

Pulmonary Radiological Changes in Varicella

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Chickenpox has a modest place among infectious diseases as far as lethality and complications are concerned. Its pulmonary complications are hardly mentioned in the textbooks. For example in Fanconi and Wallgren's *Pediatrics* VALQUIST [15] just alludes to a typical pneumonia associated with chickenpox. Literature to-day continues to rely on the 1935 data of BULLOWA and WISHIK [3], who found 21 cases with pneumonia among 2534 chickenpox patients, but it is impossible now to determine how many of these had been due to viral and how many to secondary bacterial infection, except for 8 fatal cases in which histology revealed secondary bacterial pneumonia, without the signs of viral infection. It is only in the last edition of Nelson's *Textbook of Pediatrics* that the viral pulmonary complications of chickenpox are discussed in some detail by SCOTT [10] and interstitial pneumonia is also said to occur, but chiefly in fatal adult cases. According to FELSON [5] pneumonia would occur in less than 0.1 per cent of the cases of chickenpox. This is remarkable if we realize that this

incidence is lower rather than higher than the usual incidence of pneumonia among otherwise normal infants and children. One has the feeling that FELSON, too, has relied upon the data published by BULLOWA and WISHIK [3].

In contrast with the textbooks, the problem of pulmonary changes arising in the course of chickenpox, the so-called varicella pneumonitis has been extensively discussed during the past 4 to 5 years. According to BLATTNER [2], until 1955 15 well-documented cases of varicella pneumonitis have been reported in the literature; the symptoms of pneumonia manifested themselves 2 to 6 days after the appearance of the rash, and were most extensive and almost confluent. The characteristic clinical symptoms and signs included high fever, cyanosis, dyspnoea, cough, eventually bloody sputum, and chest pain. ENDRESS and SCHNELL [4] collected 18 cases from the literature of 1950—55. Of these 7 patients died, including a premature infant who had contracted transplacental infection, one newborn infected during labour, and a child 8 years of age who had

suffered from rheumatic heart disease; the rest were adults. On the basis of these cases the mortality rate of varicella pneumonitis is 37 per cent. Of the 453 chickenpox patients of WEINSTEIN and MEADE [16] 41 suffered from respiratory complications; 20 were under 7 years and 21 over 19 years of age. According to these authors the pneumonia in the younger age group was bacterial in origin, caused mainly by *H. influenzae*, while in the adults it was apparently due to viral infection. FITZ and MEIKLEJOHN [6] found in the literature two cases in which the chickenpox origin of the pneumonia was confirmed post mortem not only on grounds of the negativity of bacterial cultures from the cadaver, but also by demonstrating A-type occlusion bodies. In three cases of their own they observed at autopsy bronchial haemorrhages, necrosing haemorrhagic pneumonitis, as well as occlusion bodies of the A-type. They therefore suggested that varicella pneumonitis was not so rare as usually claimed and supposed that it would be recognized more often if every patient with chickenpox were subjected to radiological study.

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The above reports together with some other data have stimulated us to make careful radiological studies in every case of chickenpox in which respiratory infection of a different aetiology could be ruled out.

OBSERVATIONS AND COMMENTS

In the course of more than 2 years chest X-rays were made in 154

patients with chickenpox, once in 69 and twice or more times in 85 cases. The radiological pattern deviated more or less from the normal in 105, i.e. in 70 per cent of the cases examined. The changes mostly included an indistinct, vascular or infectious-type enlargement of the hilar shadow and an increase in the intensity of the bronchovascular pattern (Fig. 1). The changes were of the

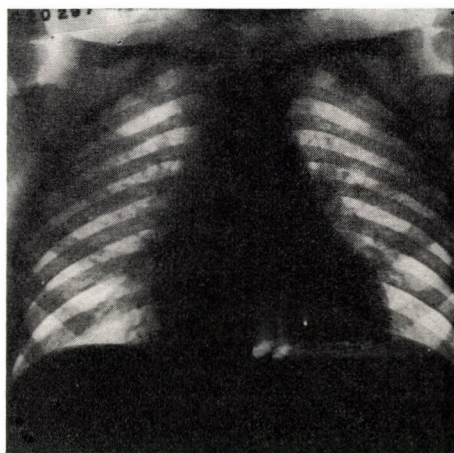


FIG. 1. N. S., aged 7 years. The hilar shadow is indistinct and enlarged, the broncho-vascular pattern is extensive and symmetrical in both lungs

same type in every case, but with marked quantitative differences; they were marked in 42 cases, i.e. in 27.3 per cent of the examined material. The tendency to form diffuse, nodular opacities described by many authors [8, 11, 13] was observed (Fig. 2), but no diffuse miliary foci were visible in our patients. This may have been due to their age. According to FELSON [5], varicella pneumonitis

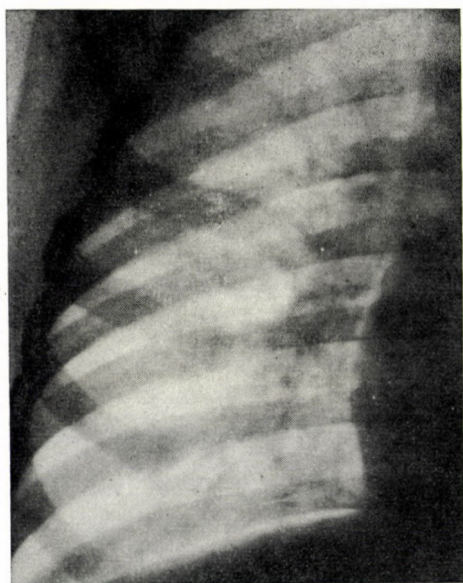
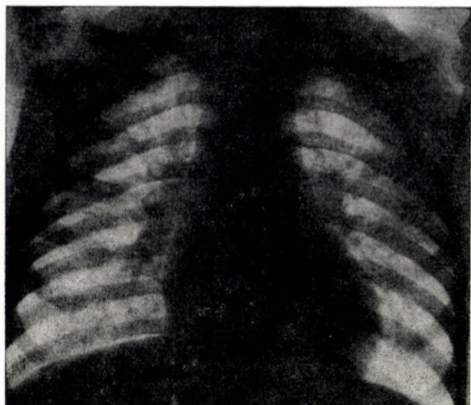


FIG. 2. T. E., aged 3 years. In addition to the changes pointed out in Fig. 1, there is a tendency to form pale, diffuse, nodular opacities

of the miliary type would occur exclusively in adults. In contrast with this, of our 154 patients 144 were under 8 years, 4 were between 8 and 16, and only 4 were over 16 years of age.

The changes found were absolutely identical with those described under the name of "measles lung" by SCHMID and WEBER [9], as well as AUGUSZTIN [1]. The latter author in his material of 4053 patients with measles found a negative chest X-ray in merely 16.8 per cent, a typical "measles lung" pattern in 28.9 per cent, and focal pneumonia in 35 per cent. The changes, which do not necessarily indicate pneumonia but are produced by virus, must develop on the basis of the same mechanism in both diseases, being brought about in the same way by diffuse hyperaemia, peribronchial and perivascular oedema formation, and by interstitial processes. It was in 3 of our cases only that shadows of medium intensity, slightly translucent, similar to a big coin or to an infant's palm in size, not exhibiting segmental distribution, were clearly visualized in the lower lobes (Figs. 3, 4/a, and 4/b). We feel inclined to hold the chickenpox in-

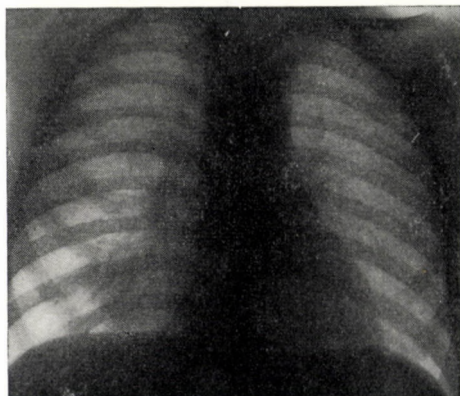


FIG. 3. V. J., aged 2 years. A light, finely translucent opacity of indistinct outlines, similar to an infant's palm in size, is visible in the right cardio-diaphragmatic sinus

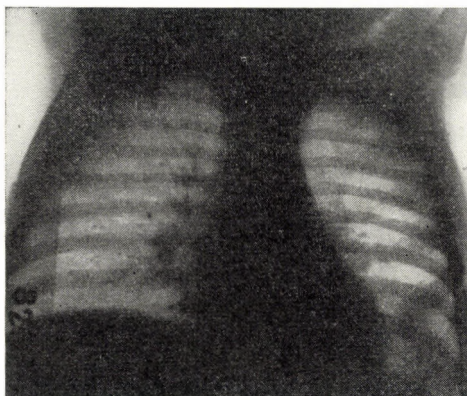


FIG. 4/a. B. E., aged 2 years. An intense shadow of an infant's palm size, with indistinct outlines, is seen in the left lower lobe

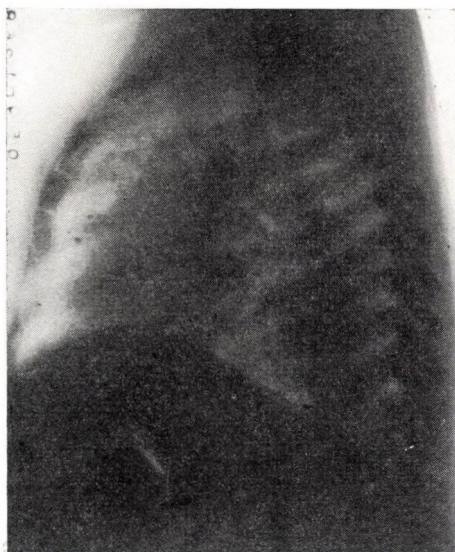


FIG. 4/b. The appearance of the former opacity in the frontal X-ray

fection responsible for these infiltrations. The changes appeared simultaneously with the onset of chickenpox, produced practically no clinical symptoms and caused no shift to the left in the differential blood count. (These

are the criteria suggested by ENDRESS and SCHNELL [4] to diagnose varicella pneumonitis). To rule out the possibility of mistaking these changes for those of bacterial pneumonia, patients with respiratory disease developed at the time of the onset of chickenpox or with increased leucocyte count at the time of examination were excluded from the study. It is just for this reason that we do not wish to discuss here the problem of bacterial pneumonia arising in the course of chickenpox.

It remains a problem why pulmonary bacterial superinfection is so uncommon in chickenpox, when (as we have found) radiological changes similar to those seen in measles, a disease characteristically accompanied by respiratory symptoms, were noted to occur in an unusually high percentage of our cases, without clinical symptoms. It is remarkable that in our hospital there should be just one case of chickenpox with respiratory complications for every 31 cases of measles associated with staphylococcal pneumonia [7]. VÁCZI [14] has pointed to the synergistic interaction apparently existing between certain viruses and bacteria concerning their invasivity, a phenomenon first described by STICKL [12]. In spite of the gross similarity of radiological changes (and of course also between the pathological changes in the background) induced by the different viral infections the single viruses must show some individual differences in promoting the development of bacterial superinfections.

SUMMARY

In 154 patients with chickenpox examined once or several times for X-ray changes in the lungs, enlargement of the hilar shadow with a more or less marked increase in the perivascular and peribronchial pattern could be demonstrated in 70 per cent. No clinical symptoms accompanied these changes, which were marked in 27.3 per cent of the cases

examined and were similar in quality to, but slighter than, those associated with measles. Miliary foci were not visible but a tendency to nodular shadow formation was observed in a few cases. In 3 cases the pulmonary pattern corresponded to varicella pneumonitis without clinical symptoms.

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