extravasated from congested or ruptured capillaries into the alveolar lumina. At the periphery of the lung the alveoli were collapsed, and contained a few desquamated epithelial cells. At the hilum the alveoli, although not distended, contained serum, alveolar epithelial cells, and a few polymorphocytes; pneumococci were clearly seen in some of these alveoli and in places in the perivascular lymphatics. Some alveoli were crowded with polymorphs; fibrin was absent. The epithelium of most of the bronchioles was completely desquamated, but the bronchi contained little secretion, thus confirming the macroscopical appearance of the dry cut surface of the lung and differing in this respect from the picture of a lobar pneumonia as commonly observed at necropsy on the fifth day of the disease. The microscopical appearances were practically those found when resolution of a pneumonic exudate is approaching completion, except that reparative changes in the bronchiolar epithelium were not yet apparent.²

The Blood Picture

A blood count on the morning of the third day of the illness showed 3,900 leucocytes per c.mm. and, later in the same day, before administration of serum, 6,000 per c.mm. On the morning of the fourth day the count was 9,000 per c.mm., and of the fifth 11,400 cells per c.mm., in each case before serum was given. The low cell count indicates a severe type of disease and failure of response on the part of the patient. The observed rise in the leucocyte count may be taken to indicate improvement. A sample of blood was collected post mortem, the serum separated, and the protective power estimated by mouse test. The patient's own pneumococcus was used; this was of maximum virulence, one ten-millionth of a cubic centimetre of a sixteen hours' blood-broth culture proving fatal to mice in forty hours. It is significant that the Type I antibody content of this serum was considerable, one-fifth of a cubic centimetre actually protecting mice against one thousand minimal lethal doses. The presence of so large a surplus of free antibody at this stage of pneumonia is, in our experience, clear evidence that the primary infective process has been overcome.

DISCUSSION

Gastric atony is a recognized complication both of lobar pneumonia and of acute abdominal disease and operation. Paresis, or even paralysis of the diaphragm, is apt to follow diaphragmatic pleurisy. Any or all of these factors may have contributed to the collapse of the lung. That the abdominal section had caused a severe disturbance of the autonomic nervous system was evident from the persistently rapid pulse uninfluenced by digitaline. The subsequent events are therefore easily understood.

The absence of consolidation of the left lung, which made complete collapse possible on the fifth day of the illness, is explicable on one hypothesis only—namely, that the antipneumococcal serum had entirely changed the normal sequence of intrapulmonary events. A state of fluid serous exudate into the pulmonary alveoli, characteristic of the second or third day of lobar pneumonia, must largely have persisted, instead of the comparatively static condition of solid hepatization proper to the fifth day. It seems probable that absorption of this fluid exudate must have been in rapid progress, and that the collapse of the lung, occurring over the period of about eight hours which preceded death, accelerated the expulsion of the inflammatory products.

Meanwhile, this remarkable case appears to us to afford unassailable evidence in favour of the use of concentrated antipneumococcal serum early in pneumonia. Had it not been for the unfortunate and purely accidental collapse of the lung, we are confident that our patient would have made a good recovery.

SUMMARY

The salient features of this case are as follows:

1. The onset exactly simulated an acute abdominal emergency.

2. The course of the case (excluding the unavoidable accident which caused death) illustrates the type of response to be anticipated from serum treatment of primary lobar pneumonia, due to the pneumococcal Types I and II, when exhibited early in the disease.

3. The pathological changes which successively follow in lobar pneumonia appear to have been profoundly modified by serum treatment, so that the normal process of inflammation has been curtailed and the disease process aborted.

4. The radiographic evidence and the careful study of physical signs prove beyond doubt that the lung was at one stage the seat of what is described as pneumonic consolidation. The findings post mortem show that the resolution of this process was almost complete by the fifth day of disease.

The observations recorded form part of an inquiry into the serum treatment of pneumonia undertaken by us for the Medical Research Council.

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THE MODERN CONCEPTION OF EARLY PHTHISIS*

BY

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(With Special Plate)

In order that I may make clear the new teaching, I shall first give a short summary of the old doctrine on this subject, which was that phthisis developed from a small discrete lesion situated just below the apex of the lung. The ulcer might heal to form an apical scar, or, on the other hand, might slowly progress to involve the surrounding lung tissue, and thus gradually spread the disease from apex to base. This orthodox view had its foundation among the pathologists, who, in thousands of necropsies on cases of pulmonary tuberculosis, found the oldest lesion in the apical region, with less intense involvement of the lower parts of the lung; further, they discovered an apical scar in 95 per cent. of patients who had not died from pulmonary tuberculosis. They therefore argued that in those cases in which pulmonary tuberculosis developed it most probably had its origin in the apical region, from which it spread downwards. The clinical interpretation placed on this teaching was that the first signs of pulmonary tuberculosis were usually found in the apical region, that the disease was of slow, insidious onset, and that it spread from apex to base. Further constitutional symptoms (pyrexia, anorexia, loss of weight, and lassitude) were often shown some considerable time before the disease process gave rise to physical signs in the chest. Therefore, in the diagnosis of the early case of phthisis, great stress was laid on the history of constitutional symptoms, and physical examination was concentrated on the apical regions. Doubts were first cast on this old teaching by statistical evidence when it was established in Germany that, in 1,438 cases¹ in which this apical lesion was diagnosed, only 7 per cent. developed phthisis; yet the death rate from this disease among the general population was 10 per cent. In other words, patients who were regarded as early cases of the disease did not develop the disease with any greater

* An address delivered to the general practitioners of Bermondsey.

frequency than the average population. This suggests that the apical scar is unlikely to be the starting point of phthisis.

A NEW DOCTRINE

The new teaching owes its conception to the work of Assmann,² Lydtin,³ and, above all, to Redecher,⁴ who examined series of skiagrams of tuberculous patients, and, by this means, was able to follow the course of the disease in some of his patients from the earliest manifestation. Beginning at the stage of initial or early infiltration, he was able to see in various patients the development of this condition into all the various forms of phthisis, previously described by the pathologists as originating in the discrete apical lesion. The new doctrine has thus been founded on radiological findings, while the old conclusions were deduced from the post-mortem room. As a broad principle, we may take it that we are less likely to fall into error by observing the course of a disease than by making deductions from the end-result seen at necropsy.

Redecher says that phthisis first develops as an acute infiltration of the lungs. This is shown on the skiagram as a definite soft shadow, the margins of which are not sharply defined. The lesion may develop in any part of the lung field, and it may vary in size from that of a cherry to that of an apple. The commonest site is the infraclavicular region, but frequently it occurs in the middle field, the basal field, and, now and then, at the apex. This initial infiltration (which is represented by a small area of broncho-pneumonia, surrounded by a perifocal inflammation) may occasionally heal with or without treatment, leaving only a scar; generally, if left without treatment, it spreads by one or more of the ways described below.

METHOD OF SPREAD

The changes may occur in a very short time; it is not a matter of months, but a question of weeks at the most, possibly only days; once a spread has taken place, the disease becomes much more difficult to control.

1. The initial infiltration spreads by small aspiration broncho-pneumonic areas forming around the initial lesion.
2. Coincident with the aspiration spread, or occasionally before an aspiration spread has formed, the initial infiltration may undergo caseation, and cavity formation takes place. This latter process may occur in the short space of four or five weeks, or less.
3. While the initial infiltration still appears to be intact, there may appear in another part of the lung, or the other lung, a second infiltration—the so-called “daughter infiltration,” which is probably an aspiration spread. The daughter infiltration may follow a course similar to that of the initial infiltration. If the aspiration process goes on increasing and unchecked, the condition becomes one of acute phthisis. If, however, the disease process is slowed down, a certain amount of fibrosis takes place; cavities already developed become thick-walled, the aspiration spreads show tendency to fibrotic changes, and the picture develops into one of chronic phthisis.

CLINICAL FEATURES

If we accept the initial infiltration as the earliest manifestation of phthisis amenable to diagnosis (most clinicians in Germany have accepted it, and an increasing number in America and in this country are now doing so) we require to know how to recognize it clinically. In a typical case, the patient, usually a young previously healthy adolescent or adult, has a short, acute, febrile attack with indefinite symptoms. Perhaps a cough is present (often the patient will not consult a doctor at this stage). The acute pyrexial attack passes off in a few days; the patient feels himself again, and returns to work, but the cough continues. Sputum may be present, but as often as not is absent at this stage. If the

patient is examined during the acute febrile attack, or shortly afterwards, the physical signs in the chest may be completely absent, or, if present, will be found over the infiltration. The latter is usually in the infraclavicular region, but may be in the axillary region or base, and consists of nothing more than a slight change in the percussion note, slight alteration in breath sounds, and the presence of post-tussic crepitation. If the lesion is near the surface, friction may be heard, and the patient will complain of pain.

It will be seen that these clinical manifestations, particularly in those cases without physical signs in the chest, are extremely likely to be regarded wrongly as “influenza,” and it is a fact that many are at first diagnosed as such; the febrile period having ended, the patient is allowed to return to work, the cough persists, and constitutional signs make their appearance. By the time the disease is diagnosed, the initial infiltration has broken down to form a cavity, with or without an accompanying aspiration spread. The constitutional changes—loss of weight, lassitude, anorexia, night sweats—which have long been regarded as the earliest manifestations of this disease are in reality quite late symptoms.

DIAGNOSIS

The important point which emerges is that if we are going to discover these cases at the earliest opportunity we must suspect every acute febrile illness without physical signs in a young adult as being due to pulmonary tuberculosis, except during the time of an influenza epidemic. Then only should we rest content with the diagnosis of such a clinical syndrome as influenza. The diagnosis of influenza, except during an epidemic, is usually a false one.

A matter which should always be inquired into is whether or not the patient has recently been in contact with a tuberculous person, not necessarily at home, but in the office or factory. My experience is the same as that of Redecher and others—namely, that a large percentage of patients with initial infiltration have been in contact with an open case. The absence of history of contact with a known source of infection does not negative the possibility of the disease.

In a number of cases the first symptom is a haemoptysis. In such the physical signs are often absent, but a skiagram shows the initial infiltration. In a few the acute febrile attack continues, the patient remains ill, and physical signs develop in a very short period. These cases are less likely to be overlooked. A few have given no history of illness, and have been discovered only when examined as a routine because they have been in contact with a known case. In many instances it is the *x* ray alone which gives the first evidence of active disease.

From what I have already said it must be clear that, in order to diagnose a case in the stage of the initial infiltration, we must never wait for constitutional symptoms to appear, but, in the young adult, we must regard with grave suspicion an occurrence of the symptoms described above, paying particular attention to the examination of the chest, not only in the apical region, but in the infraclavicular regions, in the axillae, and also the bases, and never omitting to search for post-tussic crepitations. Even if the examination of the chest is negative we should not be content, but if sputum is present we should have it examined repeatedly. If no sputum is present (as is often the case at first) a skiagram must be taken. Only when these examinations have been carried out and are negative should our suspicions be allayed. If we procrastinate, we may be losing the most valuable time for instituting therapy, because, in the course of a week or two, the infiltration may break down and cavitation may occur, or an aspiration spread may take

place into the other lung, or the lesion may reach the surface, causing a pleurisy and adhesion, which will seriously interfere with a subsequent artificial pneumothorax.

In the diagnosis of early phthisis, it is far better to have a negative sputum and a negative skiagram than a missed case. Radiology plays an important part in the diagnosis of the initial infiltration, but it is not the deciding factor, for the skiagram of this lesion may bear a close resemblance to a small pneumonic area, a lung abscess, a new growth, or a gumma. It is only by taking into account the clinical history, the physical signs or the absence of physical signs, the pathological examination of the sputum, and, sometimes, of the blood for leucocytosis or Wassermann reaction, that the x-ray picture can be correctly interpreted. The pathologist, the radiologist, and the physician, when united, are becoming more and more powerful in the field of diagnosis of pulmonary disease. It is to be remembered that this new teaching was established by a physician, working hand-in-hand with his radiological and pathological departments.

TREATMENT

There is no doubt that a certain number of these initial infiltrations will heal and become fibrotic if the patient is given general sanatorium treatment only; on the other hand, the majority of them tend to spread if so treated, and the difficulty is that in a given case it is not possible to say whether the patient will do well on general treatment only. I have seen these cases treated by rest alone;

in the majority this line of treatment has been followed by a spread of the disease, and I have wished that artificial pneumothorax had been induced at the start. This is the best form of therapy, and the longer it is delayed the greater is the possibility of a spread taking place which may jeopardize the future artificial pneumothorax. At the same time it must be admitted that artificial pneumothorax does not arrest every case, particularly if cavitation has already occurred, but the sooner it is induced the greater is the chance of success. Because of the success of early artificial pneumothorax it is imperative to diagnose intact initial infiltration before cavitation or spread has taken place.

In my previous publication on this subject I translated Redecher's "Frühinfiltrate" as "early infiltration." Zimmerli and Simmonds,⁵ in a recent paper, suggest that "initial infiltration" is a better term, because the infiltration is the initial lesion of phthisis rather than the earliest manifestation of pulmonary tuberculosis in its broadest sense, which must include such lesions as Ghon's primary focus and complex. In this paper I have adopted the term "initial infiltration."

The two skiagrams reproduced (Figs. 1 and 2, Special Plate) show the typical radiological appearance of the initial infiltration. My thanks are due to Dr. V. Sparkes for the skiagrams.

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A CASE OF MULTIPLE OSTEochondromata WITH OBSTRUCTED LABOUR

BY

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(With Special Plate)

Bony tumours of the pelvis obstructing labour are rare, and it is uncommon to find multiple affections of this structure in the condition known as "multiple osteochondromata." The case described below is a combination of these two circumstances.

The patient was a woman of 28, well developed though of short stature (5 feet). She was married in 1928, and in the following year had a five months' miscarriage. On August 23rd, 1930, she was admitted to hospital in labour, which had been in progress for over twenty-four hours. She said that there had been slight loss of blood since the pains began, and that the membranes had ruptured. On admission her pains were frequent and strong.

On abdominal examination the lie was longitudinal, with the head above the pelvic brim. There was a definite overlap of the foetal occiput above the symphysis pubis, and the head was very freely movable between the pains. It was quite impossible to press the head down into the pelvis and to make it engage. The pubic bones seemed abnormal, but no definite opinion could be arrived at owing to the overlapping of the head. The foetal heart sounds could not be heard.

When the vagina was examined the os was fully dilated, and the presenting part was high and difficult to feel. No abnormality could be made out in the pelvic cavity. The pelvic measurements were: interspinous 9½ inches, intercrystal 11 inches, and external conjugate 7¾ inches. After the vaginal examination was completed, a large bony tumour of irregular outline was noticed on the inner side of the right femur at its lower end. It felt like a large exostosis, and, according to the history, had been present since early childhood. A further examination of the bones showed similar, but

smaller, masses on the opposite femur, the head and lower end of the right tibia, and the head of the left fibula. It seemed probable, therefore, that the abnormality felt on the pubic bones, preventing descent of the head, was a bony growth of similar nature. In spite of strong pains there was no advance of the foetal head, and a Caesarean section was considered the best method of delivery. This was accordingly performed, and the woman was delivered of a living and healthy male child, which weighed nine pounds. There followed an uncomplicated puerperium, and the patient was discharged from hospital on September 6th.

DESCRIPTION OF RADIOGRAMS

Radiograms taken afterwards are shown on the Special Plate. The pelvis (Fig. 1), besides showing growths of bone on its outer surface, exhibits a tumour of the superior ramus of each pubic bone on either side of the symphysis, narrowing the pelvic inlet and rendering it somewhat asymmetrical. This photograph also shows involvement of the upper ends of both femora by the disease. The right knee region (Fig. 2) shows multiple masses on the lower end of the femur and on the upper ends of the tibia and fibula. The left knee region presented similar but less extensive changes. These leg conditions caused no disability in walking. Screening of the upper limbs revealed osteochondromatous growths in the following situations: (1) upper end of the humerus on both sides; (2) upper end of the left radius; (3) distal end of the fifth metacarpal on the left hand.

TREATMENT

Treatment for so widespread a condition seemed impracticable, especially as it is said that these tumours do not grow after adult life is reached, but the patient was advised that a future pregnancy would necessitate another Caesarean delivery. The fact that she lives within easy distance of hospital influenced one against any attempt at sterilization by ligaturing and dividing the tubes at the time of operation.

H. V. MORLOCK: THE DIAGNOSIS OF EARLY PHTHISIS

FIG. 1.—Female aged 25; the only symptom was cough of seven weeks' duration. Sputum T.B. positive. The skiagram shows a typical initial infiltration in the right mid field.

FIG. 2.—Female aged 28. Skiagram taken two months after onset of cough following a short febrile attack; shows a typical initial infiltration in the right infraclavicular region.

E. J. BLACKABY: MULTIPLE OSTEOCHONDROMATA WITH OBSTRUCTED LABOUR

FIG. 1.—Radiogram of the pelvis showing growths of bone on its outer surface and a tumour of the superior ramus on either side of the symphysis.

FIG. 2.—Right knee. Multiple bony masses on the lower end of femur and on the upper ends of the tibia and fibula.