PULMONARY TUBERCULOSIS IN CHILDHOOD.

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One of the great drawbacks to the student of medicine obtaining the bulk of his training by a study of the adult, is that he acquires a wrong perspective of disease, and in no instance is this more true than in the case of pulmonary tuberculosis. It is because he is apt to think of disease as it prevails in the adult that chronic pulmonary disease in the child usually suggests tuberculosis. This, however, is entirely wrong since the probabilities with regard to the nature of inflammatory, and especially chronic inflammatory mischief of the lung are so different in the child and in the adult.

In general, as causes of chronic pulmonary inflammation may be included the tubercle bacillus, the pneumococcus and other allied organisms, and foreign substances like silica, iron dust, gold dust and perhaps carbon. The inhalation of dust, at least those varieties of dust which have the power of inducing an inflammatory reaction, is usually consequent on some special occupation and hence, as a cause of mischief during childhood may be disregarded. Thus, there are left for consideration, tuberculous inflammations and simple or non-tuberculous inflammations of the lung. It is the first of these that I wish to discuss in the present article.

Course of Pulmonary Tuberculosis.

Pulmonary tuberculosis is without doubt a not uncommon occurrence during childhood, but it is as a rule a comparatively acute disease and seldom runs what could be called a chronic course. I can, for instance, only recall six cases of pulmonary tuberculosis in my private practice, and in them all death ensued within one year of the onset of the symptoms, and in most of them within the course of a few weeks. A persistent cough, with or without spit, not infrequently suggests to the medical attendant pulmonary tuberculosis, and to the parents almost invariably consumption, and for them both the longer the duration of the malady the greater is the fear of tuberculosis. The truth of the matter is, however, exactly the opposite. Indeed, the longer the condition has been in existence the less is the probability that the tubercle bacillus plays any part at all in its causation.

Age Incidence of Pulmonary Tuberculosis.

Pulmonary tuberculosis is a disease par excellence of infancy and not one of childhood. Thus, when one meets with chronic pulmonary mischief in an older child it is little likely to be tubercular in nature. An analysis of my hospital records reveals that the age incidence of pulmonary and mediastinal tuberculosis is greatest during the first year of life and from then rapidly declines until the seventh year, after which it is relatively infrequent. This age incidence of pulmonary tuberculosis is in harmony with the age incidence of medical tuberculosis as a whole, and is, too, practically parallel with the mortality from all forms of tuberculosis during those same years of life. The death returns from all forms of tuberculosis for England and Wales, and also, it may be remarked, for Paris and New York as well, show two periods of increased mortality. The first commences with the first year of life and rapidly declines during early childhood so that during later childhood, and particularly during school age, deaths from this cause are comparatively rare. A second wave commences with the advent of puberty and
reaches a maximum between 35 and 40 years, but even during this period of life the deaths in any one year never reach the number met with during infancy.

**Age Incidence of Abdominal and Meningeal Tuberculosis.**

A survey of my private records also reveals a greater incidence during the earlier years of childhood, but in this section of the population it is during the second and third years, and not during the first, that the maximum incidence occurs. This is due to the fact that the majority of cases of tuberculosis met with in private practice were examples of abdominal and meningeal infections, which have their greatest incidence during the second and third years of life.

**Pleurisy with Effusion.**

The only variety of medical tuberculosis which presents a different age incidence from that which has been outlined above is pleurisy with effusion. Pleurisy with effusion is not a frequent condition during childhood. Examples are very uncommon during the first four years of life and thereafter they only occur with very moderate frequency. Osler records that only 10 per cent. of 194 cases observed by him occurred in patients under 20 years of age. Not only is the incidence of pleurisy with effusion during childhood different from that which prevails during adult life, but the course and sequence would also seem to be different. In the adult pleurisy with effusion is not infrequently followed by pulmonary tuberculosis, but in childhood this would seem to be the exception. Dr. Stanley Graham analysed a series of cases of pleurisy with effusion under my care in the R.H.S.C., Glasgow, and found that of thirty-two patients whose histories were known three to six years subsequent to their dismissal from hospital only seven developed tuberculosis, and in all but one of these the mischief made itself manifest within one year of the onset of the pleurisy. The most common sequel was spinal caries.

**Type of Lesion in Pulmonary Tuberculosis.**

The type of pulmonary tuberculosis in the child is also different to that which is usually met with in the adult. Chronic phthisis as seen in the adolescent and adult is exceedingly rare during childhood. The forms of the disease at this period of life are (1), caseating broncho-pneumonia limited to one lobe or one part of a lung; and (2) the sub-acute miliary or broncho-pneumonic forms. The former variety usually occurs during the first year of life but the latter may be met with during any period of childhood. Thus a localised lesion, unless during infancy and at an early stage of the disease, is most unlikely to be tuberculous. However, if such a lesion be tuberculous in nature, comparatively soon breaking down with cavitation and extension to other parts of the lung or body generally takes place. The sub-acute broncho-pneumonic or miliary forms are the most common. These varieties are notoriously difficult of diagnosis because until late on in their course they are apt to escape detection by physical examination. The detection of these varieties of the mischief is more certain by means of the X-rays, as will be referred to later.

**Prognosis of Pulmonary Tuberculosis.**

As I have already pointed out, pulmonary tuberculosis in childhood is an acute disease, and whenever I have been able to make a definite diagnosis of the condition a fatal termination has ensued comparatively early. In the vast majority
of cases death occurs within one year of the onset of the illness, although I have
known cases to linger for as long as three years but never have I seen, either in
the West of Scotland or in the South East of England, a case recover in which a
definite diagnosis of pulmonary tuberculosis could be made. This, it should be
mentioned, is not the invariable experience. In Sweden, it is stated that general-
ised pulmonary tuberculosis not infrequently recovers and in Canada, but there
the mischief is chiefly mediastinal in type, recoveries are also frequently recorded.
These facts, however, introduce a factor other than age, namely race, which, while
admittedly of the utmost importance, is outside the scope of the present discussion.

Diagnosis of Pulmonary Tuberculosis.

In view of such a grave outlook the diagnosis of pulmonary tuberculosis must
never be lightly made, and always demands a most complete investigation of the
case so that all other possibilities may be eliminated.

In the first place ordinary physical examination of the chest is often quite
inconclusive. Unless in the type met with during infancy localised dullness is
exceptional. In fact, if there is one point more than another which should make
one suspicious of this disease it is the severity of the symptoms in comparison with
the slightness of the signs. By physical examination practically nothing abnormal
may be detected, whereas X-ray examination will reveal most extensive mischief.
In this regard there prevails the greatest difference between simple and tuber-
culous broncho-pneumonia. In lobar pneumonia or primary broncho-pneumonia
the signs are usually in excess of the X-ray findings, whereas in tuberculosis the
X-ray findings as a rule are in excess of the physical signs.

The finding of the tubercle bacillus is of course a most important point in the
diagnosis. It is frequently stated that a child has no sputum, and that this aid to
diagnosis is not available. It cannot, however, be too emphatically stated that
the child has sputum only he swallows it, not having acquired the art of expectora-
tion. Nevertheless, by means of a swab on the right forefinger with which the
pharynx is swept immediately after coughing, enough sputum for examination
can usually be obtained, and this is a procedure which should always be carried
out whenever there exists any suspicion of this disease. In this way, I personally
on many occasions have definitely substantiated the diagnosis of tuberculosis.
Some writers recommend examination of the faces, or of the stomach washings
after a night's fasting, but in my experience tubercle bacilli have never been
discovered by either of these methods when they were not more easily obtained
by examination of the sputum recovered as described above.

Radiological Appearances.

In the diagnosis of pulmonary tuberculosis X-ray examination plays a large
part. This is because the X-ray picture is exceedingly characteristic with the
discrete generalised mottling due to sub-acute miliary or broncho-pneumonic
nodules—the so-called snow-storm lung. A localised shadow is not characteristic.
As already indicated, it is usually during infancy that the localised shadow is
encountered. But if such a picture is due to a definitely tuberculous lesion soften-
ing with bronchial spread ensues comparatively soon and throughout the rest of the
lungs there will become apparent the above mentioned discrete mottling or snow-storm
appearance. It must be remembered, however, that unless typical this picture
is not pathognomonic as somewhat similar appearances are produced by bronchiectasis and widespread influenzal pneumonia. But in these latter conditions the picture is stationary or regressive whereas in tuberculosis it steadily becomes more marked and every succeeding week shows a definite advance in the lesion. Indefinite shadows at the root and slight mottling in different areas of the lung fields are of no significance. In my reading of the X-ray appearances I am guided by the conclusions of the National Tuberculosis Association of U.S.A. These were drawn up some years ago by a committee of clinicians and radiologists, and are as follow:

(1) The normal chest of the child from the röntological standpoint is subject to such wide variations within normal limits as to be beyond the possibility of exact description.

(2) The conglomerate shadow, commonly called the hilum shadow, when found lying entirely within the inner third or zone of the lung can be disregarded (or regarded as normal), except where it is made up of a solid mass of homogeneous shadow giving undoubted evidence that it represents a growth or mediastinal pleurisy.

(3) Calcified nodes at the root of the lung, without evidence of lung disease, are of no significance except as a possible evidence of some healed inflammatory condition, possibly but not necessarily tuberculous. They are a common finding in normal chests.

**Dissemination of the Disease.**

Because the mischief in the lung is so often widespread dissemination of the disease generally ensues and thus evidence of its presence in other parts of the body is anything but rare. Of these other evidences an enlarged spleen and tuberculides of the skin are the most important, and when suspicion arises they should always be searched for. The tuberculide is, as a rule, of the papulonecrotic type. This lesion appears as a papule, the centre of which becomes necrotic, leaving a small reddish depression surrounded by a narrow rampart of glossy skin.

**Significance of Tuberculin Tests.**

It might be expected that the tuberculin test in some form or other would be of help in the diagnosis, but unfortunately it is just during that period of childhood when tuberculous disease of the lung is so rare that the tuberculin test is so frequently positive. In any case, the tuberculin test only tells us that the body has become infected with the tubercle bacillus. It cannot disclose the situation of the focus, and what is more important, it cannot tell us whether the disease is active or not. We have already seen, at least during the period of childhood, that as age advances the incidence of active tuberculosis diminishes whereas all statistics dealing with the tuberculin test reveal that the incidence of positive tuberculin reactions, on the other hand, steadily increases. Hence as a diagnostic aid, unless during infancy or perhaps the first two years of life, when any tubercular focus present is most likely to be active, the tuberculin test is of little value. It must also be remembered that a negative tuberculin reaction does not necessarily, although it usually does, mean an absence of tubercular disease, since in the presence of a severe infection, and this is usually the case in the pulmonary variety of the disease during childhood, the body may not have sufficient vitality to react.
Pulmonary Tuberculosis in Childhood

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