OBSERVATIONS ON THE MANIFESTATIONS OF RICKETS IN LIVERPOOL.

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It has been said that certain manifestations of rickets are more frequently seen in some districts than in others. One would be inclined to think that this might be accounted for by the keenness of individual clinicians to elicit a particular sign were it not for the fact that there is a certain measure of agreement between the physicians in different towns and countries as to the relative frequency of certain manifestations of the disease in particular districts. What accounts for this peculiar geographical localization of certain signs and symptoms of this disease is a matter of conjecture.

Incidence of Rickets in Liverpool.—Only within recent years has the extreme prevalence of rickets been realized. Osler pointed out that the incidence of pernicious anæmia in any district depended on the acuity of the local observers; similarly the records of the prevalence of rickets in any country depend on the acuity and experience of the observers. Clinicians adopt widely divergent standards of diagnosis, some diagnosing rickets when an infant has sweating of the head, flabby muscles, a protuberant abdomen and delayed dentition, while others maintain that the radiological evidence of bone changes alone is reliable. The bone changes at the wrist that can be shown radiologically are not the earliest pathological changes of rickets. The disease may be present at the end of the sixth week of life. With the technique at present attained in radiological photography it is not possible to show the detail needed for diagnosing early rachitic changes in the cranial bones or in the costo-chondral junctions in which the earliest bony changes occur.

The British workers in Vienna⁽¹⁾ have shown conclusively that very slight enlargement of the costo-chondral junctions is indicative of rickets, but it would be as absurd to label as rachitic every infant with beading of the ribs as it would be to diagnose anæmia in every infant whose hæmaglobin was below 100%, or to class as tuberculous every patient who gave a positive Von Pirquet test.

In Liverpool almost all infants of the hospital class between the ages of 6 and 18 months on careful examination show unmistakable clinical signs of early rickets, if one includes beading of the ribs, which is undoubtedly an early sign. It is exceptional to find a patient of this class wholly free from the disease.

Breast-feeding and Rickets.—It is commonly thought that breast-feeding prevents the onset of rickets. This belief is illusory, for although breast-fed infants are less prone to suffer from the severer manifestations of the disease during the first year of life, yet they are not wholly immune. That the disease may be well established even at an early age in a breast-fed infant is shown by the following case.

T.D. Male. Age 6 weeks. Breast-fed infant. Admitted as marasmus but died a couple of days later from broncho-pneumonia. There was definite beading of the costo-chondral junctions, but the epiphyses at the wrists were not noticeably enlarged. Sections of the former showed marked rickets, while sections through the distal epiphysis of the radius showed that the disease was present but was not so far advanced.

Comparatively few breast-fed infants are admitted to Alder Hey Hospital, but of them the majority show unmistakable clinical evidence of slight rickets.

Hess⁽²⁾ states that although breast-feeding protects to some extent against rickets it does not prevent it. Among the Russian-Jewish population in the tenement district of New York he found that 40% of the breast-fed infants showed radiological evidence of rickets. In reality the incidence of the disease must have been much greater. He notes that the babies were a particularly well-nourished group and that the diets of the mothers were liberal, containing an abundance of fat.

A fact that does not seem to have been emphasized in the literature is that although breast-feeding diminishes the severity of the disease during the first year of life, it exerts absolutely no preventive action against the development of rickets in the following years. An inquiry into the histories of twenty-five patients between the ages of eighteen months and four years who showed radiological evidence of severe and active rickets elicited the surprising fact that 76% had been wholly breast-fed for three months or longer. An analysis of the figures showed that 20% were breast-fed for more than three months but less than six months, 32% were breast-fed for nine months, while 24% were breast-fed for over a year.

To ascertain the proportion of infants in Liverpool that are breast-fed for three months or longer I examined the records of four hundred healthy infants who had been brought to infant welfare centres. It was found that 65% were wholly breast-fed for three months or longer. There was, however, reason to believe that the true proportion of breast-fed infants was less than this figure. I am unable to account for the large proportion of rachitic infants in whom a history of breast-feeding was obtained, unless it be that among patients of the hospital class there is a small proportion of women who are so poor that they have no choice but to breast-feed their infants. Women living in such dire poverty are unable to provide suitable hygienic surroundings for their infants, who are thus more prone to suffer from rickets.

Craniotabes.—In Vienna⁽¹⁾ a third of all rachitic infants suffered from craniotabes. Hess⁽²⁾ states that craniotabes is regarded by many clinicians as one of the earliest and most reliable signs of rickets and that it is present in 10% of infants (presumably in New York) at the age of six months.

De Buys⁽³⁾ working in New Orleans states that 60% of infants born in the winter months suffer from craniotabes at the age of four months. In Liverpool craniotabes must be a very rare manifestation of rickets; I have examined a hundred rachitic infants and carefully searched for this condition but have failed to detect a single example. Nor have I ever noted an instance of this condition among the many hundred rachitic infants I have seen. Inquiries from my colleagues in this hospital have elicited the answers that they have never seen a case.

Sweating.—Sweating is stated in many textbooks to be one of the earliest symptoms of active rickets. The rachitic infant's brow is said to be bathed in perspiration, the pillow-slip bearing the moist imprint of the baby's head. I have carefully examined many rachitic infants in hospital, both young infants who showed the early signs of rickets and older children who showed well-marked radiological evidence of active rickets, and can state dogmatically that these patients, while in hospital at least, do not perspire. The brows of a few may be moist, but profuse sweating does not occur. Going through an infants' ward recently I noticed a baby who was perspiring freely about the head; this patient was being treated for bronchitis and malnutrition, and on examination I failed to detect any definite evidence of rickets. In Vienna⁽¹⁾ sweating is a rare symptom. Both Hess⁽²⁾ and Mackay⁽⁴⁾ state that sweating cannot be regarded as pathognomonic of rickets.

Nervous Complications.—Some authorities emphasize the nervous complications of rickets. Tetany is stated to be a complication of rickets frequently seen in Glasgow. During the eighteen months that I have paid special attention to the study of rickets in Liverpool I have seen only two cases of tetany and these occurred in children who showed no signs of severe rickets. I have not seen a case of laryngismus stridulus in eighteen months at Alder Hey. Although cases of convulsions are common, they do not occur in patients suffering from severe rickets.

Marasmus and Rickets.—It has been stated that marasmus and rickets are rarely found together. Marasmus is an indefinite term and as commonly used connotes a variety of different conditions. In infants diagnosed as marasmic I have frequently found clinical evidence of early rickets and on several occasions have confirmed the diagnosis by histological examination of the costo-chondral junctions after death, as in the case mentioned earlier in this article. Hess⁽²⁾ has pointed out that the manifestations of rickets are most marked during active growth and that any illness that retards growth tends to cure the rachitic condition.

Catarrhal Complications.—It is commonly stated that rickets predisposes to bronchial and intestinal catarrh and there seems to be some experimental evidence to support this view⁽⁵⁾. Owing to the well-nigh universal incidence of slight rickets among infants and young children of the hospital class it is hard to formulate a reasoned judgment on the subject. I can present no

figures, but I have formed a very definite clinical impression that patients with radiological evidence of active rickets are not more prone to develop catarrhal complications than are other children in the same wards.

Osseous Lesions.—In Newhaven⁽⁶⁾ in America 90% of infants under six months of age are said to show radiological evidence of rickets. My experience in Liverpool has been that there is usually little or no evidence of rickets in radiograms of the wrist before the end of the first year. In a few cases some fuzziness at the distal end of the ulna may be apparent, but in the majority of cases there is no definite evidence of rickets in the radiograms of infants under a year even in the presence of active clinical rickets. Why the disease in Newhaven should produce such early osseous lesions is not easily explained, unless it is merely due to a different standard of interpretation of radiograms. In my work I have not regarded a slight degree of osteoporosis or splaying of the distal end of the radius as pathognomonic of rickets.

Tenderness of the Limbs.—Tenderness of the limbs in florid rickets is a point emphasized by the older writers. I have never been able to satisfy myself that this is a characteristic sign of rickets. After one has overcome a child's initial nervousness the rachitic patient does not appear to resent being handled. Certainly in older children who radiologically show acute rickets, tenderness is not usually present. Probably the belief that tenderness of the limbs is characteristic of rickets is a survival of the days before the clear differentiation between rickets and scurvy.

The Radiological Cure and the Clinical Cure.—Mellanby⁽⁷⁾ has shown that in animals radiograms of the bones is a true criterion of the degree of severity of rickets. In children the healing process may be visualised in a series of radiograms of the wrist taken at frequent intervals and the curative value of any specific therapy may so be appraised. It is probably correct to state that radiograms of the wrist give a true picture of the disease; without them it is impossible to judge whether the disease is active, healing or cured.

The radiological cure of the disease does not always synchronize with the clinical cure. The radiogram may show calcification and definition of the bones, but the big square head, the beading of the ribs and the deformities of the lower limbs may persist for many months.

J.T. Age 2. The radiogram taken on admission showed severe and active rickets. Very marked genu varum was present. After nine months' treatment with cod liver oil, anti-rachitic diet and irradiations with an open-flamed tungsten-molybdino-cored carbon-arc lamp, a radiogram showed calcification of the bones at the wrist. The bowing of the legs persisted, in spite of daily massage, moulding and recumbency, and was almost unaltered four months after the radiological cure.

Contrasted with the older methods of treatment the newer methods produce very rapid calcification of rachitic bones. Elsewhere I have described⁽⁸⁾ the rapid calcification produced by the oral administration of irradiated cholesterol. It seems doubtful whether in the treatment of patients suffering from marked deformities it is advisable to employ methods of

treatment that result in very rapid calcification of bones, which must retard the tendency to natural cure, decrease the curative value of massage and daily moulding of the part and render more frequent the need for osteotomy.

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