the Signs however are sometimes so great that it is quite impossible to come to any definite conclusion and one has to turn in despair to exploratory puncture.

1V. In such cases of doubt between the diagnosis of fluid and consolidation a very important physical sign is Cardiac Displacement. This especially in left sided empyemata is almost invariable, while it is never found in pneumonia. This of course holds good for serous as well as

purulent effusions.

V. One noticed on enquiring particularly into the history of the illness that very often one got the History of Tenderness of the affected side. The mother would often volunteer the statement that whenever she lifted the child under the right or left arm as the case might be that he cried. This feature is sometimes present in pneumonia and more frequently in pleurisy but it seems to be fairly constant in empyema.

Vl. If in a child the signs of effusion have persisted for more than a week, one ought to become suspicious of its character and in the great majority of cases on exploration it turns out to be purulent.

One of our authorities (Rotch) states, "The Diagnosis of Empyema rests on the signs of fluid in the pleural cavity associated with a pronounced leucocytosis" He says that this is a most important symptom in the differential diagnosis from a serous effusion but later he admits that the condition cannot definitely be made out without the aid of an Aspirator.

No doubt our best aid to diagnosis is the exploring needle. Whenever it is suspected that there is pus in the chest an exploring needle should be used. It seems to be a good rule, that whenever there is a patch of dulness that does not clear up, especially when the Temperature is hectic or of an unsatisfactory

range one should always explore, in fact in all cases of pulmonary disease in children where the physical signs are not distinctive and the diagnosis is doubtful there should be no hesitation in using the exploring needle. The danger of exploratory puncture is practically nil but the result of mal-diagnosis is almost invariably to endanger the life of the patient. The necessity for this procedure is most impressed on one when an empyema which has been unrecognized during life, is exposed on the post-mortem table.

Exploration is especially needful in cases of localized empyemata where the difficulties in diagnosis are very great. Very often pus is not obtained with the exploring needle when one feels convinced from the history and physical signs of the case that there is a purulent effusion. In that case exploration should be performed again and if again unsuccessful then in another place and with another needle.

PROGNOSIS.

The prognosis seems to depend on the age of the patient more than on any other factor, the younger the patient the greater being the danger of a fatal issue. It will be seen from the Table that all four deaths were in children under 5 years and that 3 of these were under $2\frac{1}{2}$ years, the death rate under that age being 42%. In children under 1 year Holt gives the mortality at 50%. This high infantile mortality seems to be due to the small vitality, their great susceptability to septic infection and perhaps most of all to the great difficulties in diagnosis.

The general condition of the patient at the time of the attack should aid one in making up one's mind on the Prognosis, it being well known that the mortality is much higher in children of the Hospital type who are as a rule debilitated and emaciated than in children who are brought up in better surroundings and are in better bodily condition.

The Prognosis depends very much on the nature of the pulmonary condition present and on the organism causing the affection. As a Complication of ordinary lobar pneumonia it is a disease of small mortality when diagnosed and treated reasonably early; when occurring with broncho-pneumonia the outlook is more serious but when in association with Tubercle the prognosis is usually grave. Of 10 cases occurring with lobar pneumonia 1 died (Mortality 10%): while of 6 cases in association with broncho-pneumonia 3 died

(Mortality 50%). As a rule when pneumococcus alone is present the prognosis is good but when there is a mixed infection it is not quite so favourable. Of 3 cases with a mixed infection one died and the other two recovered after a residence of 195 and 58 days respectively.

The complications that occurred are referred to under the heading of each case.

The causes of death of the four fatal cases were:-

1. Purulent Peritonitis.
2. Broncho-pneumonia (extensive).
3. Double Broncho-pneumonia, Double Empyema and Purulent Pericarditis.
4. Double Brocnho-pneumonia.

The result of treatment was as follows:-

"Well"- meaning that the lung was apparently normal and the patient was in good general health - twelve or 60%.

"Improved" - meaning that the general health was good but that some local conditions still obtained - four or 20%.

Died - four or 20%.

T R E A T M E N T.

All the cases with the exception of one were treated by opening the pleural cavity and draining it.

The rule that one follows in regard to pus in any situation holds good here too. "Ubi Pus evacua" or, as soon as it has been definitely made out that the exudate is purulent, no time should be lost in getting rid of the pus. In reference to this point Koplik writes, "To temporize with a purulent exudate is to harm the patient. With purulent exudates we include also those serous exudates which were formerly treated expectantly: they are slightly turbid and contain to the eye a few flocculi but if examined bacteriologically and microscopically will be found to contain leucocytes and microorganisms. To temporize with such so-called serous exudates is to be finally disappointed in finding them more distinctly purulent after a short period".

In cases of empyemata in children I am rather inclined to make a few exceptions to this old surgical principle. In the acute or urgent cases developing during a lobar or broncho-pneumonia it seems to me a mistake to expose the child to the shock of opening the chest by Incision or Resection of rib immediately some thin purulent material is got by exploration. Where the effusion is not excessive would it not be better to delay any operative interference until the acute symptoms of the illness had passed off? By so doing the patient would be in a more satisfactory condition later

on to survive incision or resection of a rib and would have a much better chance of recovering. As a rule in these acute cases the quantity of fluid is small but should it be excessive why should Aspiration not be resorted to as a means of temporary relief till the child is in a condition to stand the necessary operation? This course of treatment, I should think, would be most aplicable to the acute cases in the very young. In two such acute cases, both under 2½ years only some thin purulent fluid was obtained but resection was performed and I was convinced from the rapid increase of the intra-pulmonary mischief that probably the combined influence of exposure on the operating table, the administration of a general anaesthetic and the shock of operation hurried on the fatal issue. In other two acute cases in older children. 7½ and 10 years, repeated punctures failed to reveal the presence of pus until the acute pneumonia was over, although undoubtedly fluid was present from an early stage of the illness. These two patients both had resection done later on and both made an excellent recovery, although I am sure that had pus been obtained when it was suspected and resection performed, then the illness would have been a very serious one indeed and the progress would not have been so straightforward and free from anxiety.

Aspiration undertaken as a means of cure is ridiculous and fortunately is now almost given up. Holt quotes a series of 139 cases treated by aspiration with

the following results:- cured 25: died 13: required further and other treatment 101: surely this is sufficient proof of the folly of the procedure. Still there are many uses for the aspirator in the treatment of empyema in children. It is most useful in cases of urgency i.e. in cases where the effusion has been rapid and is causing respiratory and cardiac distress. In such cases one is convinced that the best method of procedure is aspiration preliminary to drainage. By this means is avoided the great danger of sudden collapse of the patient on the table on the withdrawal of a large quantity of fluid from the chest. The relief given by aspiration in these urgent cases is very striking. The child, who probably has not had a good sound sleep for several nights dozes over and sleeps comfortably for hours. The pulse and respirations show a distinct fall: the previously distressed and laboured breathing is replaced by a calm and quiet respiratory act, the pulse which has been very rapid and perhaps irregular falls 10 to 20 beats in the minute and the child wakes refreshed and in a much improved condition to face the operation of the morrow, Resection or Incision.

Even in chronic cases where there were no symptoms of distress, if there were signs of a large quantity of pus in the chest, one made it the rule to perform preliminary aspiration. The advisability for this procedure was impressed on me when I witnessed a

case of this nature, in which aspiration had not been performed, collapse on the operating table.

In cases of Double Empyema too aspiration is a most valuable temporary expedient. The condition in itself is a very serious one and the proceeding adopted ought to be the one to produce the minimum amount of shock. The best procedure seems to be to open one side of the chest only, while the other is treated by aspiration for a few days before the second cavity is opened.

In 18 cases Resection of a Rib was performed while in only one was Simple Incision done. The usual position advised is the eighth or ninth rib or interspace on the line of the angle of the Scapula or in the posterior axillary line, but I have often convinced myself that this is too low, as I have on several occasions seen the drainage tube bent on itself by the rising of the diaphragm or occluded by granulations on that muscle. The seat of election I think is higher up and further forward viz:- The sixth intercostal space or rib in the mid or even anterior axillary line. The opening should not be lower, as although the level of the sixth rib is not the lowest of the cavity at the time of operation, it is usually found to be soon afterwards. It should be in the mid axillary or perhaps nearer the anterior axillary line. Although an opening so far forward may not seem to be at the most suitable point for drainage, still as a rule for the

first few days after operation the child inclines to lie towards the affected side so as to give the sound lung free play and so efficient drainage is obtained. It is always the last part of the cavity to be filled up by the expanding lung and often a collection of pus will remain there undrained and the case drag on for an indefinite time with a discharging sinus when an incision or resection a little further forwards would have prevented it.

The advocates of Incision claim many advantages for that operation over Resection. They say that it is a simple one, takes very little time, and can be done without a general anaesthetic, that the shock is very slight compared with the larger operation of Resection, and that with Resection there is greater liability to Pyaemia, imperfect expansion of the lung and deformity of the chest. On the other hand the advantages claimed for Resection are better drainage: facility for clearing out lymph masses, exploring boundaries of the cavity, breaking down loose adhesions and thus securing fuller expansion and better chances of rapid recovery.

No doubt in children under 18 months simple Incision is the advisable operation but to make sure of establishing efficient drainage from the outset and consequently shortening the duration of the treatment and saving much of the strength of the patient, sufficient space must be obtained for the insertion of a large drainage tube which will not be pressed on by

the adjacent ribs and will not be displaced and this can only be secured by Resection of a Rib. Discussing the relative merits of Incision and Resection Koplik states, "Many cases however do well with Incision, yet the fact remains that in other cases a secondary operation which has for its object the removal of a piece of rib, has to be performed in order to obtain drainage. The author has seen cases treated by incision and thought to be recovered in which reaccumulation occurred after removal of the tube and necessitated a secondary resection of a rib".

On studying some of the results of cases treated by Incision one is struck by the large number of cases that proved fatal from complications such as Pneumonia of the other lung, Pericarditis, Nephritis, Otitis Media etc. Surely this is a grave warning against substituting tapping for the immediately free and thorough drainage of the resection operation, for in the former residues of septic fluid must remain for weeks in a cavity which is in proximity with so many vital organs to which infection may spread at any time. Of this series 18 were treated by Resection: 10 completely recovered while 4 proved fatal. These results compare very favourably with any results from Incision.

The probable duration of the treatment must be a very important consideration on deciding on the operation and undoubtedly after resection recovery is more rapid than after incision. In a series of 15 cases treated by incision by Oloff the duration of the successful cases

was 58 days while in this series treated by resection it was only 35 days.

It is the practice of some Surgeons to irrigate the cavity at the time of operations while others denounce the procedure. Writing in "Diseases of Children" (Starr) Koplik says on this subject "Irrigation of the cavity is not necessary either at or after the operation. Such a procedure may cause fatal syncope or if not attended with accident certainly does tend to prolong inflammatory processes going on in the chest. Moreover on account of the retention of some of the irrigating fluid an exudate at first of good character may become putrid". Against this denunciation of irrigation I may state that I have seen it practised frequently without the slightest detrimental result. It must have the effect of shortening the duration of the treatment, as by this means it is possible to clear out accumulations from the pockets formed by adhesions and to get rid of masses of purulent lymph, which could not have been got rid of by the ordinary drainage tube, and which if left must prove a cause for the case dragging on indefinitely. If done with a double nozzle of the pattern of a uterine douche of Bozeman's Catheter there can be no danger of causing fatal syncope, and how irrigation with sterilized water can convert an exudate of good character into one of a "putrid" nature is rather difficult to understand.

A F T E R - T R E A T M E N T.

The observation of these cases during the whole course of their illness was sufficient to convince me that the after-treatment of the case is of quite as great importance as the operation, in fact, very great care and attention are absolutely necessary if one expects ultimate success. Strict attention to antiseptic principles is of first importance. If the after-treatment of the case is carefully attended to most of the ill effects of an Empyema can be avoided.

In the different cases different forms of drainage were used but the best method of drainage proved to be by two tubes inserted side by side. They should be about 1/3 inch diameter and about $2\frac{1}{2}$ and 3 inches long i.e. long enough to project - 1 - $1\frac{1}{2}$ inches into the cavity and to leave enough outside for the application of a guard to prevent them from slipping into the cavity. The introduction of two tubes immediately after operation no doubt facilitates the evacuation of pus and prevents the possibility of any temporary obstruction, an occurrence not uncommon with a single drainage tube. An opening should be made in the Tube just where it projects into the cavity as there pus is apt to collect.

The best form of dressing by far proved to be an abundant pad of teased out plain sterilized gauze surrounding the opening of the tube and covering this a large pad of wood-wool or wood-wool tissue

surrounding almost the entire chest. This formed a most absorbent dressing.

The following was the usual routine in the ordinary case:- the dressing was changed within 12 hours after operation, as it was found that in that period the dressing was usually soaked with discharge. Thereafter the dressing was changed daily or whenever the discharge soaked through until the tube was removed altogether. The tube was taken out daily, cleaned, boiled and reinserted. At every dressing the skin around was well sponged with antiseptic lotion. When a double tube was used it was found that one of them could be dispensed with on the second or third day. Whenever the discharge became thin and watery the tube was taken out and a small iodoform gauze drain was inserted. This was to prevent the opening from closing till such time as it was certain that there was no fear of any re-accumulation.

The most important point in the after-treatment is the management of the tube and the first point one has to remember is to get rid of the tube as soon as possible. It is put down as the rule that as soon as the discharge becomes serous the tube ought to be dispensed with. However, I think, the rule ought to be that as soon as the discharge becomes thin, not necessarily simply serous, the tube ought to be removed. The great mistake that is repeatedly made is that the services of the drainage tube are not dispensed with early enough. In the great majority of cases the discharge for which

the tube is kept in comes not from the pleural cavity but from the sinus produced and kept open by it. I have seen one case which did very well in which the tube was dispensed with on the third day, but unfortunately on the other hand I have met with several cases of old empyemata with discharging sinuses which I am sure would not have lasted so long had the source of irritation, the tube, been removed sooner.

If the child coughs or cries at the time of dressing pieces of lymph are often driven out at the opening. This no doubt has a beneficial effect in shortening the duration of the illness and these acts therefore ought to be encouraged.

Irrigation #as usually practised in the after-treatment of the case is quite unnecessary, in fact, is certainly detrimental in ordinary cases. Repeated irrigation must hinder the all too feeble lung in its attempt at expansion. However if the discharge became foul or continued too long, washing out with warm sterilized water or with boracic solution proved to be of some value as in these cases the continuance of the discharge was probably due to the presence of pockets which were not draining. This procedure however, should be stopped as soon as the discharge diminishes or becomes less offensive and should on no account be continued any longer than absolutely necessary.

Blowing soap bubbles is a favourite method of encouraging the child to expand the lung and it serves

the purpose well. Holt advises an ingenious method for aiding expansion. It consists of two bottles containing coloured liquid at different levels but connected and the child is encouraged to blow the liquid from the one bottle to the other.

In the recovery from empyema more than any other ailment in children was I impressed with the marvellous improvement wrought by fresh air. The rebound to health and strength is sometimes wonderful. Frequently I have seen a child pale, puny and emaciated on dismissal from Hospital, return from a month's residence in the country ruddy, chubby, plump and full of life and vigour.

In conclusion I must express my indebtedness to Dr. Samson Gemmell, Dr. Middleton, Dr. Dalziel and Mr. Parry for permission to make use of these cases which were under their care in the Childrens' Hospital, Glasgow.

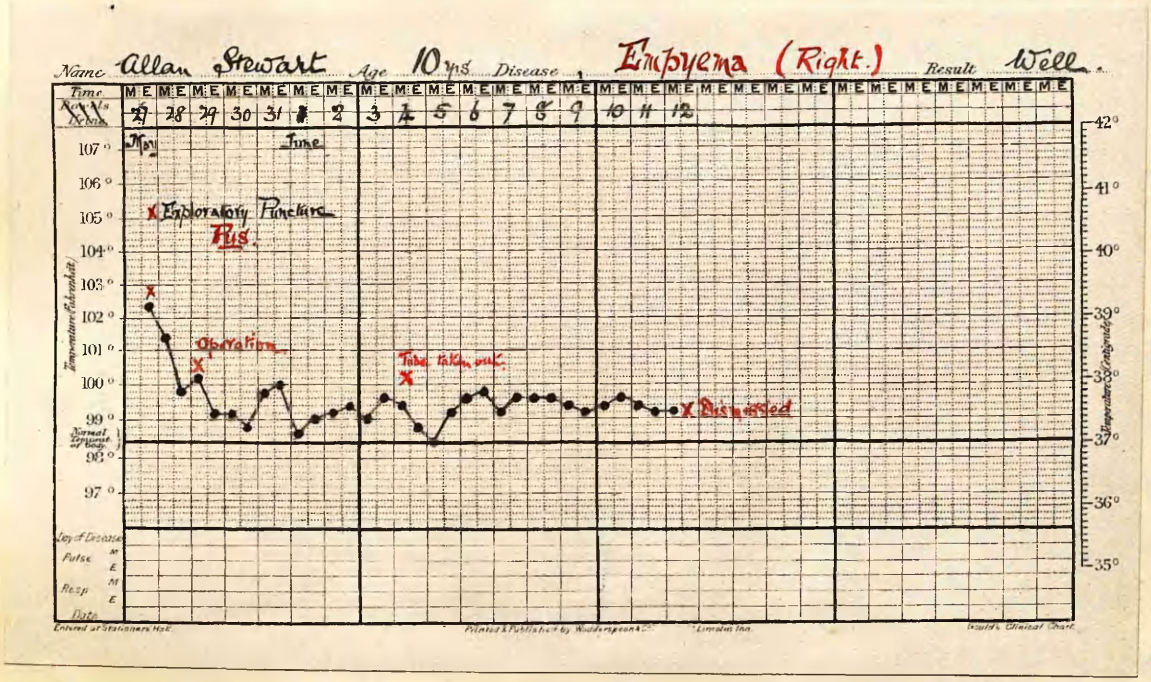
C A S E S.

Those cases of the series that did not present any points of particular interest are not given in detail.

Only a Synopsis of the History and Physical Signs is given with each case..

A Temperature Chart is given with most of the cases.

CASE 1.



Allan Stewart. aet.10.

Admitted - May 27th. 1902.

Dismissed - June 12th.1902.

Operation - May 29th. Resection of rib.

Residence - 16 days.

Result - Well.

Synopsis of History.

Present Illness:- Onset was sudden with a chill, followed by cough and fever, sickness and vomiting and pain in the right side of the chest. The medical man in attendance found him suffering from a Right Lobar Pneumonia. The disease seemed to run its natural course, the symptoms improved and the temperature came down to normal in nine days from the onset of the illness.

However it never kept a normal range, physical signs persisted and as the dulness at the right base showed signs of increasing and there was an aggravation of his symptoms, he was admitted to Hospital on May 27th. four weeks after the onset of the illness.

Previous Health:- good: no history of previous pulmonary trouble or infectious fever.

Family History:- very good.

Condition on admission:- Boy was well nourished but very pale. Skin was covered with profuse perspiration, tongue was thickly furred and appetite was poor. His preferential decubitus was on the right (the affected) side, but he did not seem to experience any great discomfort on lying on his left side. Temperature was 102.4 F: Pulse 125 per minute and Respirations 36 and laboured.

Physical Signs:- There was neither flattening nor any appearance of general or local bulging of the affected side. Movement of the right side was very defective. On measurement no difference could be made out between the two sides of the chest. The whole right side was exceedingly tender and resistance on percussion was well marked. Dulness was absolute and extended as high as 1 inch below the scapular spine behind, and 1 inch above the nipple line in front. The left cardiac border was situated just outside the vertical nipple line. Auscultatory signs were those of effusion viz:- defective Respiratory Murmur and vocal Resonance and Fremitus: there was no tubularity of

Respiratory Murmur and no friction sound or rale.

On exploratory puncture just below the angle of the scapula pus was obtained and on microscopical examination pneumococci (capsulated) were found in abundance.

Operation:- Resection of rib was performed, about ¾" of the 7th. in the posterior axillary line being removed. The pus was thin and distinctly blood-stained and there were no masses of plastic exudate in it. The cavity was well irrigated and a single large sized tube inserted.

The discharge was never very profuse and soon became serous, the tube being taken out on the sixth day. By the 11th. day the wound was closed and on the 14th. day he was dismissed.

Condition on dismissal:- The child looked well, his appetite was good and even in the 14 days he had put on flesh. The wound was healed and there was no deformity or retraction of the chest: there was no dulness and the Respiratory Murmur was only slightly defective.

Condition six weeks after dismissal:- The child looked strong and well. He had gained considerably in weight. There was no deformity and no difference in measurement. The Respiratory Murmur was quite as good on the right as the left side.

Remarks:-

This is a type of the usual case of Empyema which developes subsequently to an ordinary Lobar Pneumonia. The signs were typical of pleural effusion and there was no difficulty in distinguishing it from consolidation as there was not even persistance of tubular breathing.

A point worthy of note about the case was that the pus was thin and distinctly blood-stained, but there was no reason to consider the case of a tubercular nature as pneumococci alone were found and the patient presented no signs of tubercle.

CASE 11.

Alexander Grady, aet.8.

Admitted - Nov. 1901.

Dismissed - March 7th. 1902.

Residence - 3½ months.

Operation - Numerous resections.

Result - Well.

Synopsis of History.

Two years and nine months before admission the boy had pneumonia and from it he seemed to make quite a good recovery. It was fully six weeks after the acute attack that he began to complain of pain in his right side and on exploratory puncture then pus was found. Resection of rib was performed at that time but the sinus has never healed up. Since then the discharge has been constant although never very profuse. The boy has fallen off considerably in flesh.

Previous Health:- Has never been very robust but has had no serious illnesses.

Family History:- No history of tubercle but 3 of the family died in infancy of Scarlet Fever and Bronchitis. Father and Mother alive and well.

Condition on Admission:- Boy is pale and thin. For his age he is very tall and his body is very badly nourished. He has a slight hacking cough but no sign of any tubercular lesion can be made out in any part of the body. Temperature on admission 100.6 F: Respirations 24 per minute and Pulse 100.

Examination of the Chest. The deformity of the

chest is very marked: there is flattening of the whole of the right side: in the infra-clavicular space there is a well-marked hollow and the retraction especially in the axillary region is very great. Even in the deepest inspiration movement of that side of the chest is almost nil. The sinus is situated in the mid-axillary line at the level of the 9th. rib and from it there is a thin muco-purulent, but not very profuse discharge. A probe inserted can be carried up from 6 to 7 inches without obstruction.

The whole of the right side is absolutely dull back and front and no Respiratory Murmur can be heard except in the inter-scapular space. The Respiratory Murmur over the whole of the left lung is peurile but no evidence of any tubercular focus can be made out.

There is no cardiac displacement: apex beat is situated 1" below and within the nipple line.

Treatment:- On Dec.10th. two ribs, 7th. and 8th. were resected about 2" of each being removed. The cavity was found to be a very large one, the collapsed lung lying in the upper and posterior part of the cavity. A fair quantity of purulent debris was cleared out, the pleural wall curetted and the cavity irrigated and packed with iodoform gauze.

February 7th:- As by this time there was very little diminution in the size of the cavity or in the quantity of the discharge further resection was done, portions of six ribs being removed through two incisions in the axillary line.

March 7th.:- The patient was dismissed to-day. The chest wall has fallen in considerably and now there is only a very thin sero-purulent discharge. The boy takes his food well and looks very much better. The mother was instructed how to dress the wound daily.

July 20th:- The patient was seen to-day again, four months after dismissal. The sinus is still discharging and there is very little diminution in the amount of discharge. The boy has not put on flesh, in fact there seems to be no improvement since his dismissal.

September 20th.:- Patient was seen to-day again, after two month's residence at the Convalescent Home. The sinus is still discharging but the quantity is gradually diminishing. He has put on flesh distinctly. The deformity of the chest is very marked and now a spinal curvature is developing.

December 20th.:- Patient was seen in his home today. The discharge has almost ceased and a probe inserted can only be carried up about 1 inch. There is no increase of the spinal deformity. Since the last date he has put on flesh considerably and now he eats well and looks well.

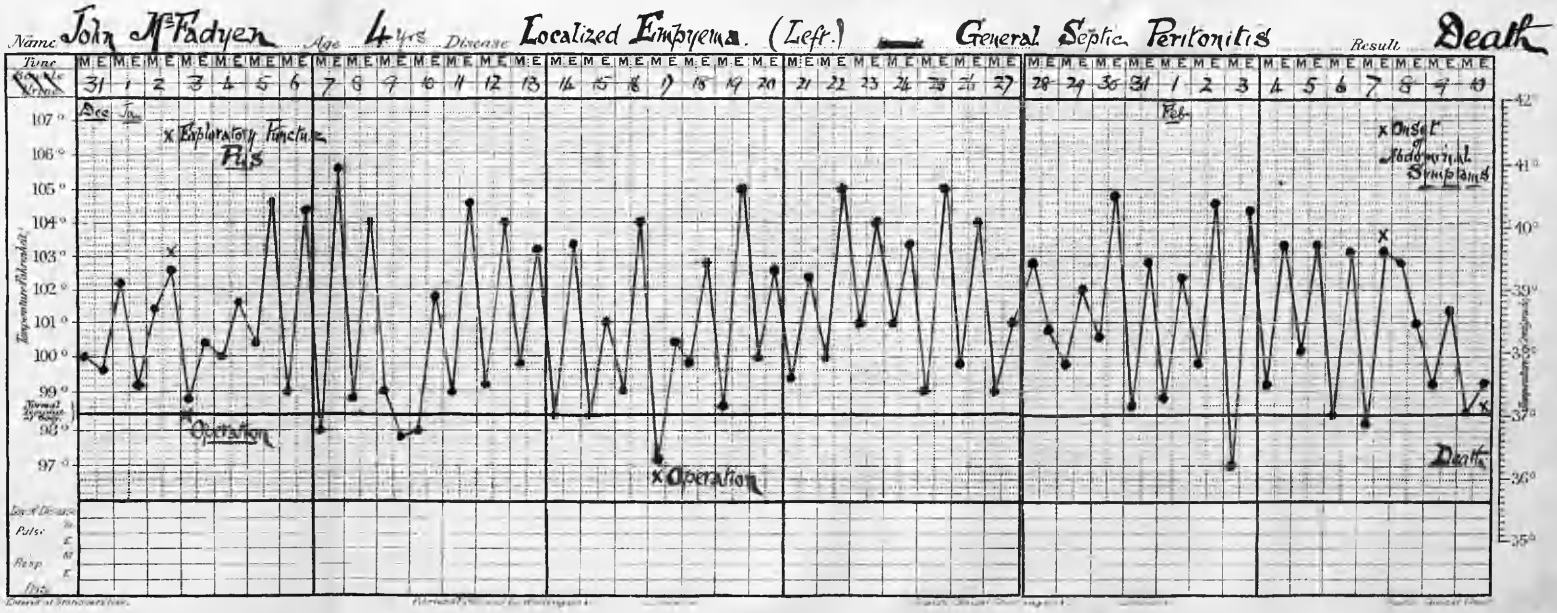
Remarks:-

This case illustrates well the terrible effects of an Empyema of long standing - 3½ years. A large fistulous suppurating cavity with retraction of the chest wall was left and the boy's

constitution ruined by the long continued discharge. The lung was hopelessly collapsed and firmly bound down by thick pleural adhesions so that the only possible treatment was to make an attempt by resection of several ribs i.e. Estlander's operation, to allow the chest wall to fall into the collapsed lung.

On first consideration one would say that this case was almost ~~entirely~~ certainly of a tubercular nature, but no signs of tubercle could be found in the body: there was no tubercular family or personal history and his temperature chart never showed any indications of evening rise.

CASE 111.



John McFadyen, aet 4.

Admitted - Dec. 31st. 1901.

Died - Feby. 11th. 1902.

Residence - 42 days.

Operation - Resection of Rib.

Synopsis of History.

Present Illness:- Present illness is of six months duration and onset was sudden with a slight convulsion and acute pain in the left side. Soon after he developed a slight cough which was attended by some expectoration. Later he complained of pain when lifted or when touched on the left side. During the first fortnight he was not confined to bed but after that his symptoms became more aggravated: he seemed to be always exceedingly tender when

touched on the left side: his cough persisted, perspirations set in and became very frequent and profuse, and loss of flesh was a very marked symptom.

Previous Health:- At the age of 2½ years he had Measles and when just recovering from the attack he took Whooping-Cough. At 3½ years he had Scarlet Fever but from that time till the present illness he had been in fairly good health although he was never a strong child.

Family History:- Good. Father and Mother and three of a family alive and well.

Condition on admission. He is a pale badly nourished boy: he is very peevish and irritable: his tongue is coated and his appetite is poor. Temperature on admission 100°F. and Pulse 124 per minute, small and regular. Respirations 50 per minute but not at all laboured.

Physical Signs:- Thoracic movements are equal and fairly free. There is dulness over the left lung in front and in the upper axillary region. Behind dulness extends from apex to base but towards the base the note is less impaired. In front and in the axilla the Respiratory Murmur is defective and hollow in quality: behind in the scapular and inter-scapular regions it is distinctly tubular and accompanied by moist articulate rale, while at the base the rale is not so abundant and the Respiratory Murmur is more defective and less hollow in quality. At the right base there is a moist crepitant

rale but over the rest of the lung the Respiratory Murmur is good. The right cardiac border is 1 inch to the right of mid-sternum but the other borders are indistinct. The urine contains a trace of albumin.

Treatment:- January 2nd.:- An exploring needle was inserted in the sixth left intercostal space in the mid-axillary line and a few drops of pus were withdrawn. On examination of a film pneumococci were found.

January 3rd.:- To-day the 8th. left rib in the posterior axillary line was resected and about 1 inch of it removed. On opening the pleura no pus was obtained, only a small quantity of thin serous fluid escaping. A director was introduced in all directions to the distance of about 3 inches round the wound but no purulent collection was tapped. An iodoform gauze drain was inserted.

January 5th.:- To-day the wound was dressed but there was no discharge from it. On the 4th. his temperature rose to 103.6° F at 2 p.m. but this morning it is again normal. With the rise of temperature there was a corresponding increase in the rapidity of Respiration and the breathing became very distressed and the cough very troublesome.

January 15th.:- During the last ten days the temperature has been very erratic, showing very marked oscillations, on one occasion registering 98° F. in the morning and 105.6° F. in the evening, a variation of over 7° F. The cough has not been so troublesome but the perspirations have been profuse.

January 17th.:- To-day a rib. the 6th. left was resected in the anterior axillary line just outside the nipple line. A large quantity of pus escaped but the greater part of it had to be brought away with a Volkmann spoon as it was thick spongy plastic material. No communication was found with the posterior opening so a pair of dressing forceps were pushed through to the original opening for drainage purposes.

January 24th.:- For a few days after the child seemed easier and the temperature range was better but three days after the operation the temperature rose as high as ever reaching 105° F. The discharge was very foul and in fair quantity.

January 31st.:- The temperature still has the same oscillating range but no signs of any fresh mischief can be detected. There are no signs of any expansion of the lung: there is still a large quantity of discharge from the wound: the cavity is syringed out daily with Boracic Solution.

February 7th.:- No improvement can be recorded, in fact fact the child is losing ground rapidly. To-day he complained of sever abdominal pain and on examination the abdomen was found to be tender and distended.

February 11th.:- The abdominal pain was not relieved by opiates and hot fomentations: the tenderness and distension persisted: the abdominal muscles were kept absolutely rigid: breathlessness became very marked and occasional sickness set in: the temperature fell to 99° F. pulse became very rapid and his

symptoms rapidly became worse. Death took place on the evening of the 11th.

Post Mortem Examination.

(Dr. A.R. Ferguson, Hon. Pathologist).

There is a localised empyema in the upper part of the left pleural cavity practically corresponding in situation with the upper lobe of the lung. It is shut off by very firm adhesions from the ramainder of the cavity. The parietal and visceral pleura are greatly thickened. The upper lobe of the left lung is greyish and somewhat anaemic in appearance and collapsed throughout. The lower lobe is congested but with considerable interstitial overgrowth and collapse of the pulmonary tissue. The pericardium is unaffected and the heart is normal in appearance. There are some subpleural areas of haemorrhage in its lower part. Some of the Bronchial Glands are enlarged: these appear very aedematous and irregularly congested in cut section. There are no evidences of tubercle either in them or in the lungs.

Abdomen:- There is a generalized septic peritonitis, without much free pus actually in the cavity. The purulent exudate however is abundant throughout, especially in the right side of the abdomen. The Vermiform Appendix is normal and no cause of peritonitis can be found in connection with any part of the bowel. The Mesenteric glands are not enlarged.

Spleen is enlarged and moderately firm and congested: the pulp is of purple colour: the Malpighian

bodies are prominent and somewhat enlarged: there are no signs of abscesses.

Kidneys:- no metastatic abscesses are to be seen but there is a cloudy appearance of the cortex.

Liver is enlarged and presents some appearances of amyloid change. The remaining abdominal viscera do not present any noteworthy abnormal appearances.

Remarks:-

There were several points of interest in this case but fortunately a post mortem examination was granted and those doubtful points were cleared up.

What was the origin? The history of the onset and the course of the illness suggested a Primary Pleurisy but the upper lobe of the lung showed evidences of a low grade of interstitial Pneumonia and the Pneumococcus was found in the purulent exudate so that in all probability the Pneumonia was the cause of the Empyema. If so then this was an exceptional case as encysted empyemata are very rare following pneumonia.

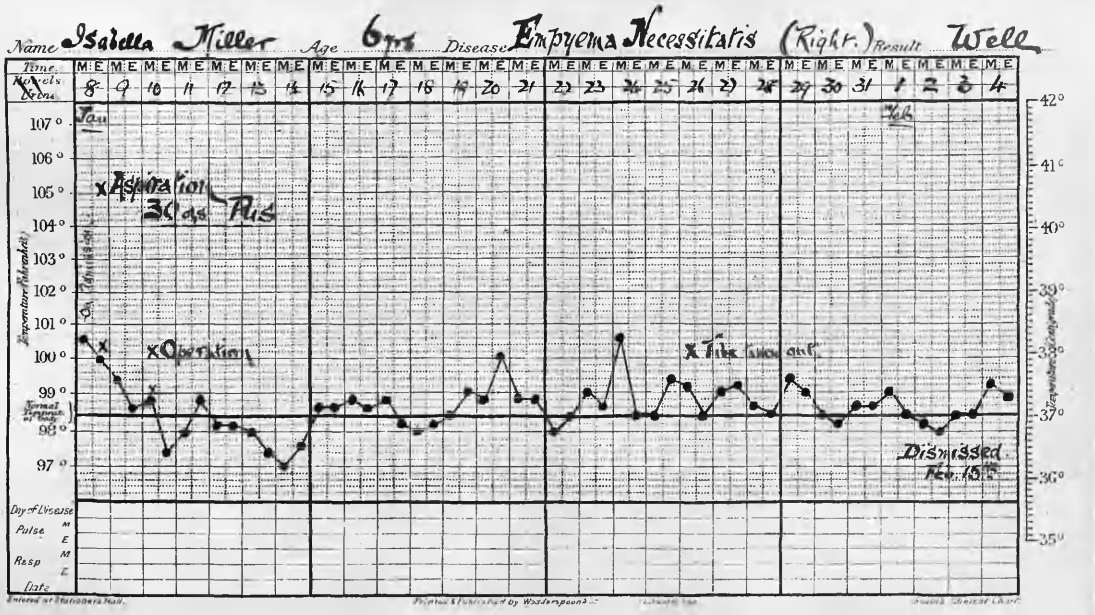
Was it of a tubercular nature? The Sectio showed without doubt that there was no tubercular focus in any part of the body.

What was the cause of the fatal complication? There was no sign of systemic infection in the way of metastatic abscesses in the spleen, liver or kidneys and it was surmised that the infective matter had reached the peritoneum from the Empyema through the Diaphragm, especially as the lower part of the chamber

containing pus in the pleura almost reached the diaphragmatic surface.

The course of events in this case clearly demonstrated the advisability of opening the chest at the point at which the pus was obtained and not as a matter of routine in the posterior axillary line.

CASE IV.



Isabella Miller, aet.6.

Admitted - January 8th. 1902.

Dismissed - February 15th. 1902.

Residence - 38 days.

Operation - Resection of Rib.

Result - Well.

Synopsis of History.

Present Illness:- 3½ months before admission she had an attack of Measles from which she recoved in the usual time. She was quite well and back to school for a few weeks when symptoms like "influenza" set in. After indefinite symptoms for a week she developed Pneumonia (right) but from it she never seemed to make a satisfactory recovery. During the firtnight before

admission she had an aggravation of her previous ~~pyrn~~ symptoms viz:- Persistent Cough, Loss of Appetite, Loss of Flesh and frequent profuse perspirations.

Previous Health:- good.

Family History:- very good.

Condition on admission:- Child was pallid but fairly well nourished. She had a short troublesome cough but not accompanied by any expectoration. She did not complain of any pain and she did not seem to have any Respiratory difficulty as she could lie comfortably on either side. Temperature on admission 100.6° F, Pulse 100 per minute of good volume and regular.

Physical Signs:- There was a distinct fulness of the whole of the right side of the chest, the measurement in the nipple line being 10 inches right and 10 inches left. In the mid-axillary line between the 8th. and 9th. ribs there was a well marked bulging 3½" X 1½" which was fluctuant and gave an impulse on coughing. The whole right side was absolutely dull and resistant: only a very faint Respiratory Murmur could be heard in the interscapular space and it had no tubular character. On the left side Respiratory Murmur was full and without rale.

Operation:- As there was a large collection of pus preliminary aspiration was performed and about 30 ounces of thick pus withdrawn. The operation gave her no discomfort and no coughing resulted. She slept well afterwards.

Next day, January 10th. Resection of rib was performed, the 8th. in the mid-axillary line being the one chosen. Another 6 ounces of thick pus and thick spongy plastic material were removed. The cavity was well irrigated and an Empyema tube inserted.

The discharge was never very profuse but the tube could not be removed till the 16th. day as the discharge remained sero-purulent for sometime. She was dismissed on February 15th. 36 days after operation.

Condition on dismissal:- There was still distinct dulness over the whole of the right side but Respiratory Murmur was good and unaccompanied by rale. She had put on flesh considerably.

Condition 5 weeks after dismissal:- The expansion was perfect: there was no difference in measurement and only the scar remained to indicate the previous trouble.

Remarks:-

This was a case of Empyema Necessitatis (Eichhorst).

Fortunately the pus pointed at a situation suitable for drainage or the seat of election for operation might have been a difficult question.

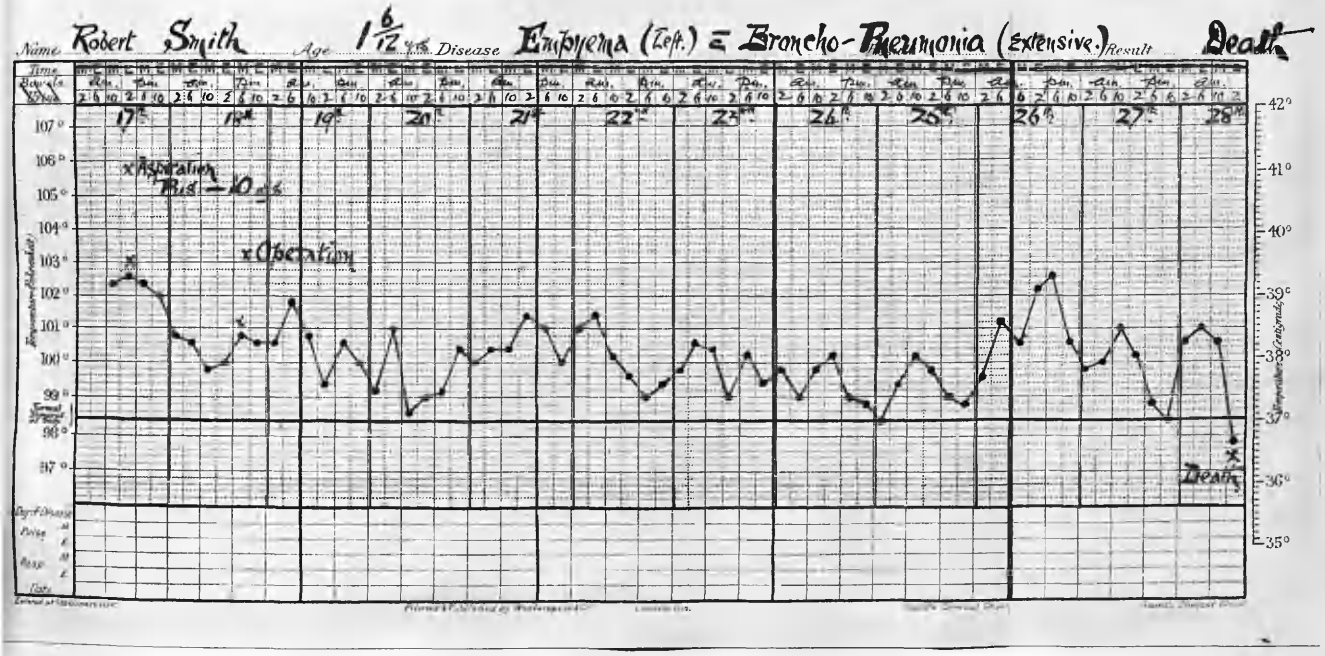
Was this bulging due to a necrosis of the costal pleura, leading to an undermining of the intercostal muscles, bulging of the skin and formation of an abscess on the point of rupturing on the surface or could a hernia-like protusion of the soft tissues like this be accounted

for by the pressure of the exudate (36 ounces) on the yielding intercostal spaces? No doubt the rapidity with which the patient recovered favours the latter view.

The striking feature of the case was that even with 36 ounces of pus in her right chest she had absolutely no symptoms: she could lie comfortably on either side and her breathing was not in the slightest degree laboured. Probably however judging from the history the collection of pus had taken place only very slowly.

The question of the origin of this case was a doubtful one. Was it a sequela of Measles 14 weeks before or was it Pneumonic in origin? Unfortunately the pus was not examined: otherwise one might have for some clue.

CASE V.



Robert Smith, aet 1,6/12.

Admitted - Feb. 17th. 1902.

Died - Feb. 27th. 1902.

Residence - 10 days.

Operation - Resection.

Synopsis of History.

Present Illness:- Illness dated from an attack of Measles when he was 15 months old i.e. three months before admission. He did not seem to recover well and on January 6th. the medical attendant said he had Broncho-pneumonia. A few days later he said he had also developed Pleurisy. For nearly a fortnight before admission Dyspnaea was a very marked symptom, but he had no cough, no perspiration and no irregularity of the

bowels. On Feb. 15th. i.e. two days before admission an exploring needle was inserted and pus was obtained.

Previous Health:- never very strong but never had any acute illness except Measles.

Family History:- Father and Mother and one brother all strong and well.

Condition on admission:- Dyspnaea was very marked: the child was in great distress at times starting up, gasping for breath. When asleep he lay on the left, the affected side, but even then Respiration was very laboured and accompanied by a grunt. Lividity of the finger-tips, nose and ears was very distinct. Temperature on admission 102.4° F: Pulse 120 per minute and Respirations 50. He had a purulent aural discharge which had been present since the attack of Measles.

Physical Signs:- The left chest from apex to base was absolutely dull and the resistance on percussion was very great. Respiratory Murmur was heard fairly distinctly over the whole side but especially in the interscapular space: it had quite a well marked tubular quality and accompanying it were crepitant rales of a very coarse quality. Over the right lung too there were numerous moist rales heard but Respiratory Murmur was not at all tubular. Cardiac displacement was very great. the right border being 1½ inches to the right of the right nipple.

Treatment:- Soon after admission about 10 ounces of pus were withdrawn from the left side with the Aspirator. Relief was given and the child spent a comfortable night. The pus was thin greenish-yellow and foul smelling. Pneumococci (capsulated) and Streptococci were found on microscopical examination.

Feb. 16th.:- Next day, Feb. 18th. Resection of rib was performed, the cavity was well irrigated and an Empyema tube inserted.

Feb. 22nd.:- The child looked easier and slept with more comfort although his nights were still very restless. Temperature was normal but Pulse was 130 per minute and Respirations 40. The discharge was still very profuse and there was very little sign of expansion of the lung. Abundant crepitant articulate rales could still be heard on the whole left side and Respiratory Murmur was still tubular.

Feb. 25th.:- Pulse continued very rapid, 140 per minute. The discharge was less but the child looked worse. There was no change in the physical signs.

Feb. 27th.:- The child died to-day. There was no rise of temperature and no indication of any accumulation of pus. The discharge was still fairly profuse but thin and there was very little expansion. There were no signs of extension of the Broncho-pneumonia to the other side. The aural discharge was up to death profuse and foul smelling.

Remarks:-

One could not but regard this case as very grave from the time of admission. There was great respiratory distress and marked cardiac displacement. The child was in a very poor condition, having never recovered from the attack of Measles and the associated Broncho-pneumonia.

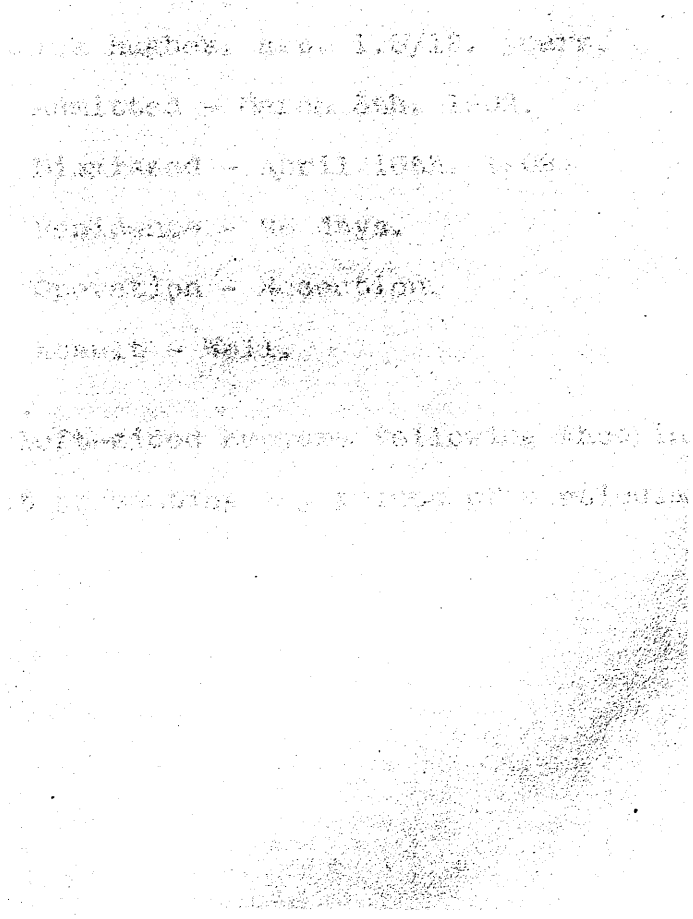
How long there had been fluid in the chest was difficult to say, but the likelihood was that it had been present for some time, probably about a month, and this was borne out by the fact that after removal of the fluid there was little or no attempt at expansion of the lung.

The pus in this case was thin and foul smelling due to a mixed infection, Pneumococci and Streptococci. The combination of Streptococci and Pneumococci in not uncommon in Empyemata following Infectious Fevers but in this case is it not probably that there was some relationship between the existing Otitis and the Empyema? It was unfortunate that the aural discharge was not examined microspopically.

A post mortem examination could not be obtained but no doubt death was due to the co-existing and extensive broncho-pneumonia.

The question of time of operation in cases such as these is a difficult one. Would it not be advantageous in such acute cases to withdraw a certain amount of pus, sufficient to relieve the child's distress and later on when the child seems to have got

over the acute affection in the lung to perform Resection? Certainly in this case at any rate, in which the intra-pulmonary mischief was so extensive I think Resection ought to have been delayed until the child was in a more favourable condition.



CASE V1.

Patrick Hughes, aet. 1,3/12. years.

Admitted - March 5th. 1902.

Dismissed - April 10th. 1902.

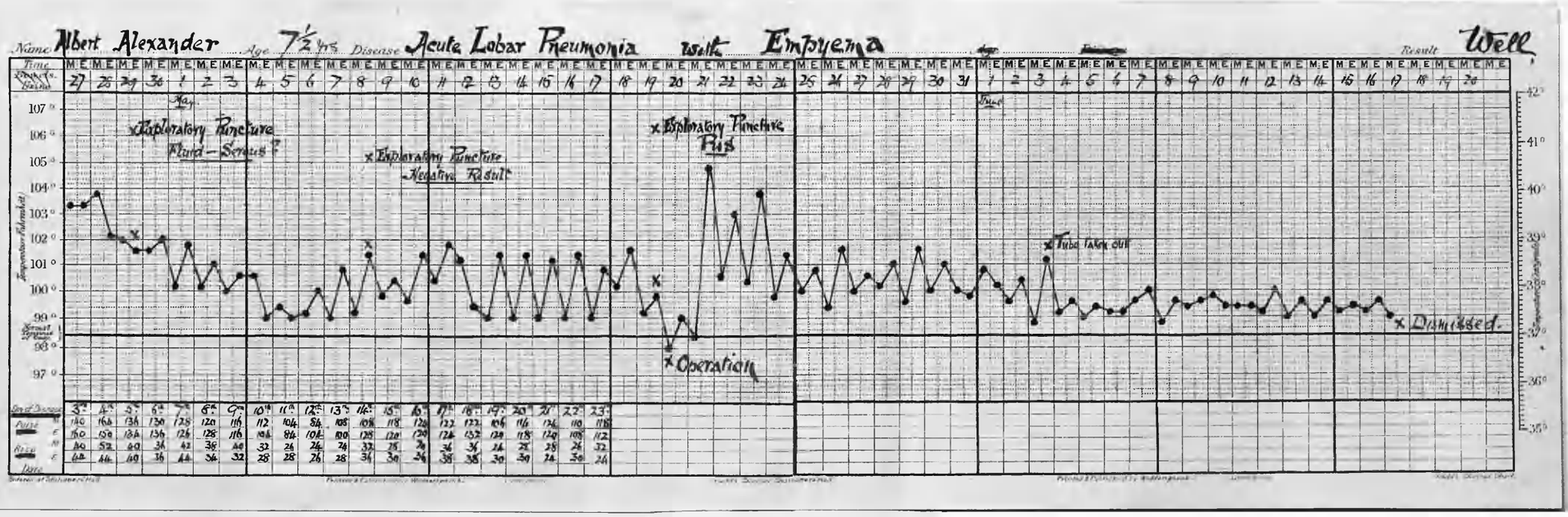
Residence - 26 days.

Operation - Resection.

Result - Well.

A left-sided Empyema following Whooping Cough but not presenting any points of particular interest.

CASE VII.



Albert Alexander, aet. 7½ years.

Admitted - April 27th. 1902.

Dismissed - June 17th. 1902.

Residence - 51 days.

Operation - Resection.

Result - Well.

Synopsis of History.

Present Illness:- On April 25th., two days before admission the boy had a sudden attack of sickness and vomiting preceded by a distinct shivering. During the following day he was very feverish and complained of pain in his abdomen and left side of his chest and a short hacking cough set in.

Previous Health:- He was always considered a delicate boy. Four years ago he had Right Pneumonia but from it he made a good recovery.

Family History:- Father and Mother and five brothers and sisters all strong and well.

Condition on admission:- Patient is a thin delicate looking boy. He complains of pain in the left side of the chest and abdomen. The cheeks are flushed and he is restless and slightly delirious. His cough is short and loose but not accompanied by any expectoration. Temperature 103.4° F: Pulse 128 and intermittent: Respirations 40 per minute and slightly laboured.

Physical Signs:- Over the right chest in front the Respiratory Murmur is accompanied by some moist rale while over the left front the rale is coarser and high pitched. Over the left side behind there is dulness and increased resistance from 2 inches below the scapular spine to the base and round into the axilla. The Respiratory Murmur is harsh in the upper part of the dull area while towards the base it is diminished and distant and accompanied by slight crackling rale.

April 29th.:- As the existence of some effusion at the left base was suspected an exploring needle was inserted and a little turbid looking fluid was obtained. Dr. Middleton did not consider it purulent but thought that the turbidity might be due to the mixture of the serous fluid with the 1 - 20 Carbolic with which the syringe was rendered aseptic. On microscopical

examination of the fluid Pneumococcus was found in abundance and in addition numerous leucocytes were present.

May 5th.:- Progress has been satisfactory. Temperature has come down gradually till this morning it registered 99°F. The Percussion Note is now fairly resonant down to the lower angle of the Scapula and down to that level Respiratory Murmur is tubular but towards the base it is less diminished and has no tubular quality.

May 8th.:- As the temperature again showed an inclination to rise registering this morning 101.4°F exploratory puncture was again performed but with a negative result.

May 19th.:- From May 5th. till now there was no alteration in the physical signs. The boy was fairly comfortable but his temperature never fell to normal averaging about 100°F. To-day exploratory puncture was again done and on this occasion pus was got.

Operation:- To-day, May 20th. Resection was performed, the 7th. rib in the posterior axillary line being the one chosen. There was only about 6 ounces of thin pus but a large quantity of curd-like lymph. The cavity was irrigated and an Empyema tube inserted.

During the first week after operation the Temperature range was rather high registering 104.8°F: 103°F. and 103.8°F. respectively on the first three nights.

The discharge continued to come freely but was not thick. Dressing was only done every second day.

The tube was taken out on the 14th. day and the wound soon healed. The boy was put on Maltine and Cod Liver Oil and very quickly put on flesh.

Condition on dismissal:- The wound was perfectly healed. The measurement of the left side was only ¼ inch less than the right side: Percussion Note was not impaired and Respiratory Murmur was not much impaired relatively.

Condition one month afterwards:- The boy had put on flesh distinctly. There was no retraction of the chest and no sign of any impairment of the lung.

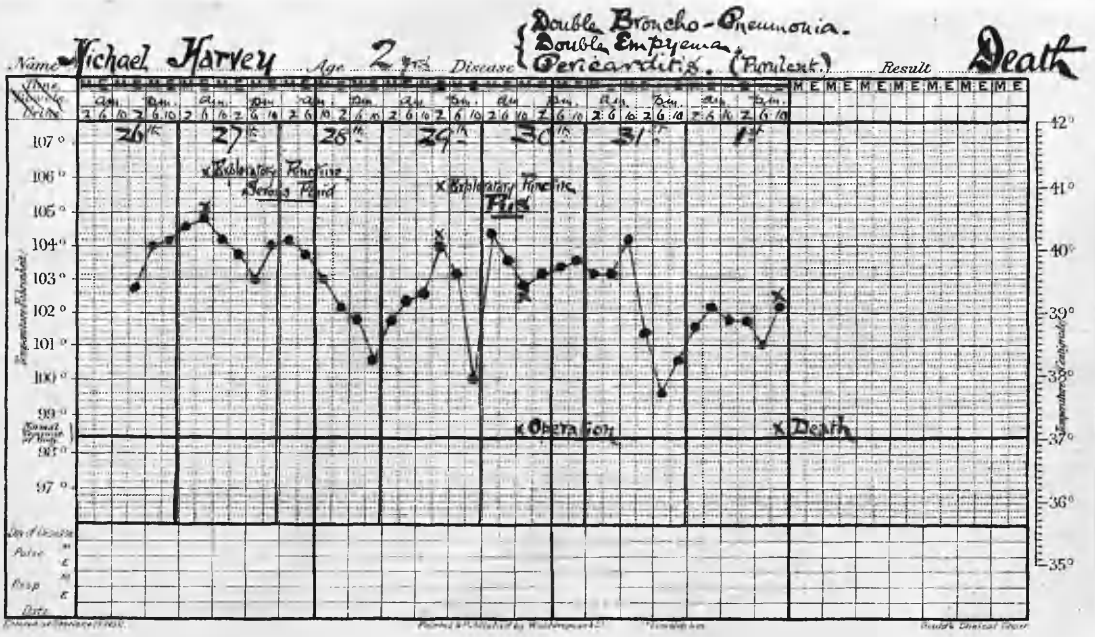
Remarks:-

This is a typical example of an ~~acute~~ Empyema developing during a "Pleuro-pneumonia". The patient was admitted on the 3rd. day of illness and temperature came down by Lysis from the 6th. to the 10th. day but never to normal range. With the fall of temperature there was a corresponding fall of the Pulse and Respiration and everything seemed satisfactory. For only three days did the records run about normal and then during the following 14 days before pus was detected, oscillations were distinct.

This case illustrates well the necessity for repeated puncture in doubtful cases where the physical signs persist. On exploration on the 5th. day serous ~~fluid~~ fluid was obtained in small quantity but on exploring

again on the 14th. day the result was negative in spite of frequent attempts. However on the 19th. day pus was found.

CASE VIII.



Michael Harvey, aet. 2.

Admitted - May 26th. 1902.

Died - June 1st. 1902.

Residence - 6 days.

Operation - Resection.

Synopsis of History.

Present Illness:- 7 weeks ago he had an attack of Measles and since then he has been troubled with a short cough: his appetite has been poor and he has been losing flesh. 8 days ago he got suddenly much worse: he had a shivering followed by profuse perspirations: breathing became much embarrassed and cough got worse and more frequent.

Previous Health:- When six months old he had

whooping-cough and for some months previous to the onset of this illness he had been in poor condition viz:- very fretful especially when moved and perspiring profusely at night.

Family History:- Father and Mother are strong and well but of a family of seven five died in infancy.

Condition on admission:- Child is fairly plump but shows marked evidences of rickets viz: Fiddle-shaped chest with rachitic rosary, patent anterior fontanelle and prominent abdomen.

He is distinctly cyanosed. Respirations number 60 per minute and are much distressed. Temperature 102.8°F. and Pulse 128 regular but of poor tension.

Physical Signs:- Movement of both# sides of the chest is very poor but it is slightly greater over the left than the right. The whole right side is dull but dulness is most intense over the axillary region and base. In front R.M. is tubular and harsh: from the nipple downwards and outwards it is accompanied by rale but no rale is heard over the apex. Behind over the base Respiratory Murmur is diminished, expiration is prolonged and harsh crackling rales accompany inspiration. On the left side just below and to the left of the left nipple there is a small area over which there is dulness tubular breathing and loud crackling rale. Cardiac sounds are poor.

May 27th.:- To-day an exploring needle was inserted at the right side but only very little fluid was obtained. It was slightly turbid but it was not

considered to be purulent.

May 29th.:- To-day exploratory puncture was again performed and on this occasion some distinctly turbid fluid was obtained. On microscopical examination leucocytes and capsulated pneumococci were found in abundance.

An attempt was made to aspirate but only a very little fluid was obtained. The needle did not seem to be free in a cavity.

May 30th.:- To-day Resection was performed, a piece of the 8th. rib in the posterior axillary line being taken away. Only about two teaspoonfuls of pus escaped but there was a fair quantity of plastic purulent exudation. The surface of the lung too was covered with a layer of the plastic material. A small piece of iodoform gauze was inserted as a drain.

May 31st.:- Child is much worse. Respiration is 80 per minute and very distressed and Pulse is 160 per minute and most ~~regular~~ irregular. Heart sounds are very faint and cardiac dulness is slightly increased: the child is very pallid.

June 1st. Child died to-day.

Post Mortem Examination:- Over the whole of the pleural surface at the anterior margins and around the base there was a thick agglutinated plastic exudation of a purulent yellowish character. There was about ½ ounce of purulent fluid in the left sac but the right was perfectly drained.

The right lung showed a very typical broncho-pneumonia of a most extensive character, purulent in part but with no suggestion of a tubercular basis. The left lung too presented a similar condition but by no means so ~~near~~ marked or so extensive.

There were signs of Pericarditis, also of a purulent character, the pericardium being covered with a fine exudation and containing about 1 ounce of purulent fluid.

The spleen was enlarged and soft but no purulent points were present. There were no signs of Peritonitis or Meningitis.

Remarks:-

There are not on record many examples of "Double Empyema" in infancy in which recovery followed any method of treatment. Morgan in the Lancet, July 19th. 1890 quotes a case in a child of 6 years in which recovery followed Double Resection and Blaker in the British Medical Journal quotes a recover in a child of 1½ years. This child was only 2 years old. The pulmonary lesion was very extensive and double and the pericardial complication of itself was sufficient to account for death.

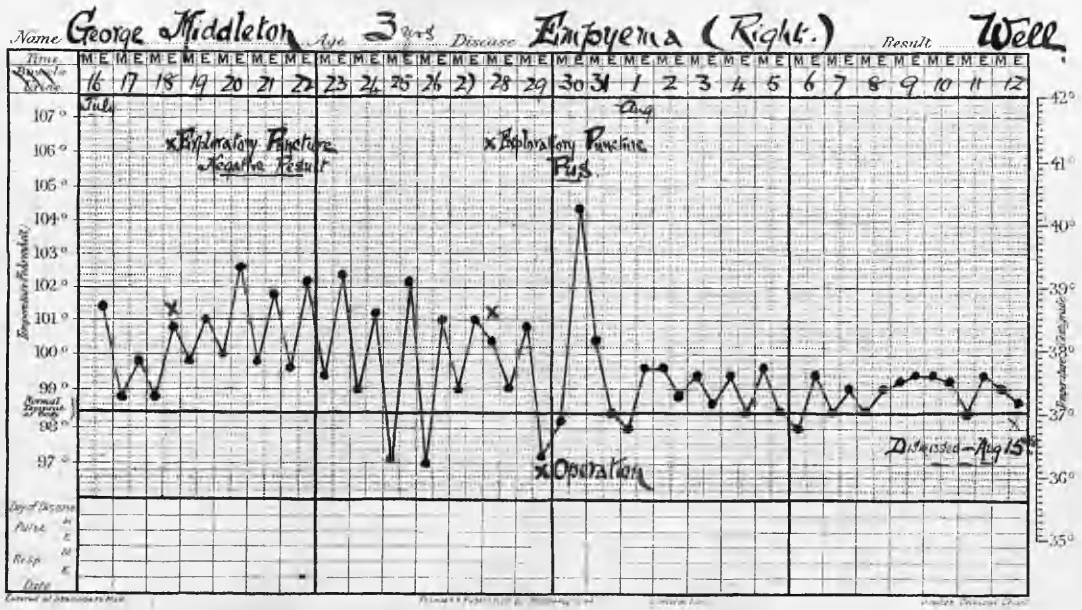
The case was considered hopeless before operation and the condition found on post-mortem fully justified this opinion. He was a poor debilitated infant. brought from a squalid home, with numerous evidences of rickets and a well marked fiddle-shaped

chest. His vitality was very low and a child in that condition could not possibly have weathered out an attack of broncho-pneumonia with Empyema and Pericarditis.

Considering the wretched condition of the child perhaps it would have been better to have trusted to Aspiration only? However the operation of Resection only took about five minutes and must have been very little shock to him.

Whether the Broncho-pneumonia, the Pericarditis or the Empyema was the cause of death is difficult to say. I was convinced it was not the Empyema: on admission the child was cyanosed and all the symptoms pointed to Respiratory distress but later on he became pallid, pulse became extremely feeble and cardiac dulness increased so that I was more inclined to consider the Pericarditis as the fatal complication.

CASE IX.



George Middleton, aet 3.

Admitted - July 16th. 1902.

Dismissed - August 15th. 1902.

Residence - 30 days.

Operation - Resection.

Result - Well.

Synopsis of History.

Present Illness:- Illness began suddenly on June 20th. i.e. nearly a month before admission, with sickness and vomiting. He had just recovered from an attack of Measles and was three weeks apparently in good health when the present illness set in. For some days he was feverish and restless and had a short dry cough. After about a week (indefinite) the patient seemed better but since then there has been no further

improvement. He has gradually lost flesh: his appetite has been poor and the slight cough has persisted. Profuse night perspirations have also been a prominent symptom.

Previous Health: good.

Family History: Father and Mother and seven children are all strong and well.

Condition on admission:- Boy is pale and sallow and looks very ill. Pulse 120 per minute: Respirations 36 per minute but not laboured: Temperature on admission 99 F.

There is distinct flattening of the whole of the right side and especially in the infra-clavicular region. Movements are defective, in fact are scarcely perceptible on the right side. Measurement of the chest is 21 inches, 10½ inches on each side. Below the right clavicle down to the 3rd. rib a dull tympanitic note is present and in the supra-spinous space behind slight resonance is made out but below these levels percussion gives an absolutely dull note. Respiratory Murmur in front over the dull tympanitic area is distinctly tubular but below the 3rd. rib in front and below the spine of the scapula behind Respiratory Murmur is distant and much diminished but still slightly tubular. Nothing abnormal can be made out on the left side.

The left border of the cardiac dulness is in the nipple line and the apex beat is situated ¾" below and in the nipple line. Sounds are pure. The

Hepatic dulness is not displaced but the upper border is obsc ured.

July 18th.:- Two days after admission an exploratory puncture was made in two places but nothing was obtained.

July 28th:- During the last ten days there has been no alteration in the physical signs but the Temperature Record has been most erratic: on the 25th. there was a variation of nearly five degrees between the morning and evening temperature and the difference has never been less than two degrees.

Exploratory puncture was again performed and on this occasion pus was got. On examination of a film Pneumococci were found.

July 29th.:- Resection was done to-day, the 8th. rib in the posterior axillary line being the one chosen. The pus was not in large quantity nor was it thick and there was very little plastic material. Irrigation was performed and an empyema tube inserted.

July 30th.:- To-day temperature rose to 104.6°F. but the cause cannot be ascertained. The discharge is perfectly free and profuse.

Aug. 6th.:- Temperature now at a normal range. Discharge is rapidly diminishing in quantity.

Aug. 15th.:- Dismissed well to-day.

Condition on dismissal:- Wound was quite healed. The Respiratory Murmur on the affected side was almost as full as over the other and no rale was present.

Condition 14 days after dismissal:- There was no deformity: percussion was resonant: measurements were equal and the Respiratory Murmur was clear and without rale.

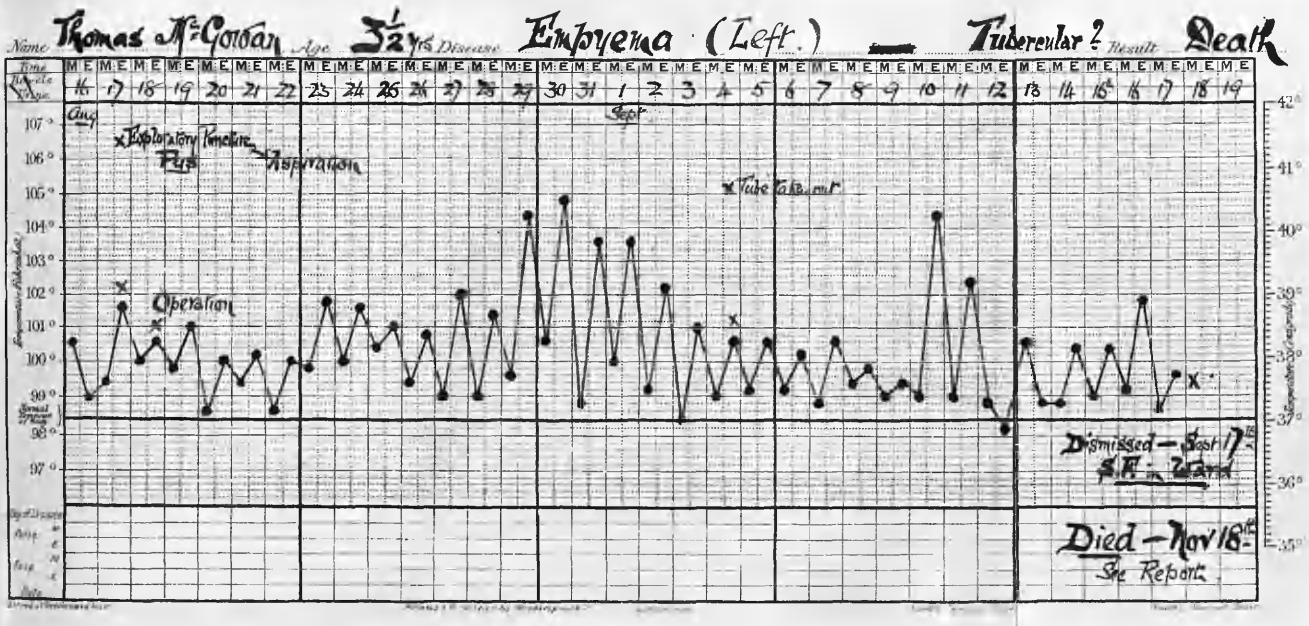
Condition two months after dismissal:- The flattening of the affected side has gone. No difference could be detected between the two sides, except for the scar. The child has put on flesh considerably.

Remarks:-

This is an example of an Empyema as a sequela of Measles. Whether it was a primary Pleurisy or not is difficult to say. The history of the onset and course is rather indefinite and gives one no assistance in coming to a conclusion.

The necessity for repeated punctures in doubtful cases of pulmonary conditions was again impressed very forcibly on me in this case. From the physical signs one more inclined to Pleuritic Effusion than Consolidation but exploratory puncture gave a negative result. It was then looked upon as an unresolved Pneumonia but as no improvement took place and the temperature continued to show oscillations a needle was again inserted, 10 days after the first puncture, and pus was obtained.

CASE X.



Thomas McGowan, aet. 3½.

Admitted - Aug. 17th. 1902.

Dismissed - Sept. 17th. 1902.

Residence - 1 month.

Result - Improved.

Synopsis of History.

Present Illness:- Onset was sudden five weeks before admission with sickness, vomiting and acute abdominal pain. Soon afterwards he developed a cough of a short dry irritating nature and with it he became breath less. During the five weeks his symptoms seemed to have remained similar except that during the three days before admission he had profuse perspirations. During the whole time he was gradually losing flesh: his appetite was poor and his dyspnaea was getting worse.

Previous History: good except for Bronchitis when six months old which lasted nearly three months.

Family History: good: father and mother alive and well.

Condition on admission:- Child looked very ill indeed: his breathlessness was most distressing necessitating the sitting posture: his pallor was very marked: Pulse was 160 per minute and of poor tension. Respiration numbered 40 per minute and temperature was 101.4° F.

The left side of the chest was distinctly flattened and movements on that side were very defective. On percussion dulness was absolute over the whole of the left side from apex to base and resistance was great. No Respiratory Murmur could be heard except very faintly at the apex in front. Over the right side Respiratory Murmur was of good volume but at the apex resonance was slightly defective, expiration was prolonged and accompanying inspiration there was some fine rale. The cardiac dulness was displaced, the right border being just within the right nipple. The left border and apex could not be defined.

On admission an exploring needle was inserted and pus was obtained. Capsulated Pneumococci alone were present in the pus. As the child's distress was very great Aspiration was done at ~~first~~ once. Only about 7 ounces were withdrawn as the needle got blocked. The relief given to the patient was most gratifying: Respirations became easier and less rapid, falling from 40 to 36 per

minute: Pulse fell from 150 to 160 per minute to 120 per minute. The recession of the cardiac displacement was distinct, the right border being at the right border of the sternum. A dull tympanitic note developed over the upper lobe of the left lung in front and there the Respiratory Murmur was tubular.

Aug.18th:- The 7th. rib just beneath the angle of the scapula was resected and about 10 ounces of thick greenish pus escaped. The cavity was irrigated and an Empyema tube inserted.

Aug.31st.:- Temperature has never come down to a normal range and the evening records for the last three days have been 104.2°: 104.8° and 103.6° F respectively. The discharge is still purulent but only in small quantity. The dulness and diminished Respiratory Murmur still persist over the lower lobe but on opening up the wound with Dressing Forceps and probing around no accumulation is tapped.

Sep.4th.:- The tube was taken out to-day: 16 days after operation. There was very little discharge and what there was was serous.

Sep.11th.:- From last note till the 10th. temperature had been practically normal but on 10th. the evening record was 104.4° F. There is still some serous discharge and dulness and diminution of Respiratory Murmur are still distinct at the left base.

Sep.17th:- Dismissed to-day owing to the outbreak of infection in the ward.

Condition on dismissal:- Wound is healed but the

above noted physical signs still persist at the left base. During the last five days temperature record has averaged about 100 F. Boy is gaining in weight and the rale with inspiration at the right apex noted on admission cannot now be detected but expiration is still unduly prolonged.

Condition three weeks after dismissal:- Child looks better and is taking his food well but the dulness and diminution of Respiratory Murmur still persist unchanged. The wound too has given way and there is a thin sero-purulent discharge. The prolongation of expiration and the slight crackling rale at the right apex were again detected. The boy was sent to the Convalescent Home in the Country for a month.

Patient died on Nov.18th. i.e. 2 months after dismissal from Hospital. He died after only 3 days acute illness from Pneumonia of the right lung. From information obtained from his mother the wound was quite closed and the Doctor in attendance considered that the left side was quite better.

Remarks:- The mode of onset of this case calls for remark. The sickness. vomiting and acute abdominal pain must have been by far the most prominent symptom as his medical attendant treated him for acute Gastric Catarrh and it was not till about three days before admission to Hospital that it was recognized that he had a pleural effusion. Abdominal pain in pleural effusion is not at all uncommon and frequently the child is supposed to be suffering from some acute abdominal affection. The child

may even scream with pain and lie in bed with legs drawn up and with a rigid abdomen, in fact in many cases the abdomen has been opened on the suspicion of perforation. It is usually a symptom of the early stage and seems to be more frequent in acute pleurisies. primary in origin, than in those following Pneumonia. It is probably a referred pain along the lower dorsal nerves.

What was the nature of the case? Was it a Primary Pleurisy or a Primary Pneumonia? It seems probable that it was pleuritic in origin judging from the history of the acute pleuritic pain at the onset, but it is more likely that it was an acute Pleuro-Pneumonia. Was it tubercular in origin? The character of the Respiratory Murmur at the right, the opposite apex, and the hectic range of the Temperature even after operation made one suspicious during the whole course of the illness that the empyema was of tubercular origin and this view was strengthened by the persistence of the physical signs at the left base even after the wound had healed. The apex of the diseased side seemed quite healthy while the opposite apex showed suspicious signs of an existing Tuberculosis viz:- slight dulness, prolongation of expiration and rale.

On this important point Rosenbach states, "It is proved by many post mortem examinations that the exudate in tubercular or phthisical processes is much more frequently found on the sound side, where the production of the caseation foci or tubercles is least active". "The cause of this peculiar behaviour of pulmonary

tuberculosis and pleural disease is not easy to find. Possibly the already diseased lung, having for some time been subject to irritation is less capable of producing a fluid exudate or else the pleura over the relatively or absolutely healthy lung is more susceptible to certain irritants".

This point suggests to one the great necessity for a careful examination of the apex on the apparently healthy side in all cases of pleural effusion. / Pneumococci alone were found in the pus but this does not lessen the likelihood of its being tubercular in nature. / It was unfortunate that this patient had to be dismissed from Hospital on account of an outbreak of infection in the ward, as a sectio would have been most interesting and instructive. In the opinion of the Doctor who saw him in his last illness the cause of death was an acute pneumonia of the right upper lobe.

CASE X1.

Thomas Flaherty, aet. 2 years.

Admitted - Sept. 19th. 1902.

Dismissed - October 20th. 1902.

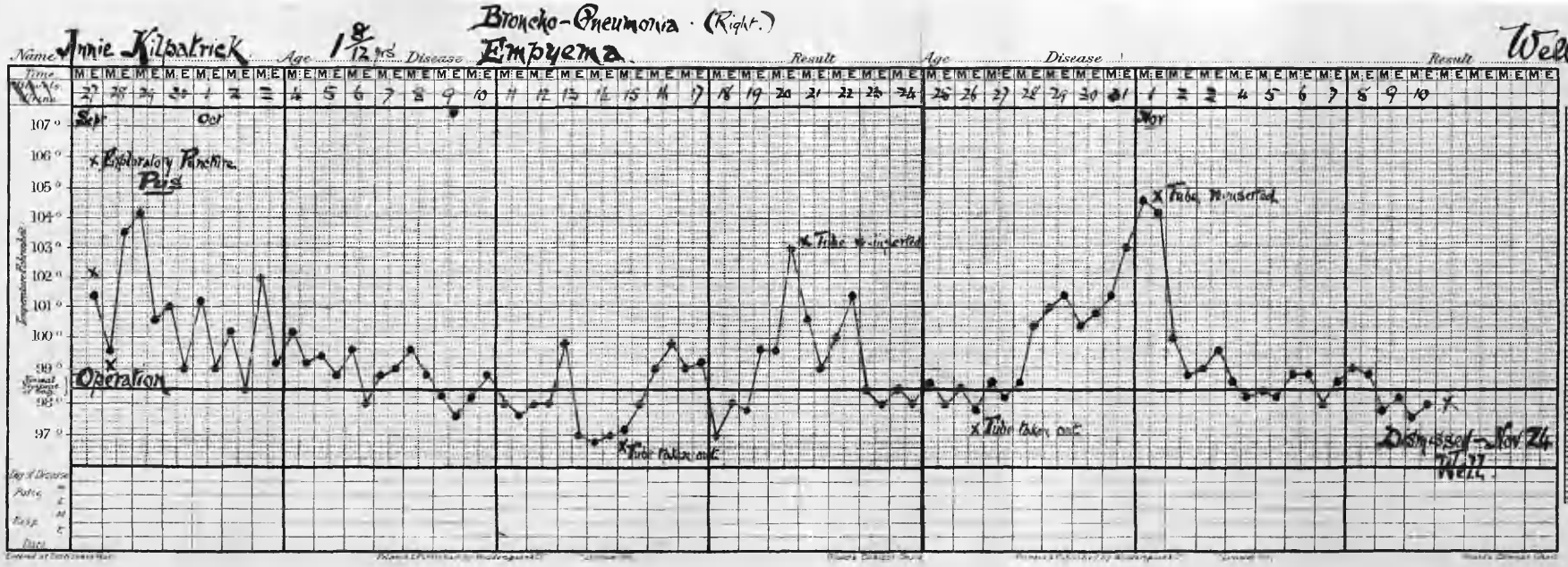
Residence - 31 days.

Operation - Resection.

Result - Well.

A left-sided Empyema following Broncho-pneumonia.

CASE XII.



Annie Kilpatrick, aet. 1,8/12.

Admitted - Sept. 27th. 1902.

Dismissed - Nov. 24th. 1902.

Residence - 58 days.

Operation - Resection.

Result - Well.

Synopsis of History.

Present Illness:- Illness is of a month's duration. Onset was sudden with feverishness, rapidity of breathing and cough. For nearly three weeks the patient was much in this condition, at times rather better than at others. During the week before admission she got much worse, the breathing becoming more laboured and the cough getting more frequent. She had

a tendency to looseness of the bowels and she was losing flesh rapidly.

Previous History:- fair except for Measles and Whooping-Cough a year ago. This left her with discharging ears.

Family History:- One of four - all alive. One of her brothers aged 5 is a Cretin.

Condition on admission:- She is a pale, sallow, badly nourished child with a dry harsh skin and distinct evidences of rickets. Both ears are discharging a foul greenish yellow pus. She is far from comfortable lying as a rule on the left (the non-affected) side and Respiration is distinctly laboured, expiration being accompanied by a grunt. Pulse numbers 148 per minute: temperature is 101.4° F and Respirations number 72 per minute.

Physical Signs:- Over the right front there is distinct dulness and Respiratory Murmur is slightly tubular in quality and accompanied by a moist clicking and somewhat even articulate rale. Over the right back up to the middle of the Scapular blade and round to the mid-axillary line there is absolute dulness and intense resistance but this area of dulness is quite distinct from the dulness of the apex in front. Over this area too very faint Respiratory Murmur only can be heard and what is present is not at all tubular. Over the left side the percussion and auscultation are normal except for an occasional moist rale.

The right border of the heart is a ½ inch to the left of the left border of the sternum and the left

border is situated outside the nipple line. The lower border of the hepatic dulness is 5½ inches below the right nipple.

On admission an exploring needle was inserted and pus obtained. On examination of the film pneumococci and staphylococci were found to be present. Aspiration was performed and about six ounces withdrawn when the operation had to be stopped on account of a severe attack of coughing. Nevertheless relief was given and the child slept easily.

Sept. 28th. The 8th. rib in the posterior axillary line was resected. There was only about three ounces of thick pus obtained but the cavity was full of large purulent fibrous masses which necessitated a scoop in addition to irrigation for their removal.

Sept. 30th. After operation patient's temperature rose to 103.4° F. and Respirations and Pulse were correspondingly accelerated, the latter being very weak and numbering 160 per minute. There was not much discharge. To-day Temperature has fallen to 99.8° but Pulse is still 136 and Respirations 56 per minute. The cough troubled her very much.

Oct. 7th.:- During the last week the child has remained very much in the condition noted in the last report. Respirations vary between 36 and 50 and are much distressed The Pulse has during the whole week been very weak and at times distinctly irregular: it has averaged about 136. Temperature has been practically normal the whole time. There is very little discharge from the wound. Expansion

seems to be taking place slowly but there are still signs of consolidation of the right lung.

Nov.10th.:- Child is now making rapid progress but for sometime her condition was very serious. Since last report the temperature on two occasions has shot up suddenly to about 104.°F and on exploring with Sinus Forceps a small quantity of pus escaped each time. For some time afterwards the wound was kept open with a small piece of gauze and now the wound has healed.

Condition on dismissal. There is still slight dulness on the affected side both at apex and base but Respiratory Murmur although comparatively feeble is much improved. Child is much improved in general condition.

Condition one month after dismissal. Child is now plump and fat and shows no indication of having only a few weeks previously gone through a serious illness. There is no deformity of the chest and no retraction of the side. Only very slight difference can be detected on percussiona ~~dnau~~ and auscultation.

Remarks:-

This case is interesting from its association with a "Double Otitis Media" which followed an attack of Measles a year before. The pus from the chest was greenish and foul and in it were found both pneumococci and staphylococci. The aural discharge too contained staphylococci so that in all probability the discharging ear had something to do with the causation

of the Empyema.

The child was in a very precarious condition for fully a week after operation. Had not Resection to blame for this? Would it not have been advisable to defer operation and to trust to Aspiration to begin with until the child had recovered somewhat from the acute attack of broncho-pneumonia? Yet, at any rate, that is the impression one gets from the observation of several cases of a similar nature.

CASE XIII.

Agnes McCabe, aet 3½ years.

Admitted - Nov. 4th. 1901.

Dismissed - March 12th. 1902.

Residence - 126 days.

Operation - Numerous Resections.

Result - improved.

Re-admission - May 26th. 1902.

Residence - 2 days.

Result - Death.

Synopsis of History.

Present Illness:- 10 months ago she had an attack of Pleuro-pneumonia. The chest was tapped on two occasions: on the first about a pint of clear looking fluid was withdrawn but on the second, only 10 days afterwards about the same quantity of pus was taken away. Nothing further was done and from that time till within the last week she had been able to go about evidently with very little discomfort.

During the last week she has complained of pain in the right side: her appetite has been poor and she has lost flesh considerably.

Previous History. She had Measles at the age of two years but with that exception she has always been a strong child.

Family History:- 2 brothers are dead both of Pneumonia in infancy. Mother is not strong but shows no sign of Phthisis.

Condition on admission:- Child is plump but marked evidences of rachitic rosary and tibial curves are present. Respiration is not much disturbed: Pulse is 116 per minute and Temperature 99.6 F.

About 2 inches below the right nipple there is a distinct bulging about the size of a plum and over it the skin is reddened, fluctuation is distinct and an impulse is is got on coughing. The measurement of the right side is 10¼ inches compared with 9½ inches of the left. The right chest is flattened in front beneath the clavicle while it is prominent below. Over the whole of the right side the percussion note is dull. but over the apex although flattened it does not lack resonance, in fact it has a dull tympanitic quality. Behind up to the spine of the scapula dulness is absolute and resistance intense. Over the whole chest Respiratory Murmur is tubular but without rale. The left side is normal to percussion and auscultation.

The laft border of the cardiac dulness is situated 1½ inches outside the left nipple line. The sounds are of good quality. The liver is palpable 6½ inches below the right nipple. The spleen is easily felt beneath the costal margin.

Nov.5th.:- An incision was made over the bulging part and about 14 ounces of dark greenish yellow pus escaped. A counter-incision was made behind and the 9th. rib resected in the line of the angle of the scapula. The lung was found to be collapsed into the upper and back part of the cavity. The cavity was irrigated and

through drainage established. A thorough examination of the pus failed to reveal the presence of any microorganisms.

Jan.20th.:- As expansion of the lung was very slow further resection was done to-day about 2½ inches being removed from the 6th., 7th., and 8th. ribs.

Condition on dismissal:- To-day March 12th. she was dismissed from Hospital and made an outdoor patient. There is only a Sinus left now but the discharge is still sero-purulent. The child looks fairly well and takes her food well. The right chest has fallen in considerably but there is no sign of spinal curvature. The whole right side is dull and Respiratory Murmur is very defective.

When seen again, a month afterwards, April14th. the discharge was much less and the child looked very well.

Re-admission:- She was re-admitted to Hospital on May 26th. after an illness of six days. She was almost in a moribund condition with well marked orthopneea anasarca and cyanosis. Pulse was 120 per minute and Respirations 60. She had distinct evidences of Pneumonia of the lower lobe of the left lung. There was a loud ventriculo-systolic murmur heard over the whole cardiac area but best towards the lower end of the sternum. There was pulsation in the 3rd. 4th. 5th. and 6th. interspaces and apex beat was situated 2½ inches below and outside the nipple line. Death took place within 36 hours of admission and fortunately a Post Mortem examination was obtained.

Post Mortem Examination:-

Synopsis:-

Old Empyema (right).

Collapsed right lung.

Adherent pericardium (recent).

Tricuspid dilatation and dilated right ventricle.

Broncho-pneumonia (Left lung).

Passive congestion of Viscera.

The Broncho-pneumonia was very extensive but there was no evidence of any tubercular basis. The pericarditis was recent but there was no inflammatory valvular lesion. There was passive congestion of all the viscera but no amyloid change could be detected.

Except for a short sinus only 1 inch in length the right pleura was practically obliterated by old connective tissue formation which cut almost like cartilage. The lung tissue left at the extreme apex was greyish and collapsed in appearance, the vessels and bronchi standing out prominently in the cut section.

Remarks:-

This case is one of the most instructive and interesting of the series. Its origin was from a Pneumonia: Pleurisy supervened and the effusion at first clear became afterwards purulent. For 10 months the child went about in apparently good health but almost certainly with a right pleura full of pus. She seemed to suffer little or no respiratory discomfort and in all probability medical

advice would not have been sought had not the Empyema shown signs of bursting on the surface#. Owing to its long duration and the hopeless collapse of the lung treatment was necessarily of some duration. The child was cured of the Empyema, as seen at Post Mortem, but left in a very crippled condition with a deformed chest and with the right lung utterly useless, so that on the supervention of a broncho-pneumonia. two months afterwards the outlook was hopeless. With a right lung collapsed and functionless and a left lung consolidated in almost 3/4ths of its extent there is little wonder that the right heart, already crippled by a developing pericarditis, rapidly showed signs of dilatation and cardiac failure.

The case is very instructive in showing us how a case correctly treated surgically may become fatal through complications which are not amenable to surgery and how incapable subjects with chronic empyema are of weathering any further acute inflammatory trouble in the chest.

A careful examination of the exudate failed to give any microbic elements and one was left to surmise the etiology. The opinion generally held is that those cases of pleural effusion, in which no microorganisms are found are tubercular but the Post Mortem Examination revealed no trace of Tubercle so that this case does not bear out this view. Neither does this case and other 3 of the series (Cases 11, X and XlV) uphold the statement made by some authors that patients who suffer from chronic

Empyema are likely to die of Phthisis.

CASE XIV.

Lizzie Cullen, aet. 1,10/12 years.

Admitted - Dec. 11th. 1901.

Dismissed - Feb.26th. 1902.

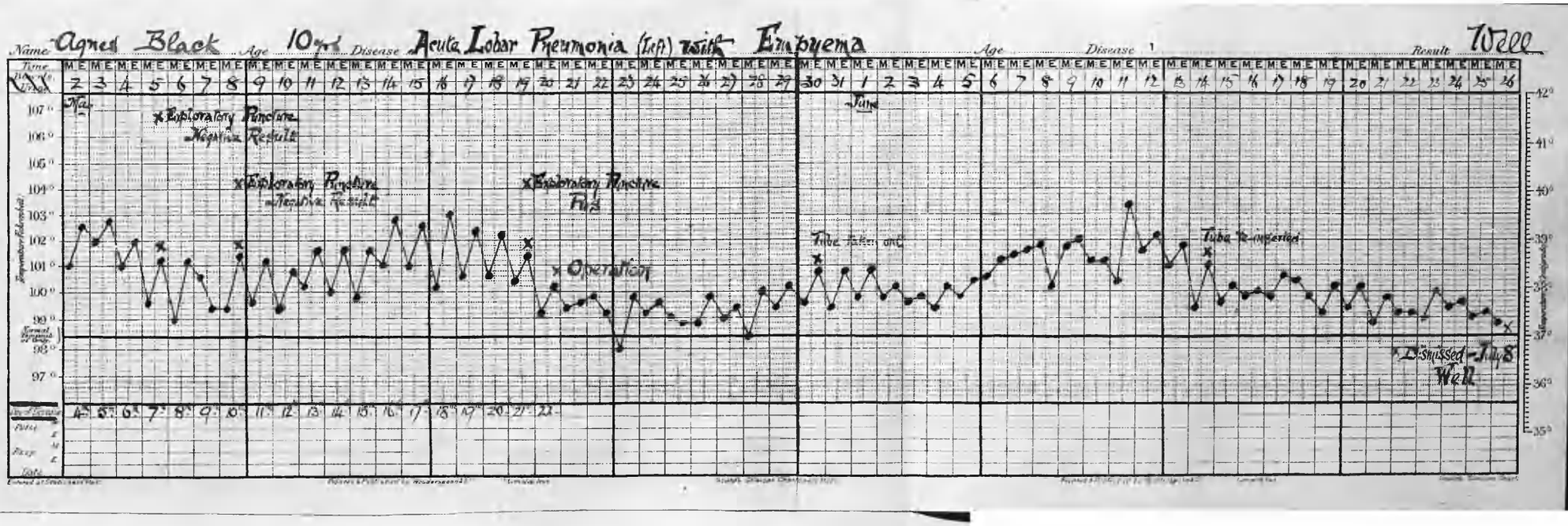
Residence - 2½ months.

Operation - Resection.

Result - Well.

A left-sided Empyema probably following broncho-pneumonia.

CASE XV.



Agnes Black, aet. 10.

Admitted : May 2nd. 1902.

Dismissed : July 8th. 1902.

Residence : 50 days.

Operation : Resection.

Result : Well.

Synopsis of History.

Present Illness:- Onset was sudden three days before admission with sickness, vomiting and acute pain in the abdomen and left side of the chest. Next morning she was feverish and her breathing was rapid and distressed.

Previous History:- With the exception of Measles at 2 years and Whooping-cough at 6 years child has enjoyed very good health.

Family History:-

Family History:- Father and Mother and four children are all alive and well.

Condition on admission:- Patient looks very ill. She has a short but frequent cough which gives rise to acute pain in her left side. Her cheeks are flushed and she has a well developed Herpes Labialis. Her preferential decubitus is on the left, the affected side. Respirations are 60 per minute: short and laboured. Temperature 101 F and Pulse 130 per minute.

Movement of the left side of the chest is very defective. Percussion over the left lung reveals dulness behind as high as 2 inches below the spine of the scapula and in front as high as the nipple line. The dulness is absolute and the sign of increased resistance is very marked. Over the dull area Respiratory Murmur is much diminished and at the extreme base distant. At the end of inspiration some fine crackling rale can be heard. Over the upper lobe nothing abnormal can be detected except that Inspiration is harsh and Percussion and Auscultation of the left lung reveal normal signs. The right border of the cardiac dulness is $1\frac{3}{4}$ inches to the right of mid-sternum.

May.5th.:- An exploring needle was inserted in the posterior axillary line but no fluid was got.

May 6th.:- To-day again a needle was inserted below the angle of the scapula but only a very small quantity of blood-stained fluid was obtained. However on examination of it Pneumococci (capsulated) were found to be present in abundance.

May 19th.:- Since the last puncture ten days ago there has been no improvement in the child's condition. In fact, during the last three nights the child has been very restless and slightly delirious. There has been no change in the Physical Signs. Temperature has shown no tendency to fall, indeed, the records during the last few days have been higher and more erratic than previously. To-day an exploring needle was again inserted, this time in the anterior axillary line and pus was obtained.

May 20th.:- Resection was performed to-day about 1¼ inches of the 8th. rib being removed. The pus was in large quantity and with it was obtained a quantity of curdy-looking material. The lung was flattened against the chest wall but was not devoid of air.

May 30th.:- Tube was taken out to-day, 10 days after the operation. The discharge was still sero-purulent and in fair quantity.

June 15th.:- During the last few days temperature has been rising reaching 103.4 F last night. On inserting a pair of dressing Forceps a fair quantity of pus escaped. The tube was re-inserted.

July 8th.:- Dismissed from Hospital to-day.

Condition on dismissal:- Child looks well but she walks about in a gingerly fashion with a distinct stoop to the affected side. There is distinct dulness over the left base and Respiratory Murmur is defective there. Wound is perfectly healed. She was sent to the Country to the Convalescent Home for a month.

Condition two months after dismissal:- Child has

put on flesh considerably and now looks plump and strong. There is no deformity, no difference in measurement, no difference in Percussion, and Respiratory Murmur is quite as good on the one side as the other. ~~This patient was sent into Hospital as a case of "Intestinal Obstruction". All the early symptoms pointed to the abdomen and the nature of the onset must have been most misleading.~~

Remarks:-

The necessity for repeated punctures in doubtful cases of basal trouble was again impressed on one here. Puncture was performed three times before pus was got although one had the suspicion that there was fluid present during the whole course of the illness.

Thorough drainage too is absolutely necessary. Should the tube be removed before, while the discharge is still sero-purulent even although only small in quantity reaccumulation is sure to take place.

The rebound from a weakly emaciated condition after a long serious illness to rude and robust health was very striking in this case. The recuperative power of children is wonderful and often one notices how a poor weedy-looking child after a few weeks in the Country comes back plump and strong.

This patient was sent into Hospital as a case

This patient was sent into Hospital as a case

of "Intestinal Obstruction". All the early symptoms pointed to the abdomen and the nature of the onset must have been most misleading.

CASE XVI.

Hugh McAllister, aet. 4.

Admitted - June 19th. 1902.

Dismissed - Dec. 31st. 1902.

Operation - Numerous Resections.

Result - Well.

Synopsis of History:-

Present Illness:- Patient had an attack of Measles three months before admission. He was not very ill during the attack but he never seemed to get properly better from it. He developed a slight cough, became feverish and restless at nights and complained of pain in his abdomen. Sickness and vomiting were also an occasional symptoms. The Doctor in attendance treated him for Gastric Catarrh. About a week before admission he got worse: diarrhoea set in: he complained more of pain in his side and became more restless and slightly delirious at nights.

Previous History:- very good.

Family History:- He is one of a family of 13 of whom 5 died in childhood.

Condition on admission:- He is a badly nourished child with a dirty sallow colour. His most comfortable position is sitting up, in fact he cannot go to sleep unless well propped up with pillows. His head is always tilted to the left, the affected side. Respirations number 48 per minute: pulse is 130 and temperature 101.2 F.

The left side is distinctly more prominent than the right: the intercostal spaces are filled up and measure-

measurement of the left is 10¾" to 10¼" of the right. Physical signs are those of a left-sided effusion filling almost the whole cavity. The cardiac displacement is marked, the apex being situated 1½ inches below and ¾ of an inch within the right nipple.

On admission a needle was inserted in the mid-axillary line and pus was withdrawn. Aspiration was then performed and about 13 ounces of stinking pus with a sewer gas-like smell was drawn off. The Aspiration had to be stopped on account of a fit of coughing. On examination of the Pus large capsulated Pneumococci were found but Staphylococci formed far the largest proportion of the microorganisms, their bunches being large and numerous. In addition there were several chains of streptococci but no Bacilli Coli were detected.

June 22nd.:- Resection of the 8th. rib in the posterior axillary line was done to-day. The pus was thin and very foul smelling but there was no plastic ~~material~~ material present. The lung was very much collapsed.

Aug. 22nd.:- Progress has been slow. The pus is still of foul odour and the cavity is syringed daily with Boracic solution. The child was allowed up to run about the Ward and several means were used to try to get expansion of the lung.

Oct. 20th.:- Further resection was done to-day. As the part of the cavity that remained unfilled was in front of the part resected about 2 inches more was taken off the same rib, the 8th. and about the same length off the 7th.

Nov. 20th.:- Improvement has been decided since further resection was done. Now there is only a short sinus and slight sero-purulent discharge. Expansion is going on satisfactory and the boy is improving quickly in condition.

Dec. 31st.:- Dismissed from Hospital to-day. There is only a very small sinus and a very little discharge.

Jan. 30th. 1903. Patient was seen to-day again. Now he looks plump and well. The sinus is quite healed and there is very little deformity resulting. There is still dulness and slightly diminished resonance around the seat of Resection but Respiratory Murmur is good over the whole side.

Remarks:-

This Empyema probably devloped immediately after the attack of Measles. 3 months before admission to Hospital and this was borne out by the bacteriological examination which revealed a mixed infection.

In cases such as this with stinking pus Bacillus Coli Communis is sometimes found but in this case it could not be detected. For some days before Aspiration and corresponding with the appearance of more Marked symptoms he had had "Intestinal Disturbance" but this I think had no causual relation to the Empyema but was more probably a symptom of Septic Poisoning from it.

In the treatment of this case the advantages of doing the Resection well forward almost in the anterior

axillary line was clearly demonstrated. This was the last part of the cavity to fill up and not until the chest was allowed to fall in by further resection did the discharge show any signs of diminishing.

CASE XVII.

Annie Congan, aet 4 years.

Admitted - July 4th1902.

Dismissed - Aug. 5th. 1902.

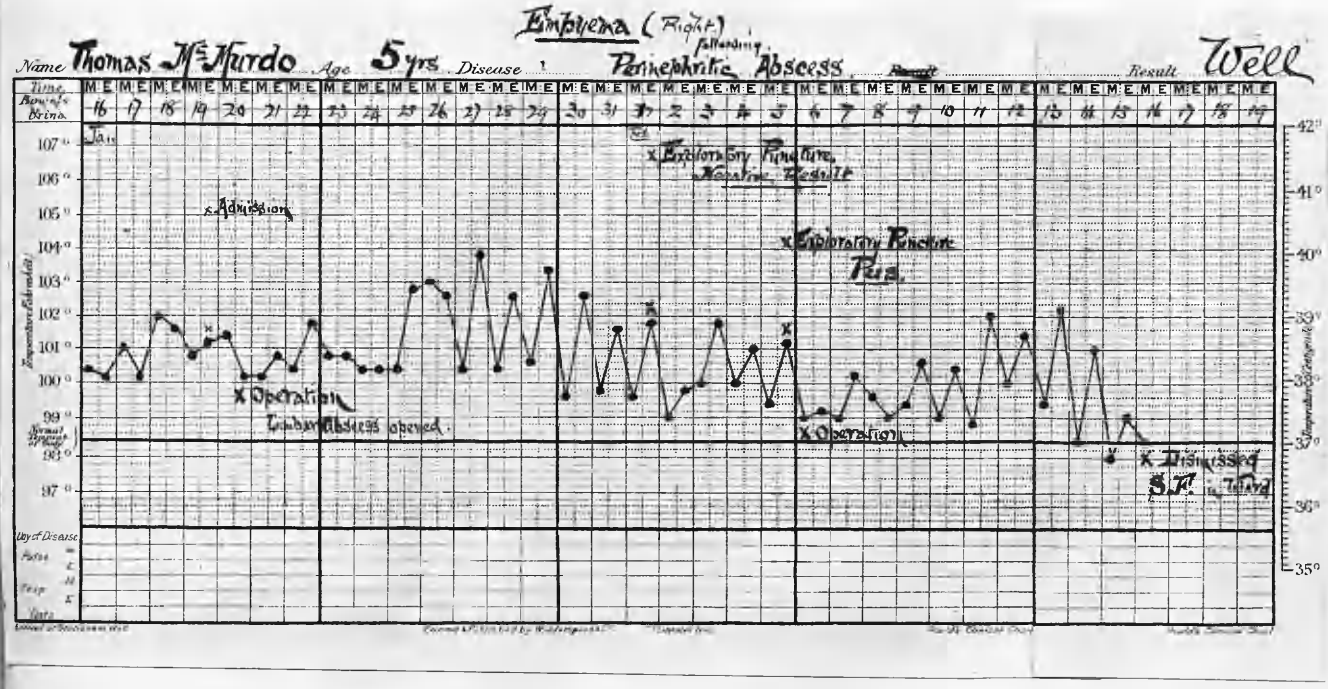
Residence - 32 days.

Operation - Resection.

Result - Well.

A left-sided Empyema of doubtful origin as no physical signs of any intra-pulmonary mischief could be detected on admission.

CASE XVIII.



Thomas McMurdo, aet 5.

Admitted - Jan. 19th. 1902.

Dismissed - Feb. 15th. 1902.

Operation - Drainage without Resection.

Result - Well.

Synopsis of History.

Present Illness:- Illness dates from the development of an abscess on the inner side of the thigh 3½ months ago. There was a large quantity of pus from it but it healed up in a fortnight. He was just recovering from this when severe and paroxysmal abdominal pains set in. The pains always seemed to be worse on the left side of the abdomen but the swelling in the loin which made its appearance a few days ago is on the right side. His bowels have been

regular and until a few days ago his urine had been normal in quantity and colour. Since then it has been thick and muddy. There is no history of a cough or of a pain in the chest.

Previous History: good.

Family History: very good.

Condition on admission:- Boy is thin and emaciated. Temperature is 101.2°F: Pulse 120 per minute and Respirations 26. Over the right loin there is a large tender fluctuant swelling extending from the spine well into the flank. There is no swelling on the left side. The urine contains a fair quantity of pus but on examination of the deposit no tubercle bacilli could be found. The chest is clear to percussion and the breath sounds are good.

Jan. 30th.:- To-day the abscess in the right loin was opened and a large quantity of pus escaped. The cavity was well irrigated and a large tube was inserted. It was considered to be a perinephritic abscess. On examination of the Pus Staphylococcus Pyogenes was found to be present.

Jan. 28th.:- The discharge from the wound has been very profuse and free but still the temperature records are high 103.8°F being recorded on the 27th. On examination of the chest to-day there are evidences of fluid at the right base.

Feb. 1st.:- As the evidences of fluid at the right base were more marked and as the temperature showed no indication of falling an exploring needle was inserted

but no fluid was withdrawn. The discharge from the wound is still very profuse.

Feb. 5th.:- To-day again the right base was explored and on this occasion pus was got. Staphylococci were found in this pus also.

Feb. 6th.:- The child was anaesthetised, an opening made between the 8th. and 9th. ribs and a drainage tube inserted. Resection of rib was not done. The cavity was well irrigated through the tube which had been inserted.

Feb. 11th.:- The discharge from the lower opening is now much less since the Empyema was opened. There is now only a trace of albumen in the urine and no pus corpuscles can be detected in the deposit. The child now takes his food better and is improving in dondition.

Feb. 15th.:- Dismissed from Hospital to-day, owing to the outbreak of Scarlet Fever in the ward. There is still a tube in each opening but the discharge is rapidly diminishing.

April 15th.:- The boy was seen to-day two months after dismissal. I could scarcely recognize him as he looked strong and well, having put on flesh considerably. Both wound are healed and no difference can be made out between the two sides of the chest.

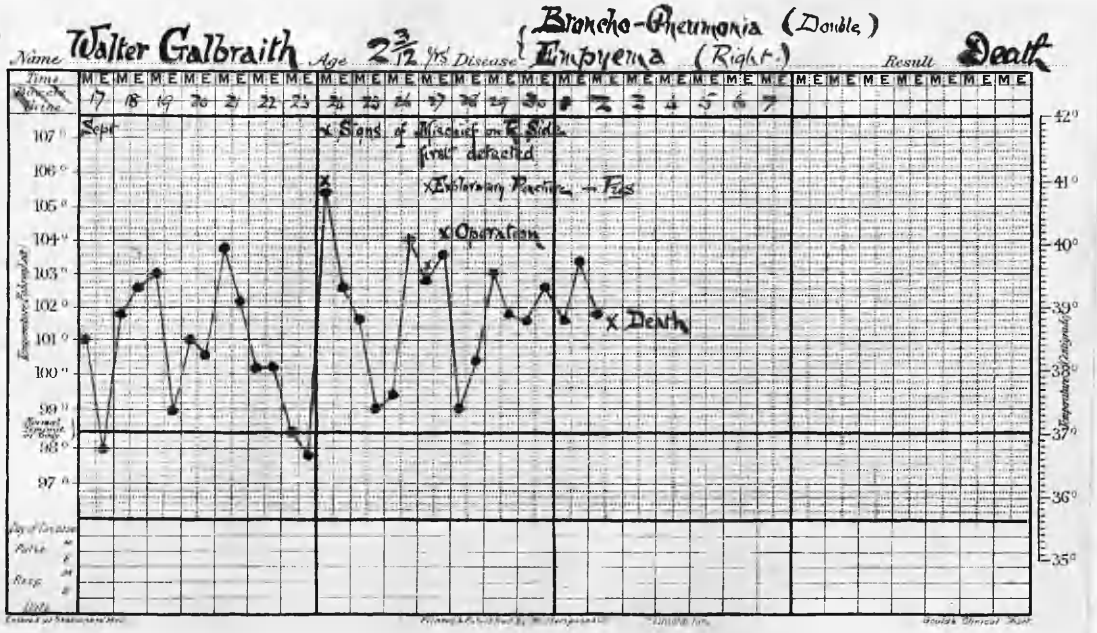
Remarks:-

Remarks:-

This is quite a rare origin for an Empyema. Sometimes an Empyema may burrow its way down behind the Diaphragm and present itself as a lumbar or even as an iliac abscess but it is very seldom that a perinephritic abscess is followed by suppuration in the chest. However in this case there is no doubt that the extension was upwards, as on admission the chest was clear while there was a large abscess below. No doubt the extension was due to direct infection through the Diaphragm as Staphylococcus Pyogenes was found in the discharge from both.

This case did very well with simple incision and drainage but then it was got in an early stage and the infection was Staphylococcic only, the pus being thin and without plastic threads.

CASE XIX.



Walter Galbraith, aet 2,3/12.

Admitted - Sep. 17th. 1902.

Operation - Resection.

Death - Oct. 2nd. 1902.

Synopsis of History:-

Present Illness:- Onset of illness was not sudden. He was dull, heavy and out of sorts for a few days before his mother noted that his breathing was rapid and that he was feverish and restless. A short cough developed and this has persisted as the most prominent symptom. Since the onset - 14 days before admission - he has been very much in the same condition with little or no improvement.

Previous History: He was never a robust child but

never had any other acute illnesses.

Family History:- Father and Mother are strong and well. He is one of six of whom two died in infancy both of "Inflammation of the Lungs".

Condition on admission:- Child looked very ill. Respirations are laboured and number 40 per minute. Pulse 140 per minute and temperature 101°F. Percussion over the right of left front gives a clear note but at the left base the note is dull and Respiratory Murmur is diminished and accompanied by moist rale at the end of inspiration.

Sept. 21st.:- Temperature record has been very high, on the 18th. being 104.4° F and on the 21st. 103.8° F but physical signs at the left base are diminishing and the rale is less.

Sept. 24th.:- This morning the temperature record was 105.4° F and on going over the chest again physical signs of fresh mischief are detected on the right side in the scapular region but the patch seems to be small.

Sept. 26th.:- To-day temperature record is 104° F and some dulness with diminution of Respiratory Murmur is made out at the right base.

Sept. 27th.:- To-day physical signs of fluid at the right base are more distinct and there is evidence of extension of the broncho-pneumonia to the middle lobe. The child's breathing is greatly distressed and the Pulse numbers 180 per minute. An exploring needle was inserted at the right base and some thin purulent fluid was

obtained. It was found to contain pneumococci in abundance.

Resection was performed. the 9th. rib in the line of the angle of the scapula being the one selected. Only about 3 ounces of purulent fluid escaped: it was not thick but only turbid fluid with flocculi of fibrin through it. The lower lobe and diaphragmatic surface were covered with thick yellowish lymph. The cavity was cleared out with strips of gauze and a drainage tube was inserted.

Sept. 29th.:- Temperature this morning was 103° F. Respirations are very distressed and number 48 per minute Pulse 178 per minute. The patch of broncho-pneumonia seems to have extended to the base as there can be heard abundant articulate rales and tubular breathing. The dulness extends as high as mid-scapula.

Oct. 2nd.:- Patient died to-day. There had been very little discharge from the wound.

Post Mortem Examination. On opening the chest the right lung was found to be collapsed, the right side of the chest being simply a large cavity lined with thick purulent plastic exudation crossed by a few thin bands of adhesions which formed pockets in which was retained some purulent material. The opening in the chest wall communicated with the main cavity but the lower lobe was firmly bound to the diaphragm and some thickened and separated pleura seemed to close the opening in a valve like way.

The lung insection presented a typical broncho-pneumonia affecting the greater part of the lower lobe and part of the upper, the two lobes being firmly bound together The upper lobe was in a state of absolute collapse. There was no suspicion of the broncho-pneumonia being of a tubercular nature. The bronchial glands were not enlarged.

The left lung also showed signs of a Broncho-pneumonia but in a stage of resolution. There were no signs of affection of any other serous surfaces.

Remarks:-

The patient was a poor weakly, emaciated child and there is little wonder that the Pneumococcus on gaining entrance to the pleura soon produced a purulent effusion. On the day after the signs of effusion were first detected an exploring needle revealed the presence of pus. This was indeed an acute Empyema.

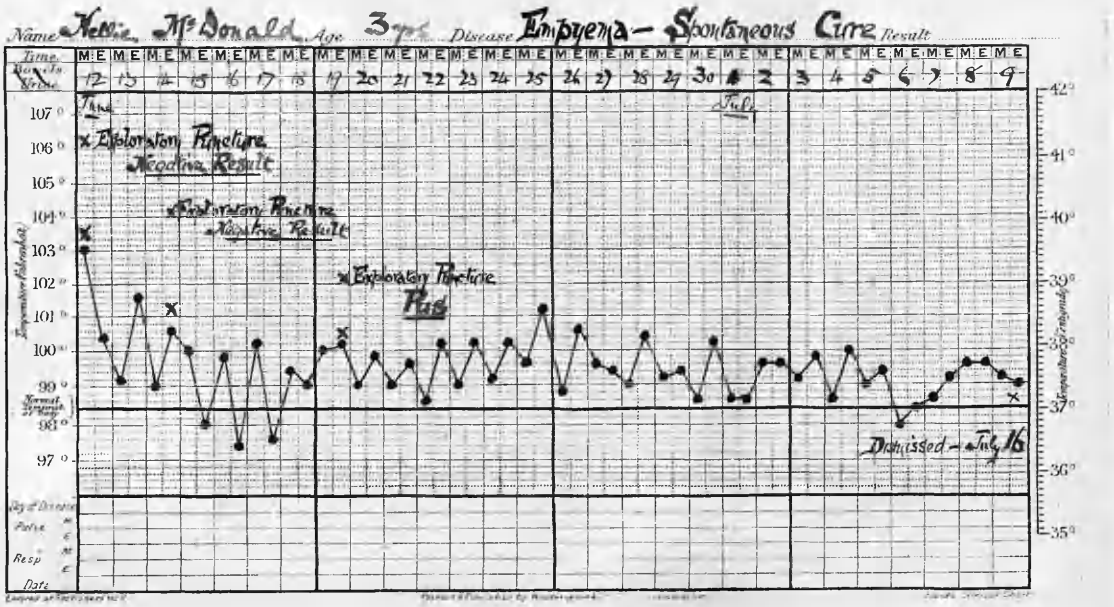
A Double Broncho-pneumonia even in a strong child is a very grave condition but when it occurs in a child whose vital resistance is at a very low ebb, the prognosis is most unfavourable. When during the course of such a Pneumonia and Empyema develops the chances for the child are infinitesimal. Death in this case was not due to the Empyema but to the extensive Double Broncho-pneumonia.

Treatment was by Resection. As the child was so very low it is questionable whether it would not

have been better to have trusted simply to Aspiration or to Drainage without Resection.

This case too clearly demonstrated to one the advisability of always making the opening into the chest higher than the level of the 9th. rib. If it is made as low as the 9th. the diaphragm after resection ~~de-~~ ascends and closes the opening.

CASE XX.



Nellie McDonald, aet. 8.

Admitted - June 12th. 1902.

Dismissed - July 16th. 1902.

Result - Well.

Synopsis of History:-

Present Illness:- Onset was sudden with a Rigor about 8 weeks before admission. On the day following the day of onset she developed a short dry cough and complained of pain in her left side. The Doctor in attendance said she had "Pneumonia". After 3 weeks illness she began to improve but did not recover her usual strength. The pain which had subsided again began to trouble her and her fever returned. Two days before admission her Doctor explored and got pus.

Previous History:- very good.

Family History:- she is one of a family of four all alive and well.

Condition on admission:- Child is rather pale but she has a distinct malar flush. Her Respiration is not much disturbed. the rate being only 28 per minute. Pulse is 130 per minute and Temperature 103 F.

The left side of the chest is distinctly flattened and measures 9¾" to 10" of the right. Movements too are very defective. The right border of the cardiac dulness is at mid-sternum and the left is quite indistinguishable from the pulmonary dulness. Over the whole of the left base and into the axilla Percussion is absolutely dull while over the upper lobe the note is rather defective. On auscultation Respiratory Murmur is distant over the base but what can be heard is slightly tubular in quality. Over the upper lobe breathing is more distinct, tubular in quality and at the end of inspiration there is an occasional crepitant rale.

June 12th.:- An exploring needle was inserted just below the angle of the scapula but with a negative result.

June 14th.:- Physical signs are unchanged. Again an exploring needle was inserted. this time in the axillary line but again with a negative result.

June 19th.:- Physical signs are practically unchanged except perhaps that at the apex the Respiratory Murmur is not so tubular in quality and the crepitant rale is gone. There are no changes to be noted at the

base. It was decided to explore again and on this occasion pus was obtained in the posterior axillary line. Pneumococci were found to be present but not in great abundance.

As the child was not suffering any discomfort, took her food well and slept well and as the Temperature showed an inclination to fall it was decided not to interfere until the consolidation of the lung had cleared up.

July 6th.:- Now the dulness at the base is not so dense and the resistance on Percussion not so great. The Respiratory Murmur is heard more distinctly but is still rather defective. The crepitanat rale and tubularity have quite gone from the apex. The child is putting on flesh and taking her food well. She sleeps comfortably, ~~was decided not to interfere~~ and has no cough or any other respiratory discomfort. It was decided not to interfere.

July 16th.:- Dismissed from Hospital to-day. She was sent to the Convalescent Home for 3 weeks.

Condition on dismissal. Except for some flattening of the whole side and slight diminution of Resonance and Respiratory Murmur at the base there is no difference between the two sides of the chest.

Condition one month after dismissal. Physical signs seem to be much as they were in the last note but that there seems to be more flattening in the intraclavicular region. Child is very well and makes no complaint.

Condition three months after dismissal:- Measurement of the two sides now shows no difference but

there is still defective resonance in the left axillary region. Her mother says the child has never been in better health.

Remarks:-

Undoubtedly this is an example of an Empyema which has undergone a spontaneous cure. On admission physical signs were those of an unresolved Pneumonia of the left lung with an effusion at the base. The effusion must have been small in amount and very thick as an exploring needle was inserted on three occasions before even a few drops of pus were withdrawn. It was undoubtedly pus and contained pneumococci. It was deemed advisable to leave the case to nature till the intra-pulmonary condition cleared up. After the pneumonic consolidation resolved itself well marked physical signs still remained but as the child had no discomfort and was improving in general health and the Temperature remained within normal limits it was decided not to interfere with "nature's" cure. In the process of cure the serous part of the exudation must have been slowly absorbed leaving a thickened pleura. When seen four months after dismissal from Hospital the physical signs suggested that condition and in the mother's words "She had never been in better health."

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