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THE EARLY DIAGNOSIS OF PULMONARY TUBERCULOSIS *

BY

GEOFFREY MARSHALL, M.D., F.R.C.P.

Physician, Guy's Hospital; Assistant Physician, Brompton Hospital

This is a subject which some of us have used for lectures to undergraduates and discussions with our colleagues for many years. As personal experience has grown the difficulties of the problem have become exemplified and tendencies to dogmatic statement curtailed. As in other troublesome problems of medicine, the brunt of it falls on the general practitioner; and in this he has our lively sympathy and our willing co-operation. When the patient comes to the specialist it is usually because there has been some conclusive symptom or because an examination of the sputum or an x-ray photograph of the chest has established the diagnosis. If then the relatives ask the consultant to support their indignant criticism of the practitioner for failing to diagnose the condition at an earlier date, he may well point out to them how complete the absence of all evidence of the disease might have been a few months or even a few weeks previously. Well-informed laymen may complain that a practitioner when consulted in a case of suspected tuberculosis did no more than make a physical examination of the patient, and took no steps to obtain bacteriological examinations of the sputum, a record of the temperature range, and a skiagram of the chest. If it were true that a suspect of tuberculosis had been acquitted on such slender grounds their criticism would be well founded, and an action for negligence might be difficult to defend. In years gone by I have heard physicians state that they could diagnose pulmonary tuberculosis in its earliest stages by physical examination of the chest. At the time I received the statement with scepticism, and now I know that it deserved flat disbelief. No special skill of eye or ear or hand will enable any individual to detect the earliest lesions of tuberculous disease in the lungs or warrant him in excluding the disease without further investigation and a period of observation. In a few exceptional cases I have found physical signs of the disease before any other positive evidence was obtainable, but in reviewing any large number of cases one is forced to the conclusion that in early diagnosis the method of physical examination alone would be completely unreliable; it is a broken reed.

I have been speaking of *physical* examination, and the same strictures would not so completely condemn a proper *clinical* examination, which would include a careful inquiry into family, contact, and personal history, and a painstaking elicitation of symptoms. This should bring a much better catch into the net.

Early Symptoms

Most of the symptoms in the earlier stages of the disease are those of toxæmia, and many of them are

not specific. They are fatigue, loss of morning appetite, loss of weight, and psychological disturbances which are often described as neurasthenia or as a nervous breakdown. In young women another common toxæmic symptom is amenorrhœa. This symptom in a young girl may arise from a variety of causes; two causes which must always be considered are tuberculosis and pregnancy. The more specific symptoms are cough, expectoration, night sweats, and hæmoptysis. Any one of these symptoms in an adolescent or a young adult should arouse suspicion, and several of them in combination would go far towards clinching the diagnosis. There is one symptom which in the absence of all other evidence is in itself diagnostic, and that is, a free hæmoptysis "out of the blue." By this is meant a copious hæmorrhage, a cupful or more of bright liquid blood welling up into the mouth in a young subject who has no other symptom or sign of disease. Is there any cause for such an occurrence other than an acute tuberculous lesion of the lung? If there be some other cause in an apparently healthy person I have not met with it. In such a case, announce the diagnosis and order your patient to bed for two months on the spot. Do not wait to investigate, for such hæmorrhages often occur at such an early stage that all investigations prove negative. In the meantime you may lose control of the treatment, and the patient may not come back to you until months later, when the disease has become firmly established and perhaps incurable.

Early Complications

We are sometimes enabled to diagnose the disease at an early stage because of the occurrence of complications that are apt to develop before the focus in the lungs has attained a size which renders it liable to detection. The more common of these complications is a sterile pleural effusion, and it is not necessary for me to insist that such an effusion, in the absence of evidence of malignant disease, is diagnostic. The less common and less universally recognized of these early complications is perianal fistula. This lesion is so frequently followed by manifest tuberculosis of the lungs that I believe its diagnostic significance is little less than that of the pleural effusion.

Investigations

Many cases are submitted to us in which the diagnosis cannot be established by the history, symptoms, signs, or complications; but we dare not in any case give a negative diagnosis without investigation. What are the methods of investigation we should employ?

First in importance comes examination of the sputum, if there be any. If there be none, then the patient should

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be given potassium iodide or ammonium carbonate in 10-grain doses until expectoration is provoked. The sample so obtained may be poor thin stuff, devoid of pus; and the pathologist may regard it with contempt and doubt whether it be worth the trouble of staining. Give him courteous encouragement, for tubercle bacilli have been found in many such unpromising specimens. One negative result is of no significance, but indicates the need for two further samples to be submitted. In many cases three negative results must be regarded as inconclusive, and then recourse is had to a more searching test than that of microscopical inspection of a stained smear. Until recently the test favoured has been injection into a guinea-pig, followed six weeks later by killing and necropsy of the animal for evidence of tuberculous inflammation of the lymph glands draining the site of injection. Objections to this method are the long period involved before the test can be completed, and the proneness of captive guinea-pigs to sudden and premature demise, which may remove them from the scene before the test is complete, but when several weeks have been wasted in fruitless waiting. The guinea-pig is therefore being supplanted by cultivation of the sputum for tubercle bacilli on special media such as that of Loewenstein. If bacilli are present, colonies usually develop within fourteen days; and the proportion of positive results is little if at all inferior to that obtained by animal inoculation.

After examination of the sputum for tubercle bacilli the investigation next in importance is the taking of an x-ray photograph of the chest. The improved definition obtained in recent years by exposures of a fraction of a second has greatly increased the diagnostic value of radiography of the lungs. It is unnecessary for me to deal with the details of this subject, but I should like to reiterate that the value of the method must depend ultimately on the knowledge and experience of the man who interprets the appearances seen on the screen and film. The wise physician will view and discuss these appearances with the radiologist; the wise radiologist will leave the responsibility of diagnosis to the physician.

The third form of investigation which we commonly employ is a diurnal record of the temperature. Satisfactory readings can be obtained with a calibrated "half-minute" thermometer kept in the closed mouth for three minutes. In a case of early tuberculosis, when the patient is up and about, we shall generally find an abnormal range, the morning readings being unusually low and the evening readings above 98.4° F. It must be remembered that in young women the temperature commonly rises to 99° or over during the week preceding the menstrual flow, even in perfect health.

These three methods of investigation—examination of the sputum, radiography of the chest, and recording of the temperature—are a necessary part of our technique in diagnosing pulmonary tuberculosis in its early stages; but there are other investigations which some of you will have in mind. First there are the various tuberculin tests—cutaneous, subcutaneous, or conjunctival. These tests are still held in great respect by our veterinary colleagues and by those of our legislators who supervise the production of the milk supply. The result of a tuberculin test decides the question of life or death in the herd of an attested dairy farm. It is fortunate that the human species is not subject to the same dubious regulation; for it would involve the slaughter of some 80 per cent. of the adult population of these islands. There is overwhelming evidence that a positive tuberculin test indicates sensitivity to tuberculin, and that it signifies that the individual has probably at some previous period been infected by and acquired

some immunity to tubercle bacilli; but it is no evidence at all that the individual is suffering from tuberculous disease, except in the case of infants.

Another type of investigation depends on examination of the blood. Many attempts have been made to devise a satisfactory complement-fixation test, but up to date none have gained a reputation for reliability. On the other hand the erythrocyte sedimentation rate, the Arneith-Von Bonsdorff nuclear count, and the lymphocyte-monocyte ratio have been found of real value in assessing the progress and severity of tuberculous disease. Most of us must, however, agree with Professor Lyle Cummins (1933) when he says that they are of little value in diagnosis.

In our routine diagnostic investigations we are therefore reduced to the three which I mentioned first: sputum test, x-ray photograph, and temperature record. Of these the sputum test, when positive, is the most conclusive. I have seen a few cases in which tubercle bacilli were demonstrated in the sputum many weeks before expert and repeated radiographic examinations were able to demonstrate any lesion in the lungs. Such cases, however, are exceptional; moreover, in many early cases no sputum is obtainable. In the early case not only may there be no sputum; there may be no symptoms of any kind. This leads me to the final point of my contribution to this discussion. Early diagnosis is impossible if the victim does not come under medical observation at the appropriate time. Not long ago I saw a young man who was working hard for an Honours degree at one of our older universities. He had had cough, expectoration, and night sweats for twelve months before he consulted a medical man. He was then found to have tuberculous cavitation of both lungs. In that case the patient and his friends were deserving of blame.

The public is being educated with regard to symptoms which should cause them to seek expert advice; but that is not sufficient, for there are cases in which the disease may be detected before the individual has any warning of an impending disturbance of health. We have learned this from the careful investigation of apparently healthy contacts living in the same house with a sufferer from open tuberculosis. The lesson is driven home by investigations such as those of R. C. Wingfield and Margaret Macpherson (1936). They took x-ray photographs of the chest in 2,381 adolescents employed in factories and shops. The material consisted of apparently healthy subjects between the ages of 14 and 21. By this method they discovered that about one in every hundred had tuberculous lesions in the lungs. Similar investigations in other countries have resulted in the finding of latent pulmonary tuberculosis in from 1.5 to 3.9 per cent. of supposedly healthy adolescents. Some of our larger hospitals are now carrying out a similar radiographic examination of their nurses and medical students. At each such institution unsuspected cases of active tuberculosis have in this way been detected. The day may come when it will be possible to take an annual x-ray photograph of the chest of every young person from the ages 14 to 24, and a big step will have been taken towards the early diagnosis and the eradication of pulmonary tuberculosis. In the meantime let us press for the application of this system where it is most needed—amongst the nurses and students at our hospitals, the students at our universities, and the factories which employ the young girls of whom this disease takes so large a toll.

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