LOBAR PNEUMONIA; SUBPHRENIC ABSCESS; DUODENAL FISTULA: RECOVERY

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(WITH SPECIAL PLATE)

While the complications of a pneumococcal infection may be many and various, a series of unexpected events such as occurred in the following case of lobar pneumonia must be rare. It is not unknown for a pneumococcal infection of the pleura to spread down through the diaphragm and cause a subphrenic abscess, but it must be exceptional for a separate large collection of pus in the apex of the same pleura to be present at the same time and to empty itself into the air passages. Again, while cases have been recorded, especially in children, in which after the drainage of a pneumococcal empyema the wall of the neighbouring oesophagus has leaked into the abscess cavity, so that food comes through the wound, it is doubtful whether there is any record of the wall of the duodenum leaking into the cavity of a subphrenic abscess within forty-eight hours of its evacuation.

The man's immediate recovery from the danger of starvation owing to this leakage of food must be largely attributed to the jejunal feeding, which for two weeks was the sole means of providing him with food. Happily he has recovered his health, and to-day, seven years later, is working full time as a miner at the coal face. It need hardly be said that in the earlier stages of the illness it was not easy to form a clear picture of what was happening. The following is the history of the case:

Case History

F., a coal-miner aged 21, single, was admitted to the Sheffield Royal Hospital under one of us (A. J. H.) on February 15, 1931, as a case of right basal empyema following pneumonia. Up to this time he had never had any serious illness. One month previously he developed influenza and went to bed. A few days later he was told by his doctor that he had pneumonia. He was very ill, and had a bad cough with a pain in the right side, which was at first acute and hurt him on coughing and breathing deeply. He coughed up brownish phlegm, often very sticky. Three weeks before admission the doctor said he had got over the crisis, but still he continued to cough up foul phlegm and his breathing became more difficult.

On admission he looked ill; his temperature was 99° F., pulse 125, and respiration rate 36; his skin was moist and pale. He had no pain and was taking food well. On examination his chest showed decreased movement on the right side with absolute dullness at the base behind up to the scapular region, with lessened fremitus and diminished breath and voice sounds over this area. Impaired resonance was observed over the right front. The heart was slightly displaced to the left. The right base was needed the same evening and thick pus containing pneumococci was obtained.

The diagnosis of a pneumococcal empyema at the right base being thus confirmed, on the following day (February 16) a portion of the right tenth rib was resected under local

anaesthesia in the post-axillary line. When opened a large amount of offensive greenish pus shot out with great force. Although a considerable amount was lost, about half a pint was collected. A large drainage tube was inserted. There is no record of anything unusual happening next day, but a note dated February 18 says: "Very copious discharge from the tube. It is thin watery fluid, brownish in colour, with patches of sodden lymph in it. It smells sour and offensive like stomach contents. There is very little actual pus." On February 19 the discharge was still thin and copious. On February 20, the fifth day after operation, milk and pieces of orange found in the dressings showed that there was a fistulous communication with the digestive tube; this had evidently begun within forty-eight hours of the operation. For the first two days only fluids leaked through, but the opening was now large enough to transmit solids.

RADIOGRAPHIC EXAMINATION

On February 21 films were taken by portable apparatus as the patient lay in bed. A straight radiograph of the chest (Plate, Fig. 1) showed the resected right tenth rib and the drainage tube *in situ*. A rather ill-defined upper border of the diaphragm is seen crossing the eleventh rib. The costophrenic angle is occupied by a shadow which extends upwards towards the axilla. Also there is a linear shadow extending obliquely downwards from the apex of the right lung to the middle of the lateral thoracic boundary. This is the edge of a collapsed portion of the lung enclosing a collection of fluid.

Shortly after the above film was taken the patient was given a small barium meal. Ten minutes later some of the barium came out through the drainage tube. A further radiograph was then taken (Fig. 2). In this the stomach is seen full of barium. The right diaphragm dome begins at the level of origin of the twelfth rib and rises to the tenth rib level. Barium is seen in and around the drainage tube. An irregular spray-like shadow seen just to the right of the third and fourth lumbar vertebrae is probably the duodenum. Between this and the barium shadow about the drainage tube there are two small shadows. These lie vertically above one another about half an inch from the right side of the vertebral column. The lower, opposite the lower edge of the second lumbar vertebra, is less dense, somewhat elongated, and about half an inch long by a quarter of an inch broad. The upper, and denser, shadow is opposite the lower margin of the first lumbar vertebra, rounded, and the size of a small pea. They are linked up to the collection about the tube by slight shadows of barium. The dome of the right diaphragm is seen at the level of the tenth rib just at the point at which it has been excised, curving across to the ninth rib. Its inner end is indistinct, but the general abdominal shadow up to about the eleventh dorsal vertebra can be observed. The sharp curved line with a shadow outside it in the right upper chest is seen as before. Between this and the dome of the diaphragm there appears to be a considerable area of lung.

It was clear from the radiographs that the fistula was not from the oesophagus nor from any part of the stomach, but probably from the duodenum. This explained the sour smell of the discharge (like stomach contents) as noted on February 18, and also the fact that barium did not appear in the tube until about ten minutes after the opaque meal had been swallowed. For the time being, however, it was not possible to make further investigations as to these various new features which the radiographs had disclosed.

FEEDING THROUGH THE JEJUNUM

The man's general condition was so rapidly becoming worse owing to leakage of food through the wound that the problem of how to feed him was now one of immediate urgency. It was decided to try feeding through the jejunum. On February 22 the abdomen was opened by one of us (G. S. S.) and a large-sized rubber catheter fixed obliquely into the jejunum. The drainage tube in the chest was at the same time removed. During the next two days (February 23 and 24) feeds of milk were administered by the jejunal tube, none of which came through the opening in the chest, thus

confirming the site of the fistula as above this level. Nothing was given orally. On February 25 a little milk pudding was given by the mouth as a test, and it came out at the chest wound. The discharge had now become more definitely purulent.

On the 27th water taken by mouth still leaked through the wound. On March 5 the general condition was improving. There was still some watery discharge with the pus from the wound, the edges of which appeared to be partially digested. Air was sucked in and blown out in coughing. He was taking food well by the mouth, and only very little escaped through the chest wall. On March 14 he was taking full meals by the mouth; none leaked through the wound. The jejunostomy tube was finally removed. The chest wound was still open, with a slight purulent discharge. A radiograph taken after an opaque meal showed no track towards the right diaphragm. The shadow in the right upper chest seen on February 21 had become denser.

PHYSICAL EXAMINATION OF UPPER CHEST

It was now possible to make a fuller physical investigation of the upper chest. There was an area of dullness in the right axillary region, corresponding with the shadow in the radiograph, with tympanitic resonance mesial to this. A needle in the right fourth space over this area in the mid-axillary line brought away about 15 c.cm. of yellowish pus, freely mixed with air. With this evidence of a pyopneumothorax at the right apex, distinct from the collection of pus which had been drained at the right base, a fuller inquiry was made into the details of the man's illness before admission. For much help in this we are indebted to his medical attendant, Dr. L. Jago.

DETAILS OF ILLNESS BEFORE ADMISSION

The facts were as follows: He began with a typical lobar pneumonia in which both lungs were affected. It ended by lysis. Three days later the temperature began to rise again and empyema was suspected. There was practically no sputum throughout, until the afternoon of February 14 (the day before admission), when the man himself states that he suddenly began to spit up foul-smelling yellow phlegm. His breathing became very bad, and the phlegm continued to come up in large amounts until about 10 p.m. The next morning he was seen by his doctor, who needed the right base, and, finding pus, arranged for the man to be sent to hospital the same day. It would seem that the doctor's attention had not been specially called to this sudden bringing up of pus on the previous afternoon, about which the patient is very clear.

Discussion

From this description of what happened on February 14, the day before admission, there can be no doubt that pus had then burst into the air passages. The collection of pus evacuated at operation on February 16 could not have been the one which had burst into the lung, because its contents were in a state of hypertension and were not mixed with air. On the other hand, the shadow in the right upper chest seen in the radiographs of February 21 (Figs. 1 and 2) and the clinical findings of pus and air in this region on March 14 are consistent with the view that it was this apical empyema which had burst into a bronchial tube the day before admission.

The presence of a large empyema in the upper part of the right pleura, which according to the history had burst into the air passages the day before admission, made it difficult to believe that the big tense collection of pus evacuated two days later could have been in the right pleura at the same time. The explanation which seemed to fit all the facts was that the pus evacuated at operation on February 16 came from below the diaphragm and not from above it—in other words, that what on admission was thought to be a basal empyema was actually a

subphrenic abscess of pneumococcal origin in the right extraperitoneal area. On this assumption the occurrence of a fistulous communication with the duodenum became less difficult to understand. The close anatomical relations between the duodenum and this subphrenic area are well known. A duodenal ulcer may give rise to a subphrenic abscess, or a subphrenic abscess arising from some other source may burst into the duodenum.

In the present case, however, neither of these things happened exactly. There is nothing which points to any primary trouble in the wall of the duodenum. The man had never suffered from any gastro-intestinal symptoms previously, although the leak was from gut to abscess cavity. On the other hand, everything points to the pneumococcal origin of the abscess: it followed directly after a definite lobar pneumonia; pneumococci were present in the pus, and there was a coincident pneumococcal empyema in the upper part of the pleura on the same side. The fact that the duodenal leak did not occur until the abscess cavity had been emptied and drained suggests that at the time of operation the abscess had already tracked down and reached the wall of the duodenum, into which it would soon have emptied itself had the pressure not been otherwise relieved. As it was, the pressure in the abscess cavity being reduced, indeed becoming negative during inspiration, the relatively greater pressure inside the duodenum after a meal was sufficient to break through the thin remnant of wall between it and the abscess cavity. In fact, what happened in this case was very similar to what happens occasionally in cases of oesophageo-pleural fistula following the opening of an empyema. In these, as a rule, it is the thinned and adherent wall of the oesophagus that gives way and bursts into the empyema cavity when the external pressure is reduced by evacuation of its contents and the internal pressure is increased by the passage of food.

Whether the pneumococci reached the subphrenic area directly from the adjacent pleura or whether they were blood-borne is perhaps more of academic interest than of practical importance. The radiographs show evidence of fluid in the right costo-phrenic angle, but it is not now possible to say if this preceded or followed the subphrenic collection. The most simple explanation is direct infection from the pleura above, though such extension of infection downwards is, as has long been recognized, very rare.

Barnard (1908) saw only one such case, and noted as remarkable that while nearly all subphrenic infections pass readily through the diaphragm to the lungs or pericardium, it is rare for the contrary to occur. He discusses the possible reasons for this, which need not be gone into here. He mentions one case of right lobar pneumonia which was followed by a pneumonic abscess in the right anterior and posterior fossae—probably a lymphatic infection—and one case of localized empyema at the left base which burrowed into the left extraperitoneal cellular space, passing below the external arcuate ligament.

Rischbieth (1911), commenting upon this rarity of direct spread through the diaphragm, illustrates it by the varied and devious other directions in which a long-standing "empyema necessitatis" will go before emptying itself. Ochsner and Graves (1933), in a critical analysis of more than 3,000 recorded cases of subphrenic abscess, together with fifty cases personally observed, give the following figures. In 88 per cent. the primary lesion was in the abdomen. In from 3 per cent. to 6 per cent. the infection was blood-borne from some distant focus, while "still less

frequently suppurative lesions in the thorax may extend through the diaphragm into the subphrenic space." This occurred in 2.6 per cent. of the collected cases. Musser and Norris (1907), in a review of 13,550 cases, say that subphrenic abscess is very rarely a sequel of pneumonia, and add that "the diagnosis of empyema is usually made."

That in our case the pleura was not directly infected by either of the two aspirations or by the subsequent operation was probably owing to adhesions from a local pleuritis, either preceding or secondary to the subphrenic abscess. The rest of the history of the case is as follows:

Further History of Case

By March 20 the patient's general condition had improved steadily. The apical empyema, which had been filling up again (Fig. 3), began to empty itself more freely, the sputum being now copious, purulent, and offensive, and increased by lying on the left side. This continued for some time. On April 8 the dull area in the right axilla was again needled, but only air was obtained. On April 15 the sputum had become much less. He began to put on weight and was sent to a convalescent home. The discharge from the chest wound was very slight. A radiograph taken on April 28 shows the shadow in the right upper chest to be much smaller. The man was now discharged home.

He was not seen again for three years (August, 1934). His condition was then as follows:

He was active and well; he had no cough; his chest expansion was three inches. The cardiac impulse was slightly nearer the middle line than normal. The front of the chest showed very little abnormality. The right side was resonant to the sixth rib in the nipple line in front, and was rather hyperresonant just above the liver—possibly some marginal emphysema. He plays a wind instrument in a local band. The liver edge was not palpable. At the right back there was a large depressed scar at the site of the excised rib, and dullness, with loss of vocal fremitus and breath sounds, up to about the lower angle of the scapula. The axillary border was resonant. He had a good colour, without any tendency to cyanosis. The fingers were clubbed. He lost his job at the coal face while he was ill, and up to this time had been out of work owing to bad conditions. A radiograph (Fig. 4) of the chest taken on September 18, 1934, did not show any remains of the shadow at the right apical region.

In February, 1938—that is, seven years after his illness—he was again seen by one of us (A. J. H.). He was then in excellent health, working full time at the coal face.

Had the existence of a right apical empyema, which had burst into the lung, and the subdiaphragmatic situation of the collection of pus been correctly diagnosed at the time of his admission, as it probably would have been had a radiograph been then taken, it is possible that the line of treatment adopted might have been different. It could not have had a more satisfactory end-result.

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The seventh joint conference of the National Association of Cemetery and Crematorium Superintendents and the Federation of Cremation Authorities in Great Britain will be held at Edinburgh from June 27 to 30. The first of a new series of annual conferences, covering all aspects of cremation administration and propaganda, will be held under the joint auspices of the Cremation Society and the Federation at Balliol College, Oxford, from July 22 to 25, under the presidency of Lord Horder.

AN ANALYSIS OF 350 CASES OF ABORTION

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(WITH SPECIAL PLATE)

In view of the frequency of abortion, and especially of procured abortion, in industrial districts an analysis has been taken of 350 cases admitted to the Derby City Hospital during the eight years 1930–7 and an endeavour made to assess the probable cause in each case. To bring the figures to a round number of 350 eleven cases of threatened abortion in which the pregnancy continued have been included.

Statistical Analysis

Table showing Number of Abortions Yearly (1930–7)

1930	30	1934	46
1931	31	1935	44
1932	47	1936	49
1933	36	1937	67

The low figures for 1930 and 1931 were those relating to the first two years after the hospital opened. The large number in 1937 may be due to medical practitioners sending more cases into hospital instead of dealing with them at home, on account of the proceedings taken against certain professional women abortionists.

The civil state of the patients was:

Married	306
Single, widow, or legally separated from husband	44

In addition a certain number of abortions occurred in married women living apart from their husbands but not legally separated.

Number of Previous Children

None	97	Seven	5
One	82	Eight	5
Two	63	Nine	2
Three	27	Ten	3
Four	34	Eleven	3
Five	14	Twelve	3
Six	12		

The highest proportion of presumably natural abortions was in women with no children. The highest proportion of presumably procured abortions was in women who had had four children.

Number of Previous Abortions

None	230	Three	4
One	91	Four	2
Two	23		

It is probable that the history obtained was not always accurate. Thus in a procured abortion a history of "no previous abortions" might be given in an attempt to divert suspicion.

Stage at which Abortion Took Place

Under two months	46	Four to five months	44
Two to three months	126	Five to six months	10
Three to four months	124		

Attitude of Patients

As a whole the patients gave their history and symptoms fully. In 316 cases the condition was described freely; in thirty-four the patient was apprehensive and afraid, apart from a transient nervousness, which, however, was not always present in cases, due to a criminal

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FIG. 1.—February 21, 1931. Drainage tube *in situ*; tenth right rib resected. Shadow in upper and outer right chest; curved marginal linear shadow from third rib to seventh space. Right apical empyema. Small collection of fluid at right costo-phrenic angle.

FIG. 2.—February 21, 1931. After barium meal; stomach filled with barium. Much barium seen in and around drainage tube, also small amounts between this and region of duodenum.

FIG. 3.—March 20, 1931. Shadow in right upper chest is more dense; right diaphragm is obscured. Right lung does not light up well. Density at right base possibly due to thickened pleura.

FIG. 4.—September 18, 1934. Lungs now show very little evidence of disease. Examination of the oesophagus by means of a barium swallow revealed some displacement of the oesophagus to the right.