

NOTES ON SOME CASES OF

PLEURAL EFFUSION OCCURRING IN CHILDREN.

by

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NOTES ON SOME CASES OF

PLEURAL EFFUSION OCCURRING IN CHILDREN.

The following are notes of cases which have occurred during the last two years in the Children's Hospital, Derby.

Seventeen cases were admitted. They may be divided into four clinical groups according to their bacteriology:

- I. Pneumonic^{coccal}. 15 out of 17 cases, due to the pneumococcus.

These are subdivided into

- (a) Cases secondary to acute lobar pneumonia = 13/15.
(b) Cases secondary to (?) broncho-pneumonia = 2/15.

- II. Septic 1/17, due to the streptococcus and staphylococcus.

- III. Tuberculous 1/17, due to the tubercle bacillus.

To consider these groups in detail.

Class I., due to the Pneumococcus

This was the largest, containing 15 out of 17 cases, or 88%. The majority of empyemata in children are pneumococcal, Dr Bythell⁽¹⁾ finding 90%,

Koplik 69%⁽²⁾ and Netter 53%⁽²⁾.

Sex:

Of these 15, seven were boys and eight girls. Emyema is generally more common in males, and on looking back over the hospital records, I find that in 29 other cases (the majority of which were doubtless pneumococcic) 18 were boys, and 11 girls.

In 40 cases recorded by Dr Bythell⁽¹⁾ 67.5% were male, and 32.5% female.

Age:

Out of 15 cases, 10 occurred between $1\frac{1}{2}$ and 4 years. Two were 7, one 8, and ~~one~~^{two} 10 years old. Dr Bythell found that 1-5 years and 8-9 were the commonest ages. Both Koplik⁽²⁾ and Goodhart & Still⁽³⁾ find most cases under 5 years. The youngest case was $1\frac{1}{2}$ years old. David Bovaird⁽⁴⁾ has reported many cases in infancy, and Goodhart⁽³⁾ quotes one case at 4 weeks & 4 days.

Date of Admission:

The cases occurred mainly in the spring months, and were admitted after three weeks illness. Thirteen were admitted from January to June, one in November, and one in December.

Dr Bythell⁽¹⁾ states that in Manchester most cases occurred in spring and early summer.

Class I.a.Family History:

7/13 showed histories clear from any hereditary disease. 5/13 had phthisical histories; 1/13, a $1\frac{1}{2}$ years old baby, had a specific family history - it was in poor health, but showed no marked specific lesions.

Previous Health:

10/13 were healthy children who had only had minor complaints of childhood, such as measles and varicella. Of these two gave the history of a previous pneumonia with good recovery, and one of a burn three months before, with subsequent rapid deterioration of health.

2/13 had always been delicate.

1/13 was in a weak condition, having had pneumonia and empyema of the other lung five weeks previously.

Present Illness:

All the thirteen were secondary to acute lobar pneumonia. Most had been acutely ill for one week, had improved for a second, and become worse in the third week. In addition, one of them had vomited for several days previous to the onset of pneumonia, and another had enlarged glands in the neck.

Duration from onset of illness to aspiration of pus:

12/13 were aspirated within a month from the onset of illness. The shortest time was four days. This child was already in hospital when pneumonia began. One was sent into hospital with the diagnosis of pleural effusion on its 7th day of disease. Two already in hospital were aspirated on the 14th and 16th days respectively. Six were sent in during their 3rd week. One was sent in after nine weeks illness; this died.

Koplik⁽²⁾ records a case where effusion was found within 3 days of the onset. Bythell⁽¹⁾ found that the average interval between onset of illness and diagnosis of effusion was four weeks.

Side:

Eight were right sided and five left. There were no cases of double effusion, though one case admitted with empyema of right side developed pneumonia and effusion of left side five weeks later.

Bythell⁽¹⁾ found 59% of his cases were right-sided; but Koplik⁽²⁾, Goodhart & Still⁽³⁾ and Elder & Fowler⁽⁵⁾ state that the left is more commonly affected.

Nature of Effusion:

Eleven were purulent, two were serous.

Class I.b.

due to the pneumococcus (but not secondary to acute lobar pneumonia) contained two cases out of the 17 - a boy, aet $1\frac{1}{2}$ year, and a girl aet 7. The onset was gradual, possibly the empyema was secondary to broncho-pneumonia, but I have not been able to verify that by a post-mortem.

Family History:

One had a phthisical history. The mother of the second was insane.

Previous History:

Both had been delicate. The girl had 8 months previously had lobar pneumonia with serous effusion. This was aspirated, and a few weeks later she showed no signs of effusion, but remained in poor health.

Present Illness:

Both cases had an insidious onset. The boy had been wasting and coughing for about eight weeks. On admission he was in wretched condition with a large empyema necessitatis, the size of a tangerine orange, over the left supra-scapular region. He had large abscesses on left clavicular region (but not communicating with the pleural cavity), left forearm and left knee.

No definite duration of the empyema could be made out with the girl. She had been in poor health since pneumonia with serous effusion 18 months previously, and when first seen, the chest was full of pus.

Side:

One was right and one left sided.

Nature of Effusion:

Both effusions were purulent.

Class II. Septic Case:

Only 1/17 was due to streptococcus and staphylococcus. This occurred in an 8-year old boy. There was no hereditary disease in the family. He had always been subject to colds on the chest, but otherwise he was healthy. There had been several sore throats among the children in the school he attended. He had not complained of any tonsillitis himself, but this was a possible source of infection. He turned ill suddenly, complaining of pains all over, and coughing a little. He was admitted on the 6th day of disease with pus in the left pleural cavity. There was no evidence to show whether there was an accompanying pneumonia, or whether this was a primary infection of the pleura.

Class III., due to the Tubercle bacillus:

One case in 17 occurred. This was in a typically tubercular looking girl of 9 years. Her maternal grandmother had died of phthisis. She had always been delicate and had had scarlet and measles. In June 1904 she became more languid than usual; on July 10th she turned ill suddenly with high temperature, pain in and distension of abdomen. On July 20th fluid was present in the abdomen. On July 22nd the left lung moved less than the right and was slightly dull, with faint breath sounds. Signs of effusion in the left pleural cavity^{became more} marked, and on July 27th, 15 oz. of serum was aspirated from the left side.

Symptoms and Physical signs of Pleural Effusion
in all classes.

To consider the symptoms and signs of pleural effusion in children. These are difficult to make out and notoriously variable.

General Appearance:

Rapid emaciation was a constant and marked feature; in 2/17 cases it was the sole symptom for which the mother sought advice, and in most cases it was given a prominent place.

The sharp contrast between the distension of the chest and abdomen,^{and} the skin and bone condition of the limbs, head and neck, is very characteristic.

Face:

As a rule the face was pale and sallow, a few were flushed, 7/16 showed cyanosis of lips.

Goodhart and Still⁽³⁾ mention puffiness of the face as frequent - only 1 case out of the 17 showed this, and she had nephritis in addition.

The expression was anxious. The alae nasi were working. The skin was (except in the tuberculous case) dry, sallow and shrivelled. One case which had been ill for nine weeks, showed brown pigmentation of the whole body. In no case was there the heavy sweating referred to in many textbooks. One case (3 weeks duration) showed clubbing of finger nails.

Attitude:

13/16 lay on their backs. Only two persistently lay on the affected side. One child with pus in both left pleural cavity and pericardium lay on his back with his head bent over to the left shoulder, his left leg drawn up, and one hand on his epigastrium. One of the thirteen lay with her shoulders drawn up high, and the arm of the affected side over her head. Several objected strongly if any

attempt was made to move them from their chosen attitude.

Temperature:

Type: While effusion was present the temperature was of an irregular hectic character, varying from normal or subnormal in the morning to 100 or 101 at night. When first seen in the out-patient department at 10 a.m., many therefore showed a low temperature. This combination of low temperature with rapid respiration was a suggestive diagnostic sign, e.g. one case on admission had a temperature of 96.2 with a respiration of 60 per min.

Respiratory System:

The alae nasi were always working. Respiration was as a rule rapid, 68 in a $1\frac{1}{2}$ year old baby, 40-60 in older children. Another $1\frac{1}{2}$ year old child showed only 28 respirations per min., and one tuberculous case aet 9 years, with fluid in peritoneal as well as pleural cavity, showed no dyspnoea, breathing comfortably at 32 per min.

Goodhart & Still attribute the absence of distress in breathing in these cases to the compensatory emaciation. (3)

Regularity:

In 2/16 cases the breathing was irregular, of

the pneumonic type, i.e. short expiration and inspiration followed by a pause, and moan during expiration. In many cases, however, the breathing, though rapid, was regular.

Cough:

10/15 had a short painful cough. This was brought on by movement, but if lying quietly in bed was rare. Cough, therefore, was not a marked feature.

Pain:

4/16 complained of pain in the affected side. One complained of pains all over. Most screamed if moved, but did not definitely refer pain to the side.

Thorax Inspection:

The difference between the two sides (in unilateral cases) was clear.

Excursion:

Diminished excursion was present in every case. In some cases the affected side hardly moved, and as the unaffected did extra work, the difference was obvious.

Fulness of the affected side was constant. When the child lay flat on its back, the bulging was clearly marked in the lower axillary region. If there was a large effusion, the apex bulged too;

this was best seen by looking along the surface of the chest from above the child's head.

Interspaces:

This also was a reliable sign. Owing to the general emaciation there was a clear difference between the sides. On the unaffected, the interspaces would be fallen in, while on the affected they were full.

Enlarged Veins:

This sign was not reliable. 5/16 showed clearly enlarged veins in the axilla of the affected side. 7/16 showed no dilatation. One case with left sided empyema and purulent pericarditis showed dilated veins over the unaffected, i.e. right side, owing to displacement of the pericardium. A second with effusion in left ploura showed dilated veins over the right side, where there had been pneumonia and empyema five weeks before.

A third complicated with tuberculous peritonitis, had before the effusion commenced, dilated veins on both sides of the chest and abdomen from the abdominal distension. There was no unilateral increase when the effusion came on.

A case of lobar pneumonia with no effusion showed marked dilatation of veins on the affected side.

Palpation:

Showed diminished excursion. Vocal fremitus was useless.

Percussion: Affected: Side

In every case the base posteriorly was dead dull with a sense of resistance. In several cases the degree of dullness varied at times, even with the patient in the same position. Goodhart and Still⁽³⁾ state that a variability of signs is a feature of chest disease in children. The area of dullness varied of course with the amount of effusion - the tuberculous case was the only one which showed well the S-shaped curve with its highest point in the axilla.

Percussion at the apex varied according to the amount of fluid. In 2/16 with large effusion the apex was dead dull; 2/16 gave Skodiac resonance. The rest were dull, but less so than at the base. Several cases showed dullness of the unaffected base close to the vertebrae, the area described by Grocco as the paravertebral triangle⁽¹⁹⁾

Koplik⁽²⁾ points out the displacement of the pleural fold under the sternum to right or left as a useful physical sign.

Unaffected:

The unaffected lung gave resonant percussion, and in 8/16 of the cases hyperresonance at the apex anteriorly.

Auscultation and Vocal Resonance:

In every case at the base breath sounds were diminished, becoming fainter or even inaudible towards the lowest part of the pleural cavity. In some cases the breathing was bronchial, but in others the character could not be determined. The vocal resonance over the effusion was diminished or absent. None of these cases showed the harsh tubular breathing with increased vocal resonance which the text-books state as common in children.

If the effusion was not large, there was harsh tubular breathing and bronchophony above its upper limit, i.e. in one case it was present above the level of the 4th rib. If the effusion was large, even at the apex, the breathing was faint and tubular, and the vocal resonance diminished.

Several cases had friction over the affected base. There was usually harsh vesicular breathing in the unaffected lung.

The vocal resonance could not always be obtained, some children being too young, stupid or feeble

to give reliable results. One ten-year-old boy had aegophony very clearly near the angle of the scapula, and one three-year-old had aegophony at level of third rib anteriorly. Others who spoke clearly gave none. In several children with pneumonia or phthisis, but no effusion, there has been aegophony near the angle of the scapula. Vocal resonance therefore was not reliable. The vocal resonance of the unaffected lung was normal.

Effect of Pressure on Surrounding Organs.

Heart:

Displacement was the rule, 13/16 showing it. In 8 left sided cases, 7 showed marked displacement to the right - one showing pulsation as far out as the right nipple line. In some cases the apex beat could not be felt, but there was abnormal pulsation in the epigastrium. One very feeble infant showed no marked displacement, but as empyema was not then suspected, displacement might have been found by more careful examination. One case had purulent pericarditis. This case p.m. showed the whole pericardium displaced to the right, its left border was at the left lateral sternal line, and it occupied most of the right sub-clavicular and upper mammary regions.

Of 8 right-sided cases, six were displaced to the left, the farthest being one inch beyond the nipple line. A small effusion may not always cause displacement.

Liver:

In one right-sided case the lower border was $\frac{1}{2}$ inch below the costal margin.

Traube's Space:

In three cases this was markedly diminished.

Oedema - No cases.

Pupil:

In one case the pupil on the affected side was larger than on the unaffected.

Condition of the other Systems.

Alimentary:

This showed the usual results of prolonged fever. Lips dry, cracked and often cyanosed. Tongue dry and furred. Appetite poor, but promptly improving when pus was removed. Occasional displacement of liver. No displacement of spleen was made out. Bowels constipated. Diarrhoea occurred in two fatal cases, six weeks after aspiration and a few days before death.

Circulatory:

Cyanosis frequent. Heart displaced (See above)
One case of purulent pericarditis complicating a
left-sided empyema. Pulse was usually weak and
irregular

Haemopoietic:

One case suffered from enlarged glands in the
neck at the onset of the illness and two showed en-
larged glands in the axilla on the affected side.
The septic case showed a rapid anaemia, the haemo-
globin falling to 63% by the fourth week of disease.
A leucocytosis is common.

Integumentary:

The skin was, as a rule, dry and rough, and in
two cases markedly hairy. No cases of heavy sweat-
ing occurred. Two cases had small crops of suda-
mina on the chest, and one labial herpes during the
precedent lobar pneumonia.

The limbs and face became emaciated, and in
marked contrast to the trunk, which remained distend-
ed. One case showed puffiness round the eyes, but
she had nephritis.

Urinary:

Urine was of the ordinary febrile type, high-coloured, with high specific gravity and deposit of urates. No albumoses found.

One case had a temporary nephritis, which accompanied a localized patch of lung gangrene.

Nervous:

One case showed dilatation of pupil on the affected side, otherwise there was nothing special in this system.

Locomotory:

One left sided empyema had swelling and slight effusion into the left sterno-clavicular articulation. Dr J. B. Herrick⁽⁶⁾ has pointed out the fairly frequent occurrence of pneumococcic arthritis in this joint.

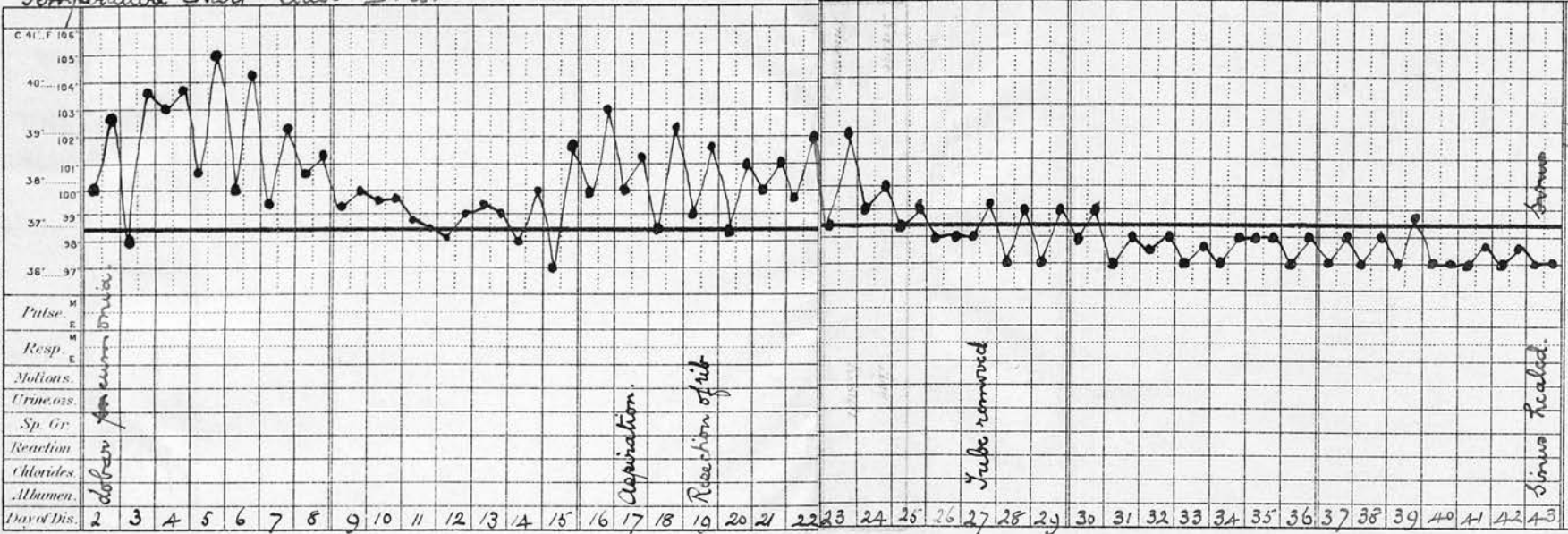
Multiple Abscesses:

One left pneumonic case had subcutaneous abscesses over left clavicular region, left forearm and knee.

Other complications mentioned by various writers, Bovaird⁽⁴⁾ et al.⁽⁷⁾ are: Pericarditis, meningitis, involvement of the second pleura, peritonitis, which is more common in girls, possibly in connection with salpingitis, endocarditis, otitis media and keratitis.

Temperature chart Class I. a.

A. & D. PADON, 15 SAINT ANDREW SQUARE, EDINBURGH.



Name *Hilda M.*
 Disease *Dysphyma (Pneumococcus) Rosell*
 Age *3 years.*
 Course *curd.*

doban
~~temperature~~
 initial

Aspiration.
Reception of rib

Tube removed

Sinus healed.

Course - Treatment.Class I a. Following acute lobar pneumonia:

The pneumonia required the usual treatment, i.e. febrile mixture, tepid sponging for pyrexia, and stimulants towards the end of the week. The crisis occurred as usual, and for a few days patient was much better. Then the temperature rose again, became irregularly hectic, dyspnoea increased, and the signs of effusion became evident. The chest was first aspirated - this temporarily relieved the symptoms - and in doubtful cases it also aided the diagnosis. A Potain's aspirator was used. The trocar, cannula, and stop-cock were boiled, the rest of the apparatus was run through with 1/20 carbolic and then sterilized water.

The skin over the affected side was cleaned up with ether soap, turpentine and methylated spirit, and sterilized lint laid over it until time of puncture. The arm on the affected side was drawn forward and its hand placed on the opposite shoulder. The skin over the actual site of puncture was pulled up or down to ensure a valvular puncture, and a small wool pad soaked in 1/20 carbolic was pressed over the point for a few minutes to aid anaesthesia.

The needle was usually inserted behind and below the angle of the scapula, in the 8th interspace to the outer edge of the trapezius, but its site varied with the position of maximum dulness. In small children the puncture was sometimes made in the 9th, owing to its larger size. The child had to be firmly held during the introduction of the trocar. When the trocar was withdrawn the tap of the aspirating bottle was slowly opened, and fluid withdrawn gradually. Dr Murray⁽⁸⁾ recommends that 10 minutes should be allowed for removing a pint. No anaesthetic other than 1/20 carbolic was used. Insertion and withdrawal of the needle was painful, and also any movement of it while inside the chest; otherwise no complaint was made of the process. If pus was not found at first, the cannula was withdrawn, and another point aspirated. The cannula was kept in as long as pus drained away, the amount thus obtained being rarely over a pint. Dr Murray⁽⁸⁾ says not more than two pints should be removed at one sitting. The cannula was slowly removed with the tap open, as often more pus was found nearer the surface. As soon as withdrawn, the puncture hole was closed with gauze and collodion, no bandaging was used, so as to allow free expansion for the

healthy lung. The state of the circulation was watched throughout the operation. 3i brandy was given before it, and in bad cases a hypodermic of ether and strychnine in addition. The same stimulants were kept in readiness in case they were required during aspiration.

No severe coughing occurred, and no fatal results. In one case aspiration was begun under A.C.E. mist, but the patient became cyanosed; the anaesthetic was stopped and he improved. Several cases of sudden death during aspiration of chest are recorded (22)

After aspiration if the child (as often happened) was in a feeble condition, stimulants were freely given, and as much nourishing food as the child could manage. Brandy, Mist. Sp^t Vini Gallici, Tr. Strophanth., Liq. Strychn, Sp^t ^{Ammon. Aromat.} ~~Am. Ar.~~ and Tr. Card. Co. were used; Beef tea, eggs beaten into milk, &c. The pus was examined for bacteria directly after aspiration.

Twenty-four hours after aspiration when dyspnoea had lessened and pulse improved, resection of rib was performed.

In two cases, the child being moribund, further operation was not justifiable.

Resection of rib:

The chest wall was well cleaned up^{and} the small gauze and collodion dressing removed. Stockings, blankets, and hot water bottles were arranged to minimize shock from exposure. The child was anaesthetised with A.C.E. mist. and at first lay upon its back. When "under" it was moved so that the affected side came to the edge of the table; it was turned slightly over on to its unaffected side, and the arm drawn over to the opposite shoulder. An incision was made between the scapular and posterior axillary lines down to the rib, the periosteum stripped, and about half an inch of rib removed with rib forceps. After this little or no anaesthetic was used, the child usually lying still for the remainder of the operation. The pleura was incised, a large pad of wool held over the wound, and the pus allowed to escape into this. An india-rubber tube, made from two wide bore pieces of perforated tubing was inserted. The two ends of the incision were stitched so as to close the wound all round the tube. This gives only a small raw surface to heal when the tube is removed. The ends of the sutures were tied over the flange. This keeps the tube in place. The portion of drainage tube inside the chest can easily

be removed to be cleaned or shortened, without removing the flange - if not stitched the child will probably cough or wriggle the tube out.

A thick dressing of gauze and wool was bandaged over the sinus, and the child put to bed lying on its affected side, so as to facilitate drainage.

In nearly all the cases of empyema the pus was so thick and clotted that it was doubtful if anything short of resection would have drained the cavity.

They were first aspirated, but more pus came away at resection, showing that aspiration had failed to entirely empty the cavity.

Resection of rib seems generally acknowledged as the most satisfactory treatment of empyema. On looking over the hospital books, I find no record of any empyema cured by aspiration alone.

Further Treatment:

In three hours the wound usually required re-dressing, as the wool was soaked through, and again a few hours later. A probe was run through the tube if necessary, as it was often blocked with clots.

The wound was then dressed daily. After the third day the tube was removed, cleaned and shortened. The cavity was syringed out with weak boracic lotion, a glass syringe with gentle stream was used.

Lotion was syringed into the cavity during inspiration, expiration assisted by coughing or crying, expelled large clots.

Opinions are divided on the subject of irrigation, Mr Tubby⁽²³⁾, for instance, discouraging it.

I have found it very useful for removing the large clots so frequent in post-pneumonic cases. Goodhart and Still⁽³⁾ recommend removing these with forceps. I have had no bad results, and in some cases with persistent discharge, syringing out the cavity with a weak iodine lotion (3 i-ii Tr.Iodi to pint of water) lessened the discharge and quickened recovery. None of these cases were foul.

By the 7th-10th day the discharge would be small in amount, thin, no clots. The tube was then removed, the stitches holding it in place till this date, and irrigation stopped. A small dressing was strapped on, no bandages being used. This early removal of the tube was sometimes followed by a recollection of pus. This was indicated by a rise of temperature, and often a new patch of dulness, and heart displacement. The tube would then be reinserted for a few days, till the pus drained away and the temperature fell. The child was encouraged to sit up and blow water from one bottle to another, soap bubbles, or

any other toys of the balloon-blowing type.

If the tube is left in long it causes a sinus which is slow in healing.

As to the physical signs at this period - the lung frequently showed flattening at the apex anteriorly, with slight dulness, bronchial breathing and increased vocal resonance. This may be due to collapsed lung. Posteriorly, dulness remained, but this gradually lessened and breathing became clearer. (During examination the sinus may conveniently be plugged with wool.)

Two or three weeks after operation the child would be up and dressed, and encouraged to run about and play games. Some, however, were so thin and weak on admission, that they required a longer stay in bed.

In four to six weeks after operation the sinus would be firmly healed. The lung would have re-expanded and the flattening at apex would have disappeared. Slight dulness and faint breathing remained permanently at the base, due to the thickening of the pleura. Beyond puckering round the scar, there was no deformity.

Patients were then sent away for a change of air.

Dr Murray⁽⁸⁾ recommends high altitudes to ensure deep respiration. Goodhart and Still⁽³⁾ find the air at Margate especially beneficial. Most of these cases went to the Lincolnshire coast and did well. Syr. Ferri Phosph. Co. or some tonic was given during convalescence.

Of the two pneumonic serous cases, one had resection of rib, the serous discharge became small and purulent. He made a slow, but finally good recovery. The second had the preliminary aspiration, but was then too weak for operation and died a few days later.

I have examined many post pneumonic cases up to four years after time of operation. They have remained in good health with good expansion of lung, one only had flattening. There have been no cases of pulmonary tuberculosis secondary to the empyema.

Complications:

In 12 cases there were 5 deaths, collapse of lung was present in each. Two cases, i.e. No. 5 & 8 and 6, five weeks after aspiration clinically suggested pulmonary tuberculosis. Gradual emaciation with a hectic temperature and diarrhoea set in, dullness remained at the bases, with amphoric and bronchial breathing, loud crepitations, and increased vocal

resonance. The autopsy of one showed no signs of tubercle, only collapsed lung, and a cavity between that and the diaphragm. The second had a similar condition, the sinus leading into a large firm-walled cavity. Case 6 had purulent pericarditis, and died at the end of the third week of illness.

Case 12 developed pyopneumothorax 36 hours after aspiration, and died in the fourth week. During life there was much bulging in the axilla and round the outer border of the scapula. On percussion the lung had become resonant from apex to costal margin, and from sternum to anterior axillary line; behind this line it was dull.

Auscultation showed amphoric breathing with a musical low pitched tone over the apex, increased vocal resonance. Posteriorly it was faintly amphoric. Case 4 caught tonsillitis, probably from another child in the ward, three weeks after admission. Four days later he began to vomit up his food. On the 7th day he looked rather white and died suddenly in the evening. ~~An autopsy was not obtained.~~ This was the only sudden unexpected death among the cases. Nothing abnormal had been found in life to account for it. No post mortem was allowed.

Class I.b. were slower in their course.

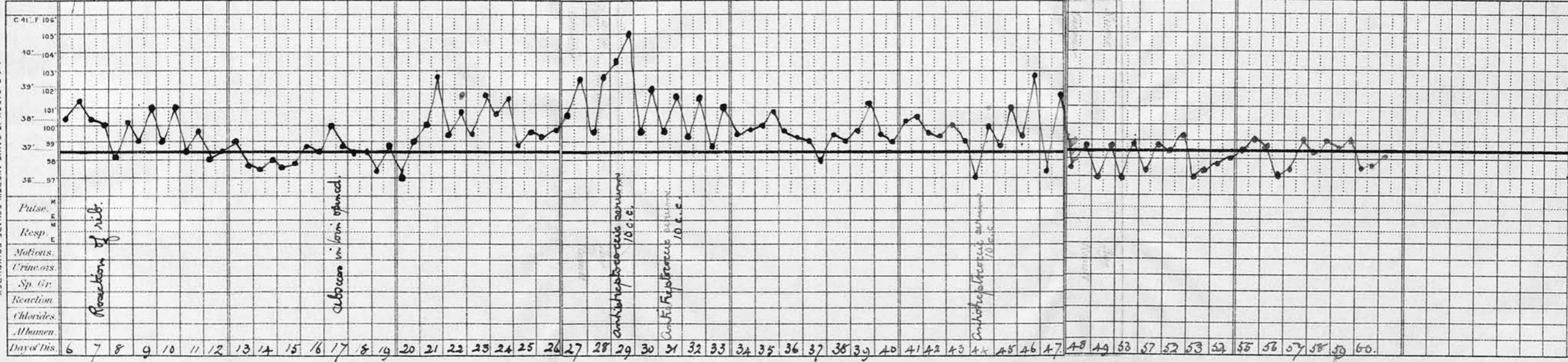
Case 14 appeared to be moribund on admission, was never anaesthetised, but first the empyema necessitatis and then the other abscesses were opened. Pus continued to discharge profusely from the sinus, so in the 5th week after admission a counter incision was made in the suprascapular region above and internal to the first. A probe could be passed between the 4th and 5th ribs into the pleural cavity.

After this the discharge lessened, general condition improved and he was discharged at the end of nine weeks in good health.

Case 15 had been operated on outside hospital, a portion of rib had been resected in the anterior axillary line, and a good deal of pus was draining through this sinus. The discharge did not lessen, and at the end of a month, it became very offensive, probably due to a localised gangrene of the lung. The sinus was washed out with lysoform, at first 1% and then 2%. The child became markedly puffy round the eyes, and the urine, which on admission was normal, contained albumin and epithelial casts. At the end of a fortnight the foetid smell disappeared, the albumin gradually ceased, but the discharge was still large. Two months therefore after admission

Temperature Chart, Class II.

A. & D. PADON, 13 SAINT ANDREW SQUARE, EDINBURGH.



Reaction of rib.

Subcostal pain noticed.

Antihisteplococcus serum 10 c.c.

Anti Feptococcus 10 c.c.

Antihisteplococcus serum 10 c.c.

Name Boyman G.
 Disease Histeplococcus rhabdyllococcus
 Age 6 years.
 Result Cured.

a portion of the 8th rib was removed behind the angle of the scapula, a tube was inserted, and the anterior sinus left to heal up. For some days after operation the child changed mentally, was apathetic and quiet. The empyema drained well through the posterior sinus. At present, three months after admission, she is not doing well, there is much flattening on the affected side, moderate discharge of pus continues, and she is losing weight. She may require an Estlander's operation.

II. Septic Case. No.16

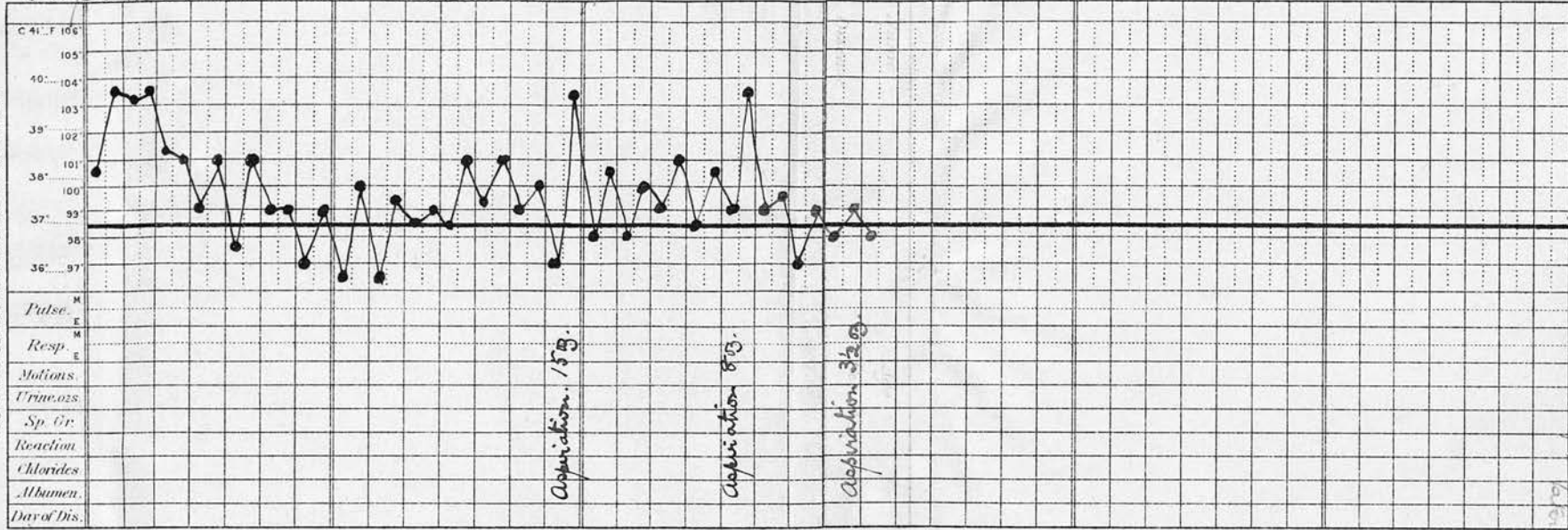
Two days after resection an erythematous rash came out over the body. The pus was swarming with streptococci and staphylococci, and the skin all round the sinus became inflamed and pustular. The sinus was dressed twice daily and syringed out with weak boracic lotion. As the smell was slightly offensive, weak iodine lotion was used for irrigation; this lessened the discharge and removed the smell. There had been some subcutaneous emphysema from the aspiration, and on the 12th day the temperature ran up, and a sub-cutaneous abscess formed in the left loin. This was opened and the pus showed numerous streptococci and staphylococci. At the

end of the 3rd week the boy was doing badly, temperature remained up, he was feeble, ~~and~~ irritable and anaemic, pus continued to discharge from both empyema and abscess. An erysipelatous inflammation with blisters, spread all over the affected side of the back, in spite of frequent dressing. On the 24th day, 10 c.c. of antistreptococcic serum (Lister Institute) was injected into the right flank, as the skin over the left side was so inflamed. The temperature rose to 105 at night; on the 26th day another 10 c.c. was injected into the left sub-clavicular region. There was marked improvement after this, discharge lessening and temperature falling. On the 39th day, another 10 c.c. was injected, as there was more discharge, and temperature ^{was} rising again. The immediate effect of the antitoxin was to further raise the temperature, and a few days later an erythematous rash came out all over the body. The temperature then fell and remained normal - the discharge practically ceased, and he began to gain in weight.

Seven weeks after admission he was discharged in good health. He attended the out-patient department then, as there was a small raw point in the sinus which took some weeks to firmly heal.

Temperature chart. Class III. Tuberculous effusion.

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Aspiration 15th.

Aspiration 28th.

Aspiration 32nd.

Name: *Swelby B.*
 Disease: *Severe effusion in Pleural cavity (Tuberculous)*
 Age: *2 years.*
 Result: *Cured.*
 Date: *1908*

III. Tuberculous Case, No.17

This case was aspirated, and on the first occasion (July 27th 1904) 15 oz. of serum was drawn off. She was in a serious condition, having tuberculous peritonitis with effusion. As it was fine weather, she was kept out of doors all day long. The heart continued to be displaced, and on August 1st, 8 oz. more of serum was drawn off. Her parents then wished her home, and on August 4th, $3\frac{1}{2}$ oz. was removed and she left hospital. She was kept out of doors at home and gradually improved. She walked up to the hospital in October, she was then thin, pale and languid, but her mother considered her to have completely recovered and to be in her usual state of health. The left side of the chest had fallen in, there was marked pulsation of the heart, probably from retraction of lung. The great omentum was puckered into a tumour crossing the abdomen. In November she became worse - her mother states that she developed consumption, there was no re-accumulation of fluid, and in January 1905 she died.

Empyema is said to be rare with pulmonary tuberculosis.

As to treatment, Dr Barr⁽⁹⁾ has had good results

from the injection into the pleural cavity of adrenalin chloride, m.40-60, or sterilized air, and De Waldo⁽¹⁰⁾ has found a dressing soaked in a saturated solution of common salt useful.

Diagnosis - of Pleural Effusions.

This is difficult, and to quote Dr Bovaird,⁽⁴⁾ "the younger the child, the more difficult is the diagnosis." The variability in auscultation complicates matters; in all these cases over the effusion breath sounds were faint and vocal resonance (when obtained) diminished; but the text-books state that bronchial breathing with increased vocal resonance is common. Holt⁽¹¹⁾ states that the difficulty in differentiating the consolidation of acute pneumonia and tubercle from empyema generally arises from placing too much reliance on auscultatory sounds. As far as my experience goes, I have frequently been unable to get reliable results in auscultation. With a well-behaved and intelligent 10-year old child, one may find the majority of the foregoing signs, but in the case of a restless feeble baby, who resents being touched, auscultation and comparison of the two sides is difficult. I have so far found it better to rely on history, inspection and percussion.

History:

This is of great assistance in the cases following lobar pneumonia. A child previously healthy, who has had lobar pneumonia for a week, improved for a few days, and then become worse with rapid emaciation and dyspnoea, is a suspicious case. If occurring in a boy under five, it is even more suspicious.

General appearance: Note the emaciation of limbs, head and neck, as contrasted with the distension of thorax and abdomen, the dry rough skin, the sallow face with cyanosed lips and cheeks, the rapid dyspnoea with often (especially if first seen in the morning) a normal or subnormal temperature.

Inspection with palpation will show diminished movement of one side of the chest, if the effusion is large there will be bulging of the whole side and fulness of the interspaces.

Percussion of the base will be dull, with a sense of resistance, apex dull or showing Skodaic resonance.

Note the position of the heart - a left sided effusion nearly always, and a right frequently cause displacement. Dr Hubert Armstrong⁽¹²⁾ gives extreme dulness with distinct resistance on percussion and

altered position of the heart beat as diagnostic points. Koplik⁽²⁾ mentions immobility, bulging, displacement of heart, and dulness with bronchophony.

The Rontgen Rays may aid diagnosis.⁽¹³⁾

The tuberculous cases will give varying histories, and the patient may show other evidences of tuberculous disease.

If in doubt, use the aspirating syringe - as the danger of an undiagnosed effusion causing collapse of the lung overbalances any risk attending an aseptic puncture into the pleural cavity. Then examine the effusion, as treatment and prognosis depends on the bacteriology.

The diagnosis between pus and serum cannot be definitely ascertained without the exploring needle. Rotch⁽⁴⁾ states that a pronounced leucocytosis occurs in empyema, but in sero-fibrinous pleurisy only a moderate increase in the white cells takes place.

Differential Diagnosis:

Here I do not enumerate the conditions which may simulate effusion, but only several recent cases in which fluid has been wrongly suspected.

1. Acute croupous pneumonia:

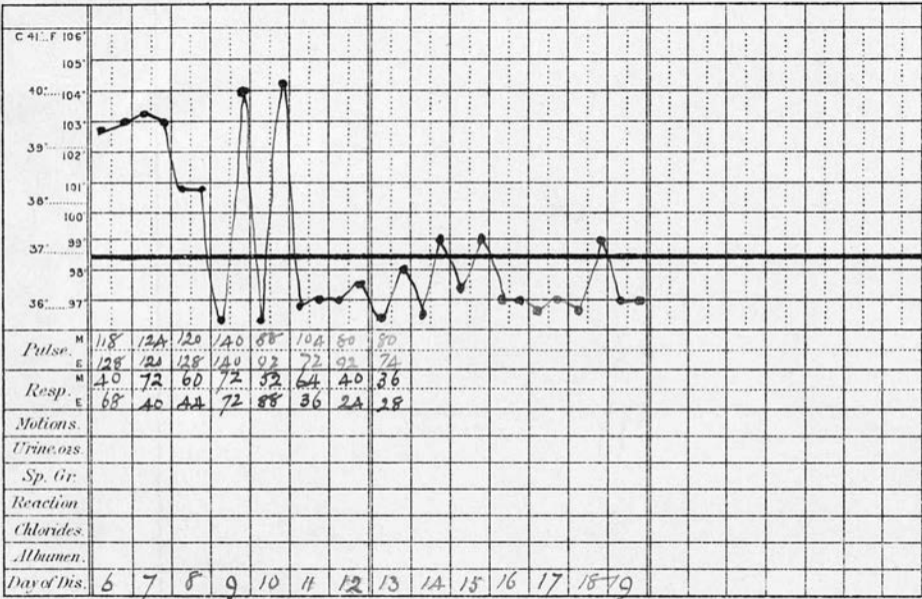
Note the following points of difference.

- (a) Dyspnoea in pneumonia is associated with pyrexia; in effusion there is often apyrexia.
- (b) Pneumonia usually resolves by the 10th day; but effusion has a history of 2 weeks or longer.

Name Charles B.

Age 4 3/4 yrs.

Disease diphtheria pneumonia. Result Cured.



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- (c) Dulness in effusion does not correspond to a lobe.
- (d) There is no displacement of heart, though there may be dilatation, in pneumonia.
- (e) Traube's space remains in pneumonia; in a left-sided effusion it is diminished.

Illustrative Case:

A delicate boy of $4\frac{1}{2}$ was admitted on the 6th day of disease with temperature of 102.8 and respirations 40 per min. The left lung was dull, dulness being most marked at the base posteriorly, there was one prominently dilated vein in the left axilla. Breathing over left lung was faint, broncho-vesicular, not high pitched, fine crepitations all over and vocal resonance slightly increased. No apex beat of the heart was visible or palpable, but on percussion the heart was of normal size and not displaced. The temperature remained high till the 9th day, when it began to swing from 104 in the evening to 97.2 in the morning, respiration varying in rate from 52 to 88 per min. The heart slightly dilated on the left side, but no displacement occurred. The lungs showed the same physical signs. He was aspirated in three different places, but no fluid could be found. On the 11th day the temperature

fell to subnormal, and stayed down after that. The child did well, 14 days later the lung was clear on percussion and he was discharged.

2. Pulmonary Tuberculosis:

In a 14 year old girl with phthisis, the temperature rose suddenly and became hectic in character. The left base grew dull, with faint breathing, increase of vocal resonance, and aegophony near angle of scapula. There were dilated veins on the left side. No displacement of heart took place, however. She was aspirated, but no fluid was found and no further signs of effusion occurred.

In doubtful cases, Goodhart⁽³⁾ states that crepitations suggest phthisis, and an absence of crepitations, particularly at the apex, are in favour of effusion. Case 17, however, showed crepitations at the apex, although effusion was present.

3. Collapse of lung due to abdominal distension:

A feeble 8-year old boy had been ill for several months with peritonitis consequent on an old-standing appendicular abscess. On August 5th his temperature rose, and he became breathless. On inspection the right side of the chest appeared fuller than the left. The right lung was dead dull

on percussion up to the 7th rib posteriorly, breathing was very faint over this area and vocal resonance diminished. There was aegophony at the level of the 6th rib. The left lung was also dull at its base. The apex beat was in the 4th interspace, just inside the nipple line, but on August 7th it had shifted to just outside it. On August 8th the apex beat was in the third interspace and fluid in the pericardium and both pleural cavities was suspected. He was therefore aspirated on the right side with a negative result. For the last 8 months he has remained in much the same condition, with abdominal distension and no further signs of effusion.

4. Infarcts of lung secondary to mitral incompetence

A three-year old girl with mitral incompetence, rapidly developed dulness of right base with faint breath sounds. She became cyanosed. There was no displacement of the heart. Passive exudation into the pleural cavity was diagnosed, she was aspirated, but nothing found. At the autopsy, the lung was full of solid infarcts.

5. Pericardial effusion:

A four year old boy was admitted in a moribund condition, and died shortly after admission. On

examination of the body there were marked dilated veins over the right apex, the apex anteriorly was dead dull, but percussion in the axilla was resonant. The left lung was dead dull all over with bulging interspaces. The p.m. examination showed empyema of left pleura, and purulent pericarditis. The dilated pericardium occupied the normal position of the upper lobe of the right lung.

Prognosis:

The prognosis of empyema in children is good, if it occurs in a previously healthy child, is diagnosed early and is free from complications. The prognosis depends largely on collapse of lung, its extent, and possibility of re-expansion.

The following are influential factors:

1. Duration of effusion before aspiration.

The longer the effusion has lasted, the greater the compression of the lung.

2. Age of child. The younger the child, the more quickly does the lung collapse. Bovaird⁽⁴⁾ states that 69 out of 82 post mortems were under two years.

3. Side affected. Left sided effusions seem more fatal than right. The resulting displacement of the heart, and the possibility of purulent pericarditis, may account for this.

4. Complications. Purulent pericarditis is the most dangerous; it is usually fatal, though Dr Coutts and Dr Rowlands have reported a case where the child lived four months after operation. (15)

Meningitis, peritonitis or nephritis may prove fatal.

5. Bacteriology. The pneumococcus alone gives the best prognosis. Cases due to the streptococcus and staphylococcus are more severe, the staphylococcus being insidious, less acute, and the streptococcus rapid, acute, with severe toxic symptoms.

(Dr Murray Leslie⁽¹⁶⁾)

The tuberculous cases are as a rule unfavourable, though temporary improvement may take place.

PATHOLOGY.Characters of Effusion.Nature:

Class I. a & b. : Thirteen out of the fifteen cases consisted of pus, and two of turbid serum; there were no haemorrhagic cases. This result agrees with the well-known statement that the majority of effusions in children are purulent. As to the question whether a serous effusion may become purulent, Koplik,⁽²⁾ Bovaird,⁽⁴⁾ Goodhart & Still⁽³⁾ all think that it may occur.

Case 5 and 8 had first pneumonia in the right lung and at the end of three weeks there was an accompanying empyema. Later she developed pneumonia in the left lung; four days later a serous effusion was present. On the fourth day after aspiration she died - the effusion being still serous. If she had lived it would have been interesting to see if the effusion had turned into pus.

Case 3 aspirated on the 9th day gave serum, after resection of rib the discharge remained serous till the 22nd day; it then became scanty and thick, and by the 44th day it was purulent. Of course in this case there was the possibility of infection from without.

Case 15 had pneumonia with serous effusion in the right lung. This was aspirated and she recovered. Eight months later the right pleural cavity was found full of pus.

Quantity:

Aspiration as a rule drew off only a few ounces, but did not remove the whole effusion, as more fluid always came away when a rib was resected. In one case which died before aspiration, the pleural cavity contained $15\frac{1}{2}$ oz. 38 oz. was aspirated from a 10-year old patient.

Colour: In all cases it was pale green.

Consistence:

In 7/13 the pus was thick with clotted masses of lymph; in 4/13 it was moderately thick, and in 2/13 it was thin. No cases showed any sedimentation.

Dr Bythell found that 57.69% of his cases there was no separation into layers. (1)

Odour:

Thirteen were odourless, of these two became slightly sour a few days after resection. One was slightly sour when aspirated. One when first seen seven days after resection had a musty odour. One

month later the pus became horribly foetid, probably owing to a localised gangrene of the lung. This lasted for two weeks, the odour then diminished and did not return.

Bacteriology:

6/11 showed a moderate number of pneumococci; 3/11 showed a large number, and 2/11 showed only a few. The foetid pus was examined, but showed only pneumococci in large amount, no septic organisms or bac. coli communis. The pneumococcus was found in the pus from the pericardium in Case 9.

Method of Examination:

The pus was examined directly after aspiration in cover-slip films. For detecting pneumococci weak carbol fuchsin was used as a stain, or Ziehl-Neelsen carbol. fuchsin, with decolourization by weak acetic acid. All films were also stained with Ziehl-Neelsen and methylene blue for tubercle bacilli, and with methylene blue only for streptococci and staphylococci.

I was unfortunately unable to get any cultures, except in the septic case, where the previous film results were confirmed.

Of the two serous cases, one was turbid yellowish brown; it was not examined at first, later the discharge became scanty and thick, and this showed numerous pneumococci.

The other was slightly turbid yellowish-brown. Two days later it became greenish and the child died. No bacteria could be found, only a few medium-sized leucocytes, but p.m. there was pneumonia present.

II. Septic Case: This was sero-purulent, 8 oz. in quantity, thin, yellowish green in colour, slight foetid odour. It showed sedimentation. Bacteriologically, it showed numerous streptococci and a moderate amount of staphylococci. The pus from the secondary abscess showed the same organisms.

II. Tuberculous Case: It consisted of slightly turbid serum. 15 oz., 8 oz. and $3\frac{1}{2}$ oz. were drawn off on three separate occasions. It was odourless.

Microscopically, no tubercle bacilli could be found.

The first specimen was greenish-orange in colour, and highly albuminous; it began to coagulate after standing for an hour, and at the end of 24 hours there was a large coagulum. Microscopic examination showed a moderate number of normal sized granular

leucocytes, no tubercle or other bacilli were found.

Five days later the serum was darker in colour, and more turbid. After standing, numerous small nodules of caseous material were found at the bottom of the fluid. These were teased out and examined. (Ziehl-Neilsen stain). They contained numerous cells.

1. Most numerous: Lymphocytes, circular, granular, staining deeply with methylene blue, their edges in many cases were finely crenated. Some showed a branching network, others stained too deeply to show any structure.

2. Next in quantity were large endothelial cells - 6 to 10 times the size of No.1, circular, oval or slightly irregular in size, no nuclei, contents granular, stained with methylene blue more faintly than No.1. In many cases these were collected together.

3. Still less in number were cells the size of or smaller than No.2. The contents were granular, but they contained a deeply stained nuclei.

No tubercle bacilli, pneumococci, or other bacteria could be found.

Dr Osler states that in tuberculous cases the exudate contains small mononuclear leucocytes⁽²⁰⁾.

Dr Murray⁽⁸⁾ states that half the serous pleurisies are tuberculous. Empyema is said to be rare with tubercle.

As to bacteriology Dr Murray⁽⁸⁾ states that negative results are strong evidence in favour of tubercle. The tubercle bacilli are very sparsely scattered, and inoculation of guinea-pigs is the best test. Koplik⁽²⁾ supports the same view.

BACTERIOLOGY.

Out of the 14 cases examined therefore:

11 showed pneumococcus unmixed, i.e.	78.5%
1 showed streptococcus and staphylococcus, i.e.	7.0%
1 was due to tubercle, though no tubercle bacilli were found	7.0%
1 was due to lobar pneumonia, but no pneumococci found	<u>7.0%</u>

100.

This bears out the widely stated fact that the majority of effusions in children are caused by the pneumococcus, the streptococcus and staphylococcus are next frequent, then the tubercle bacillus.

Dr Bythell's figures are:

Pneumococcus alone	65%	} 87%
" mixed	22.5%	
Streptococcus alone	5%	
Streptococcus & Staphylococcus	}	5%
Streptococcus & pneumococcus		
Friedlander's bacillus & staphylococcus,		2.5%

Dr. A. G. R. Foulerton (17)

Micrococcus pneumoniae,	75%
Streptococcus pyogenes,	25%.

Other less common bacteria which have been reported are Friedlander's bacillus, micrococcus tetragenus, an unidentified bacillus (Bythell)⁽¹⁾ typhoid (Murray, ~~Escherich~~⁽⁸⁾) and bac.coli communis. Dr Matthews⁽¹⁸⁾ has described the presence of a leptothrix. Several cases have been attributed to the diplococcus of acute rheumatism.

PATHOLOGY OF LUNG AND PLEURA.

So far I have obtained post mortems only in the cases following lobar pneumonia. In all of these the pleura was much thickened, green in colour, and shaggy, with large clots of lymph. Where the two surfaces were separated by pus the parietal may be smooth, but where they are in contact they

are rough. The effusion was found in the posterior and lateral part of the pleural cavity. No sacculations were found.

Lungs:

Lower lobes show pneumonia, but often they are collapsed, so that it is impossible to say whether pneumonia existed during life. Later the collapsed lung becomes fibrous, and lies against the vertebrae, being firmly adherent to the pleura in that region.

The upper lobe may show pneumonia also, but frequently there is emphysema. The opposite lung also is often emphysematous.

Dr Bovaird⁽⁴⁾ states that, in 35% of his autopsies, the lung showed only compression, there was no evidence of a precedent pneumonia, the empyema being the only discoverable manifestation of the pneumococcic infection. In other cases he found lobar and bronchial consolidation.

Cases illustrating Pathology.

Case I., ^{No 8} set 3 years, died 8 days after onset.

Left Lung: The whole of the pleura, except a small patch at the apex, was thickened, shaggy and pale green. In places there were extra thick patches, measuring $\frac{1}{2}$ inch. There were many adhesions between the layers.

There was 1 oz. of thin green serum in the pleural cavity, no bacteria were found in it.

Lower lobe showed acute lobar pneumonia in the stage of red hepatization; its lower part was quite solid, its upper part was less so. Upper lobe of lung pale and emphysematous.

Case II 439 aet 4 years, died three weeks after onset.

Left Lung: Pleurae adherent everywhere, except at outer lateral surface where the two layers were separated by a pool of pus, $15\frac{1}{2}$ oz. Here the parietal layer was smooth, the visceral thick, shaggy, pale green. Lung small and collapsed, lying against vertebrae. Upper lobe red hepatization, lower lobe solid, grey hepatization.

This case was complicated with purulent pericarditis. Pericardium, external surface, reddened with prominent dilated veins, contained 15 oz. of thick green pus, in which the pneumococcus was present. Internal surface was coated with clots of pus, especially at apex and round vessels of base; the heart was covered with clotted pus. The pericardium extended from left lateral sternal line and occupied the situation of the upper lobe of the right lung. The heart was small, contracted, situated at the top of the cavity. There was no endo-

carditis.

The Right Lung: Its upper part was situated behind the pericardium, it was congested and emphysematous.

Case III ^{49/2} died four weeks after onset, aet 7.

Left Lung: On opening pleura, the upper part (the body lying on its back) was full of air. The lower part was a pool of pus, 12 oz. A flat band, 1 inch in diameter, extended across the lower part of the pleura, from root of lung to diaphragm. On cutting this out it was composed of lung tissue, the compressed remains of the lower lobe. Upper lobe was compressed into the apex of the pleural cavity, small, solid, airless, very adherent, only small bits of it could be cut out. Pus was found in one of the bronchi, so probably the pneumo-thorax was caused by rupture of a bronchus during coughing. As only small pieces of lung could be removed, no definite communication between a bronchus and the pleural cavity could be found.

Right lung was bulky and emphysematous. A few weak adhesions at apex. No pneumonia present.

Case IV/la, 5, aet 3.

Right Lung: (for left lung see Case I.)

Died 9 weeks after onset of illness - empyema.

Upper lobe was pale, and very emphysematous. Between the middle and lower lobe was a thick patch ($\frac{1}{4}$ inch) of fibrous pleura. The lower lobe was collapsed, small, solid, fibrous, lying against the vertebrae. Pleura covering the diaphragm was firmly adherent to both diaphragm and lobe. The sinus caused by resection of rib opened into a cavity formed by the thick fibrous layer covering the middle lobe and the diaphragm. There was no discharge from this and there were no signs of it being obliterated.

Case V, no. 6, aet $1\frac{1}{2}$. Died 9 weeks after onset.

Left Lung. No p.m. was allowed, but probably the condition was similar to IV. A probe entered a large cavity, discharging thin sour pus, lower lobe was collapsed, firm, lying against the vertebrae, and covered with thickened green pleura.

There was only one case of empyema necessitatis (No. 14) This ^{had} formed a swelling over the left suprascapular region 8 weeks after onset of illness - it was opened, and a probe could be passed between the 4th

and 5th ribs. Possibly owing to its unusual position for rupture, it was a localized or interlobar pneumonia⁽²¹⁾. The child recovered.

In conclusion, I wish to thank the honorary medical staff of the Children's Hospital, Derby, for their kind permission to report these cases.

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GENERAL HISTORY OF CASES.

No.	Name	Sex	Age	Date of Admission	Family History	Previous Health	Present Illness	Duration onset to Aspiration	Side affected	Nature of Effusion	Bacteria	Complications	Results	Duration Aspiration to termination
<u>Class I.</u>														
1.	Joseph M.	M.	10	June	Clear	Strong	Lobar pneumonia	2 weeks	Right	Pus	Not exd.	None	Cured	10 weeks.
2.	Dorothy B.	F.	4	November	Clear	Strong	do.	3 weeks	Left	Pus	Not exd.	Influenza	C.	12 weeks
3.	Herbert G.	M.	4½	March	Clear	Strong	do.	1 week.	Right	Serum	Pneumococcus	None	C.	10 weeks
4.	Alfred G.	M.	3	March	F. & F's sister phthisis	Strong	do.	9 weeks	Right	Pus	Not exd.	Tonsillitis	D.	3 weeks
5.	Martha R.	F.	3	April	Clear	Burn 3 months ago	do.	3 weeks	Right	Pus	Pneumococcus	Pneumonia & effusion in 2nd lung.	D.	6 weeks
6.	William C.	M.	1½	April	Specific	Strong	do.	3 weeks	Left	Pus	Pneumococcus	None	D.	6 weeks
7.	Alfred L.	M.	10	April	F. & M. phthisis	Strong	do.	2 weeks	Right	Pus	do.	do.	C.	9 weeks
8.	Martha R.	F.	3	May	Clear	Pneumonia & Empyema in Rt. Lung	do.	4 days	Left	Serum	Negative result.	None	D.	4 days
9.	Frank A.	M.	4½	June	Clear	Delicate	do.	3 weeks	Left	Pus	pneumococcus	Purulent pericarditis.	D.	-----
10.	Elsie H.	F.	4	June	F's F. & S. phthisis	Strong	do.	3 weeks	Right	Pus	do.	None	C.	4 weeks
11.	Hilda M.	F.	3	June	M. & M's F. phthisis	Strong	do.	16 days	Right	Pus	do.	None	C.	3½ weeks
12.	Nellie C.	F.	7	December	Clear	Strong	do.	3½ weeks	Left	Pus	do.	Pyopneumothorax.	D.	4 days
13.	May B.	F.	8	January	F. phthisis	Delicate	do.	4 weeks	Right	Pus	do	Double pneumonia	C.	5 weeks
<u>Class I.b.</u>														
14.	William B.	M.	1½	April	F. phthisis	Delicate	Gradual onset, cough & wasting	8 weeks	Left	Pus	do.	Subcutaneous Abscesses	C.	7 weeks
15.	Agnes K.	F.	7	January	M. Insane	Delicate	Grad. onset Poor health for 8 mos.	? 8 mos.	Right	Pus	do.	Gangrene of Lung	still under treatment	
<u>Class II.</u>														
16.	Benjamin G.	M.	8	December	Clear	Strong	Sudden onset. Pains all over, slight cough	6 days	Left	Sero-pus	Streptococcus & Staphylococcus	Secondary Abscess	C.	7 weeks
<u>Class III.</u>														
17.	Evelyn S.	F.	9	July	M.'s M. phthisis	Delicate	Gradual onset	5 days	Left	Turbid Serum	Negative	Tuberc. peritonitis, phthisis.	C.	4 weeks. died of phthisis 7 mos. later

Name	Attitude	Cyanosis	Temperature on morning of aspiration.	No. of respirations per minute.	Regularity of breathing.	Cough	Pain in side	Form of chest on affected side.	Condition of interspaces	Enlarged veins in axilla.	Movement of affected side.	Percussion			Auscultation.			Vocal resonance over effusion.	Position of heart.	Side of Effusion.
												Affected lung		Unaffected lung.	Affected lung		Unaffected lung.			
												Base	Apex		Base	Apex.				
D.B.	Back	Flushed, no cyanosis	102	40	Irreg.	Short	Pain	Bulging	Bulging slight.	None	Diminished	Dead dull	Slightly dull.	Resonant	Inaudible	faint	harsh	Not obtained.	displaced	Left
H.G.	"	Yes	103	52	Reg.	"	None	Bulging slight.	None	"	"	dull	dull	"	v. faint	faint	vesic.	Not obtained.	"	Right
A.G.	"	"	101	48	"	"	"	Bulging	Bulging	"	"	dead dull	dead dull	"	"	"	harsh	diminished.	"	Right
M.K.	"	No. pale.	102	52	"	None	"	"	"	"	"	"	slightly dull	hyper. resonant	faint	"	"	"	"	Right
W.C.	On affected side.	No. pale	100	68	"	"	"	"	"	Yes	"	"	"	resonant	"	"	"	Not obtained.	"	Left
A.L.	Back	No. flushed	97	32	"	"	Pain	Bulging slight.	none	none	"	"	"	resonant	"	"	vesic.	diminished aegophony at angle of scapula	none	Right
M.K.	Back	"	98	90	"	Short	None	bulging	bulging	Yes, on opposite side	"	"	"	hyper.	"	"	harsh	Not obtained	displaced	Left
F.A.	Back. Head bent to affected side and leg on that side drawn up.	Yes	96	32	Gasp- ing	None	Pain	"	"	Yes. on opposite side.	"	"	dead dull	resonant	faint	"	-	Not obtained.	"	Left
E.H.	Back	"	100	60	Reg.	Short	None	"	"	None	"	dull	dull	hyper.	inaudible	harsh.	vesic.	slightly diminished	"	Right
H.M.	"	No. flushed	100	40	"	On movement only	"	bulging slight	None	Yes	"	dead dull	slightly dull	resonant	faint	high pitched	"	diminished	None	Right
N.C.	On affected side	Yes	96	60	Irreg.	Short	"	bulging	bulging	"	"	dull	dull	hyper.	faint	faint	harsh	diminished	displaced	Left
M.B.	Back	No.	99	48	Reg.	"	"	"	bulging slight	None	"	"	Skodaic res.	"	"	"	vesic.	absent	"	Right
4. W.B.	"	"	100	28	"	"	"	bulging on back	bulging at back	Yes	"	"	dull	resonant	"	"	"	diminished	doubtful	Left
5. A.K.	"	Yes	97	20	"	None	"	bulging slight	bulging slight	"	"	"	"	hyper.	"	harsh	harsh	diminished	displaced	Right
3. B.G.	"	"	100	52	"	Short	"	bulging	"	"	"	"	Skodaic res.	"	Inaudible	faint	harsh	"	!	Left
7. E.S	"	No, pale.	98	32	"	None	Pain	bulging slight	"	On both sides	"	"	slightly dull	"	Inaudible	"	vesic.	normal	"	Left

CHARACTER OF EFFUSION.

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No.	Name	Nature	Quantity removed at aspiration	Colour	Consistence	Odour	Bacteriology	Amount of Bacteria present.
<u>Class I.a.</u>								
1.	Joseph M.	Pus	Not measured	Pale green	Moderate	None	Not exd.	----
2.	Dorothy B.	"	1 oz.	"	"	"	"	----
3.	Herbert G.	Turbid serum becoming pus	4 oz.	yellow-brown	Thin	"	pneumococcus	small
4.	Alfred G.	Pus	26½ oz.	Pale green	Thick	"	Not exd.	----
5.	Martha R.	Pus, right	1 oz.	"	Thin	"	pneumococcus	moderate.
6.	William C.	Pus	1½ oz.	"	Thick	None, sour later	"	small.
7.	Alfred L.	"	38 oz.	"	"	None	"	large.
8.	Martha R.	Serum, left	3 oz.	yellow-brown	Thin	"	negative result (<i>pneumonia present p.m.</i>)	----
9.	Frank A.	Pus	15½ oz.	pale green	Thick	"	pneumococcus	moderate
10.	Elsie H.	"	3½ oz.	"	"	None, sour later	"	"
11.	Hilda M.	"	6 oz.	"	Very thick	slightly sour	"	large.
12.	Nellie C.	"	17 oz.	"	"	"	"	moderate
13.	May B.	"	15 oz.	"	"	"	"	"
<u>Class I.b.</u>								
14.	William B.	"	2 oz.	"	"	"	"	large.
15.	Agnes K.	"	Not measured	"	Thin	Musty, foetid later.	"	"
<u>Class II.</u>								
16.	Benjamin G.	Sero-pus	8 oz.	yellow-green	Thin sedimentation	slightly foetid	streptococcus staphylococcus	large moderate
<u>Class III.</u>								
17.	Evelyn S.	Serum	15 oz.	Green-orange	Thin	none	negative result. <i>(did from pulmonary tuberculosis later)</i>	

TABLE OF DEATHS

No.	Name	Sex	Age	Side	Duration from onset to aspiration	Bacteriology	Complications	Duration from aspiration to death
4.	Alfred G.	M.	3	Right	9 weeks	Following lobar pneumonia, pne. <i>pus</i> not exd.	Acute Tonsillitis	3 weeks.
5 & 8	Martha R.	F.	3	Left	4 days	Pneumococcus	Empyema & collapse of part of Rt. Lung 5 weeks previously	3 days
6	William C.	M.	1½	Left	3 weeks	"	Collapse of lung, exhaustion.	6 weeks
9	Frank A.	M.	4½	Left	3 weeks	"	Purulent pericarditis	Diagnosis made post mortem
12.	Nellie C.	F.	7	Left	3½ weeks	"	Pyopneumothorax	3 days.
17.	Evelyn S.	F.	9	Left	5 days	Tubercle bacillus	Tuberculosis of peritoneum and lungs.	About 6 months. Died from pulmonary tuberculosis.