DISSEMINATED MILIARY TUBERCULOSIS OF LUNGS AND SKIN *

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The diagnosis of miliary tuberculosis in the very young is difficult. In the lungs, for instance, without consolidation and without cavity, miliary tuberculosis may be strongly suspected, but not easily proved.

I submit herewith two helps to the diagnosis — one, of the lungs — the x-ray; the other of the skin — the eruption. The first case selected for illustration shows both diagnostic signs and will be submitted complete. The best recent x-ray apparatus has made it possible to produce the accompanying pictures, which speak for themselves. In six cases of infants and young children suspected of disseminated miliary tuberculosis of the lungs, the x-ray has cooperated with other tests to decide the diagnosis. For illustration of what can be done, the best x-ray plate has been selected, the best print made from it and the best result obtainable here presented (Fig. 1).

The second help to the diagnosis of general miliary tuberculosis in the young is general miliary tuberculosis of the skin. The localized lesions of the skin so often described, are not here meant. (See Figs. 2, 3 and 4.)

CASE 1. General miliary tuberculosis; involvement of skin.

Dorothy K., 2½ years old, was admitted to the Presbyterian Hospital with the diagnosis of pneumonia. The case presents the following points of interest: 1. The patient had the appearance and the chart of a child sick with pneumonia but with the physical signs of bronchitis. 2. The exact diagnosis was made by x-ray (lungs), (Fig. 5). 3. There was the unusual skin eruption of disseminated miliary tuberculosis. (Figs. 2, 3, 4.) 4. A necropsy completed the record and confirmed all previous findings.

1. Physical signs: As to the "look and chart" of pneumonia in this child, the temperature (T) was high and continuous, 102 to 105 F.; the pulse (P) was 130 to 160 per minute; the respiration (R) was 42 to 72; out of normal proportion to the pulse; the R-P ratio was "disturbed." "When the R-P ratio departs from the normal of $\frac{1}{4}$ and approximates $\frac{1}{3}$, look for pneumonia" (O'Dwyer). It is to children that I would apply this; it is not so valuable in adults.

It would be exceptional for a pneumonia patient to remain in hospital a week developing a severe febrile reaction, without revealing some signs of consolidation. Presumably all clinical men will think there is here shown good reason for the diagnosis of tuberculosis. That is granted. For exact diagnosis by means of new and high grade mechanical appliances, however, we may still contend.

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2. Exact Diagnosis by X-ray: At the last meeting of this Association I presented in discussion of Dr. Sewell's paper an x-ray plate showing clearly disseminated miliary tuberculosis of the lungs without consolidation; also without excavation. (Fig. 1.) At this time I am prepared to submit the x-ray plates of six cases including the first shown. Two of the cases have been confirmed by necropsy (the one here shown being included), one has been corroborated by inoculation into the guinea-pig, one was confirmed by examination of an excised gland; others by finding bacilli in the throat swabs, etc., till we can be rationally certain that our x-ray findings are reliable and trustworthy.

Fig. 1.—General miliary tuberculosis. Radiograph of thorax of Rosie R., aged 8 years. Tubercle bacilli recovered from the spinal fluid. No necropsy.

3. Skin Eruption: Miliary skin tuberculosis, necrotic skin tuberculid—the names suggested are sufficiently descriptive. This is an unusual though not rare lesion. In the Presbyterian Hospital three cases have been seen. I personally have seen but two. (Figs. 2, 3, 4.)

The character of the eruption is papulo-vesicular, perhaps more vesicular from the first. On the neck, in the above case, the vesicles were more like sudamina, a little larger, though not as large as the vesicle of chicken-pox. They were thickly clustered in the neck. Later there developed a hemorrhagic zone about the vesicle and a subsequent drying and crusting in the middle of the lesion. The completed individual lesion was about 2 mm. in diameter. This stage is figured in Pfandler and Schlossmann in an excellent picture to which the reader is referred. The illustrations are colored and are the only ones

known to us. The accompanying photographs of the present case, in black and white, show to good advantage. (Figs. 2, 3, 4.) The rash was on all skin surfaces, including soles, palms and scalp, with more about the mouth, anus and buttocks. The superficial lymph-nodes were enlarged everywhere; the liver was enlarged. Naturally the case attracted a good deal of attention. Colleagues who were called in to see the case expressed their views, one suggesting syphilis, another chicken-pox. The rash is said to have been evident three days before entrance, appearing first about the mouth, neck and chest.

4. Necropsy: The brain was not examined; tubercles were found in the lungs, spleen, kidneys, liver, etc. Tubercle bacilli were found in clumps in the blood of the heart in any casual smear. Smears taken from the skin vesicles showed such quantities that the spread-out corium was faintly pink from the stained bacilli. The case was acute, which may have determined the character of lesions.

It is interesting to note that the structure of the tubercles was not the usual structure; in fact, strictly speaking, they were not tubercles at all. More

Fig. 2.—Miliary tuberculosis of the skin. Papulo-vesicles; hemorrhagic crusts (umbilicated). Properly, necrotic tuberculid.

properly speaking, the lesion was necrotic tuberculosis ("tuberculid"); there was no tissue reaction at all, merely melting down into necrosis where tubercle bacilli stopped and began to grow. There was no connective tissue reaction, no giant cells, no surrounding zone of epithelioid and mononuclear wandering cells. "There were just necrotic areas filled with tubercle bacilli. In none of the zones were found evidences of protective reaction" (Dr. Lamb). Simply larger and smaller areas of necrosis, lymph-nodes and tonsils containing the same.

Six cases are shown in the x-ray plates. All of the patients came into the hospital with the evidence in favor of acute pneumonia, the chart bearing out the general suggestion and appearance of the disease. The x-ray was really the first means of positive diagnosis, being subsequently confirmed by finding tubercle bacilli.

Tuberculous eruption on the skin, necrotic tuberculid, disseminated miliary tuberculosis of the skin, suggest in their names the characteristics of the lesions under consideration.

CASE 2.—General miliary tuberculosis involving the skin in a child aged 18 months. Died. No autopsy.

Kate N. entered the Presbyterian Hospital with the diagnosis of pneumonia. The onset was abrupt three days before, with drowsiness, fever, cough and a peculiar, unrecognized rash.

Examination showed a temperature of 101 to 103 F., rising to 105.5 F. at or just before death, cough, coarse râles over both lungs, harsh breathing and voice over irregular areas, restlessness, flaring nostrils—satisfactory evidences

Fig. 3.—Tuberculosis of skin; papulo-vesicular; crusts (umbilicated); hemorrhagic. Properly, necrotic tuberculid.

of pneumonia. As the Roentgen-ray was not in common use at that time, no radiographs can be shown. There was no autopsy. No bacilli were found.

Skin Eruption: In order of time, this case was the first case that had come under the observation of the staff and was not recognized until an excellent colored illustration in Pfaunder and Schlossmann was noticed. It is important to have this case in mind in deciding on skin eruptions, for those who see one case and recognize its character will never make a mistake. Witness the fact that the two cases accompanying this were recognized instantly by those who saw the first, and by no others present.

The eruption was discrete, papulo-vesicular, later drying, "topped with a scab," about 2 mm. in diameter, and, as the recorder says, "suggestive of chicken-pox, except that the papules are small."

An expert from the Board of Health pronounced it a late stage of chicken-pox, thus explaining why they were so small.

The lesion is called by Pfaundler and Schlossmann "necrotic tuberculid."

CASE 3.—Pulmonary tuberculosis and skin tuberculids.

John H., 15 months old. This patient also came to hospital with the diagnosis of acute pneumonia. The patient died; no necropsy and no radiographs made, but the tissues of the skin lesion were inoculated into guinea-pigs and proved to be tuberculosis.

The patient was in hospital five days, in a dying condition all the time. The lungs showed râles everywhere, bronchial voice and breathing, harsh in nature.

The main interest centers about the skin lesion, small pin-head-sized and a little larger papules with small necrotic centers. There were a few on the arms and legs, a few on the back and front of the trunk, also one or two on the thighs. There were a few small ecchymotic spots on the thighs. The diagnosis was pulmonary tuberculosis, and on the skin, tuberculids. When engrafted in the guinea-pig, typical tuberculosis in the internal organs was developed.

Fig. 4.—Miliary tuberculosis of skin: papulo-vesicular; hemorrhagic; crusts (umbilicated). Properly, necrotic tuberculid.

CASE 4.—General miliary tuberculosis of lungs; x-ray; autopsy.

William F. (colored), aged 10 months, entered the hospital with the diagnosis of pneumonia. There were fever, apathy ("dopey"), R-P ration disturbed, 1-3; respiration, 36 to 50 per minute; pulse, 110 to 150 per minute, irregular; temperature, 100.5 to 102.5 F.; discharging ear; vomiting—manifestly a very sick child; no consolidation of the lungs, no tubercle bacilli found, no history of râles in the chest. The diagnosis was suspected from the history and chart but not confirmed till the x-ray showed it clearly and unmistakably. This was one of the best proofs of the value of the x-ray. As to râles, they were probably to be found at favorable moments, after a long interval of uninterrupted quiet. The hospital intern states that the lungs were clear in front and behind. Spinal fluid was perfectly clear. Noguchi-Wassermann test of blood and spinal fluid was negative.

This case, also entered as one of pneumonia, was then believed to be tuberculosis from the history and chart, and the diagnosis was confirmed by the x-ray and at last by autopsy. The radiograph was one of the best of the series.

CASE 5.—Diagnosis on admission, acute tuberculous broncho-pneumonia. General tuberculosis. Died. No necropsy.

Vieto S., aged 3 years. This case is one in which there was good ground for believing that there was tuberculosis, and the x-ray was convincing; there was also confirmation later from the tissue of a superficial gland.

CASE 6.—Diagnosis on admission, general bronchitis, probably tuberculous. X-ray convincing. No corroboration. No necropsy.

Dan B., 6 years old. This case on admission was one that suggested pneumonia, general bronchitis, and at length the conviction that it was probably tuberculosis. The point of interest was the convincing x-ray picture. There was no corroborating evidence of tuberculosis, but the x-ray was so good that there could be no feeling of doubt.

The child had had measles, whooping-cough and pneumonia. He entered the hospital with a cough which had been active for two weeks, and there was evidence of an acute fever-chill and fever, no expectoration, no vomiting. Patient had been treated for malaria. In the lungs were fine, scattered, "squeaking" râles.

Fig. 5.—Miliary tuberculosis of lungs. Same patient had also miliary tuberculosis of skin (necrotic tuberculid).

There were thought to be certain localities in which the breathing sounds indicated a moderate condensation of the lungs, but the x-ray did not corroborate it. There was no record of positive evidence of consolidation. The patient was several weeks in hospital, and the x-ray was the only convincing testimony outside of the clinical.

CASE 7.—Entered as pneumonia. Diagnosis by x-ray. Tubercle bacilli found in spinal fluid. No necropsy.

Rosie R. This 8-year-old child was in the hospital twenty-five days, running the course of an old-fashioned consumptive. The history on admission, though,

suggested pneumonia-cough, expectoration, blood-stained sticky expectoration, stabbing pains in the chest, night-sweats and loss of weight.

The previous history was that of measles at 2 years, bronchitis at 7. The interest in the case centers in the x-ray testimony. It was a convincing picture and was corroborated by finding tubercle bacilli in the spinal fluid. (Fig. 1.)

CASE 8.—Diagnosis on discharge was general miliary tuberculosis of the lungs. X-ray. Improved.

John S., aged 9. The interest in this case rests on these points: A suggestive previous history; a positive x-ray picture; "tubercles on the lungs"; good general condition; discharged having no fever and apparently thriving fairly. Sent to the country for still further improvement.

Previous History.—No significant family history or surroundings. Previous illnesses, whooping-cough, measles, and indefinite history of tumors which seem to have been tuberculosis of the lymph-nodes just over sternum and neck. This patient was observed in good hospitals just before coming to the present one, and nothing special was discovered in the lungs. In one particularly good hospital, where the facilities for x-ray would probably be excellent, nothing was sought by x-ray; at least there was nothing said about it.

Examination.—"Bright boy; does not look ill; ears and cheeks bluish-red; not dyspneic; slightly cyanotic; mentally alert; no noteworthy scars; tongue clean in the middle line; lips very red; cervical and inguinal glands enlarged; lungs and abdomen negative; extremities and hands bluish; veins of neck enlarged; a few moist râles, most of which clear up on deep breathing; while in hospital, up and about, comfortable, always cyanosed, notably about the ears and lips, also finger-nails. Fluoroscopic examination confirms x-ray plates described above. Patient went to Loomis Sanatorium. Father reports glands are smaller. Clinical diagnosis, cervical tuberculous adenitis.

DISCUSSION

There is still an added interest to this case. The human interest in a case that by all laws and experience is doomed, yet has gone out of the hospital with lungs thickly studded with miliary tubercles. To be sure, without the recent new appliances above alluded to, the diagnostician might have thought he had made a mistake; the case then would have passed as undetermined and the memory need not concern itself trying to learn anything from it. Whether the further history of this case is ever written cannot now be said. This may be the final outcome—by the use of the x-ray many such histories may accumulate and the profession learn that they have for years been overlooking cases of disseminated miliary tuberculosis of the lung. What the Wassermann reaction is to syphilis, the x-ray promises to be to the diagnosis of lung tuberculosis in children.

These three cases of skin tuberculosis present the characteristic features thus far met in our experience and most of those not recorded by Tileston in his larger experience.

The most profitable impression to carry away from this reading is that the cases present to the experienced observer the mental picture of pneumonia, but the physical signs of bronchitis. At this point the physician may be unable to procure any reliable testimony for exact diagnosis;

and until a good x-ray picture has been obtained he may but conjecture, and he may never know whether or not he has made the correct diagnosis. Next to an autopsy the x-ray gives the most intimate knowledge of the lesion of the child's lung.

Skin eruptions in the feeble and non-resistant are not rare, but are mostly overlooked. The lesion is mainly necrotic, resulting in vesicles. There may be a stage of papulo-vesicle preceding this. The cases here cited are distinctly acute. Our experience leads us to prefer the term given to the lesion by the authors, Pfaundler and Schlossmann, "necrotic tuberculid."

"The fatal result in infants is probably only another manifestation of the more pernicious course of tuberculosis in general in the first years of life."¹

Briefly stated, the modern x-ray apparatus, next to an autopsy, furnishes the most valuable insight to the lung lesion of infants and young children.

Eruption of miliary tubercles furnishes a pathognomonic sign for diagnosis and a valuable, almost conclusive, point for prognosis; that is, the lesion is nearly always associated with a fatal form of tuberculosis in the young child.

The histology varies with the acuteness of the invasion. The above cases were of the acute type and the vesicles (necroses) were the first revealed lesion. It may be that slower developing lesions would disclose the different types described, viz., "papulo-squamous" and "papulo-necrotic" tuberculids, described by Darier and Boeck in 1896.

Bacilli are found frequently in the blood and the eruption and the lesion is probably always embolic.

Among the characteristics of the individual lesions may be mentioned the *size*, that of a rose spot in typhoid fever, topped by a tiny *vesicle*, surrounded sooner or later with a congested or hemorrhagic *zone*, with the formation of a *crust*, which, when removed, leaves a little *pit*.

The skin lesion is to be differentiated from that of chicken-pox, moluscum contagiosum and from syphilis.

Experience with this eruption is like that with scurvy in infants — once seen the lesion cannot be again overlooked.

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1. Tileston: Arch. Int. Med., July, 1909, iv, 21.