RECENT ADVANCES IN MEDICAL SCIENCE.

MEDICINE.

UNDER THE CHARGE OF

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Rickets and Osteomalacia. Microbic Cyanosis.

Late rickets, and the relationship between rickets and osteomalacia.—Looser contributes a long and important paper (*Mitth. a. d. Grenzgebiet. Med. u. Chir.*, Jena, 1908, Bd. viii. SS. 678–744) on this difficult subject. The case on which the paper is based is described in great detail; its leading features are as follows:—The patient was a prematurely born imbecile, and probably, but not certainly, suffered from rickets in infancy. At the age of 13 he fractured his femur from very trifling violence, and at that time it was noted that he showed the ordinary "sabre deformity" of the tibiæ, increase of the tendon reflexes, and general extreme muscular irritability. Spontaneous fractures recurred during the 15th and 16th years, and there was contemporaneous enlargement of the epiphyses. In consequence of the fractures and spontaneous bending of the long bones, the limbs became unusually deformed (the photograph shows the legs as completely doubled back on themselves, as well as a marked enlargement of the epiphyses of the wrists, and scoliosis), and one of them had to be amputated on account of pressure ulcers due to its abnormal position. From the 17th year no more fractures; the skeleton has since that time consolidated. The patient is now 27 years old. A careful examination was made of the amputated limb; for details of the histology, the original must be referred to.

When one tries to place such a case in any of the recognised categories of disease, rickets has first to be considered. As the first and clearest evidence of that disease, the bones of the amputated limb showed periosteal and endosteal deposits of imperfectly calcified substance; second, there was deficiency of the zone of temporary calcification of the epiphyses, and enormous overgrowth of the epiphyseal cartilages. The appearances, however, differed to this extent from rickets, that the atrophy of the older parts of the bones was more marked than in that disease. This, however, does not exclude rickets; it is explained by the age of this patient as compared with that at which rickets ordinarily occurs. Further, the case undeniably presents clinical and anatomical resemblances to osteomalacia,—the fragility of the bones, the muscular hypertonus, the exaggerated reflexes, and the atrophy of the bones. Ostitis fibrosa,

osteogenesis imperfecta, syphilis hereditaria tarda, and scorbutus can all be excluded by the microscopic appearances.

After a study of the reports of late rickets and juvenile osteomalacia, Looser confesses his inability to find any criterion by which the one can be distinguished from the other: late rickets and juvenile osteomalacia form an indivisible whole, from which "rickety" alterations in the cartilage are never absent, and in which atrophy of bone is a prominent symptom. *Clinically*, all grades are described, from a mild, curable disease to the most aggravated fatal types; the latter, if we dismiss from our notice the typical rickety changes in the epiphyses, realise in all respects the picture of the worst forms of adult osteomalacia. Up to the present about sixty cases are on record, two-thirds in girls, one-third in boys. The cases fall into two groups, according to the origin of the disease—(1) In the smaller group the malady began in infancy, and progressed steadily into later childhood or adolescence. Such children either walk very late, or never learn the art at all; they are in miserable general health, and show excessive deformity of the limbs and spine, with enlargement of the epiphyses. (2) More common than these is genuine late rickets. This occurs either as a recidive of rickets which has been recovered from in childhood, or, more frequently, develops for the first time between the 11th and 17th years, or later. The development of the previously healthy patient undergoes arrest; he is easily tired, complains of pain in the bones, and gives up walking; simultaneously therewith the epiphyses enlarge, and, unless the patient is safeguarded, deformities, such as kyphosis, bending of the limbs, genu valgum, malformation of the pelvis, take place. No deformity has been described in late rickets which has not also been recorded in juvenile osteomalacia, and *vice versâ*. At the height of the malady the development is very backward; the patients are infantile, the eruption of teeth ceases, and the onset of puberty and the acquirement of the secondary sexual characters is retarded. Fragilitas ossium occurs in almost all bad cases; the bones are as brittle as in the worst forms of adult osteomalacia. Union of the fractures is slow, but pseudo-arthroses are rare. Radiograms of both late rickets and juvenile osteomalacia regularly show—(1) Epiphyseal enlargement, (2) broadening and irregularity of the epiphyseal cartilages, (3) osteoporosis and atrophy. Analysis of fifteen post-mortem reports shows that, whatever the disease was called, there was always atrophy of bones and enlargement of the epiphyses. It is as impossible to separate the two diseases by reference to the age of the patients as on pathological grounds. Juvenile osteomalacia may begin before the 10th year, and late rickets after the 20th. They are therefore one disease, characterised by defective calcification of the newly deposited bone, atrophy of bone, and epiphyseal swelling; the more severe these changes, and the later their occurrence, the closer the resemblance to adult osteomalacia.

In addition to the above group of cases, some of the *common deformities of adolescence* undoubtedly come under the same heading. These are kypho-scoliosis, genu valgum, genu varum, and coxa vara. The essentially rickety nature of these was pointed out by Mickulicz, who found a moderate degree of broadening, and irregularity of the proliferating zone of the epiphyseal cartilage in genu varum; he also

described beading of the ribs and enlargement of the lower ends of radius and ulna as common in this series of affections. Thiersch confirmed these observations in genu valgum. In coxa vara, changes suggestive of osteomalacia were described by Langhans; of rickets, by Haedke. More recently, Schmorl, by a systematic examination of the bones of all the young subjects who came to the post-mortem room, could demonstrate moderate degrees of rickety change in many patients dying of other diseases, and clinically showing no evidence of rickets. Mild or commencing late rickets may show no clinical sign of epiphyseal swelling, as such case-histories as the following prove: An 18-year-old girl began to complain of weariness in walking; no epiphyseal enlargement until three months later.

The latter part of Looser's paper is almost entirely pathological, and concerns the relation of rickets to osteomalacia in general. He sketches the history of the question. Before Virchow's time the diseases were regarded as fundamentally the same: rickets the osteomalacia of the growing bone, osteomalacia the rickets of the mature bone. Virchow changed this: rickets was a disease of cartilage, the other of bone; rickets a hypertrophic, osteomalacia an atrophic, process. Subsequently Cohnheim and Kassowitz favoured the unity of the two diseases, the changes being, in the view of the latter, due to an "inflammatory hyperæmia." Pommer came to the same conclusion, and later work is rather in the direction of interpreting the nature of the changes, than in drawing distinctions. Looser then gives his own observations on the histology of the condition, and concludes that rickets and osteomalacia are a single identical affection, which may affect the skeleton at any age, but is most liable to do so at the periods—infancy and adolescence—when skeletal growth is most active. The clinical and anatomical characters are modified by the different physical circumstances at different periods of life.

Microbic cyanosis.—Under the heading "Enterogenous Cyanosis," the literature of this subject was given in abstract in this Journal in April 1906, and since that time some further important observations, made on the condition by Gibson in this country and Blackader in Canada (*Med. Journ.*, N.Y., 1907, March 16), have independently shown that it may arise from the invasion of the blood stream by the colon bacillus. Gibson and Carstairs Douglas (*Lancet*, London, 1906, July 14) describe the following instance of the malady. The patient was a lady, æt. 36, who had suffered for some years from headaches, giddiness, and faintness, and latterly from diarrhœa and general gastric disturbance. Her most obvious symptom, however, was cyanosis; the face and hands had a lavender hue, and the lips, ears, and nails were almost as dark as bilberries. There was no clubbing. The blood showed evidence merely of a moderate secondary anæmia. Urine was of low specific gravity, with a trace of pus and albumin; low percentage of urea, and a few hyaline casts. The first suggestion made was that the lady suffered from blood destruction, caused by a too free indulgence in aniline derivatives, which she had been using for the relief of headache; it was accordingly decided to eliminate these as a possible cause. Notwithstanding abstinence from such drugs, the cyanosis did not become less, but after the expiry of eight months was just as intense as it had ever

been, although it varied somewhat from day to day. A diagnosis of methæmoglobinæmia, due to changes in the intestine, was then made. Blood from the ear gave the characteristic spectrum of methæmoglobin in dilute solution,—the narrow band in the red between the C and D lines, as well as the ordinary bands of oxyhæmoglobin at D and E. It yielded a crimson solution in water, instead of a red solution, as ordinary blood does. On the addition of ammonium sulphide the characteristic phenomena of the methæmoglobin spectrum were perceived,—that is, the red band disappeared promptly, leaving the bands of oxyhæmoglobin at D and E, while these merged more slowly into the broad, ill-defined band of reduced hæmoglobin. The blood was tested for the presence of nitrites by the addition of sulphanilic acid, naphthylamine, and acetic acid,—a method of such delicacy that so little as $\frac{1}{4200}$ gr. of nitrous acid can be detected. The reaction was positive. The saliva gave a much more pronounced reaction than normal saliva. The fæces were acid, very offensive, but not unduly rich in sulphuretted hydrogen, and gave only a slight nitrite reaction. They contained no blood, and did not produce methæmoglobin when incubated with fresh ox blood. These facts, therefore, indicated that methæmoglobin was very distinctly present in the blood, but not in the stools; that nitrites were present in the blood and saliva, but only in traces in the fæces; and that the latter were destitute of any power of altering the normal hæmoglobin of ox blood to methæmoglobin. This seemed to point to a hæmatogenous formation of nitrites, possibly due to bacterial activity there. Further research showed that an organism of the colon group could be obtained in pure culture from the blood. Provisionally, Gibson interprets the case thus: From an original source of mischief in the bowel a systemic infection occurs; nitrites are being continuously produced in the blood, and therefore a varying quantity of hæmoglobin is converted into methæmoglobin. In a later communication (*Quarterly Journ. Med.*, 1907, October) the further progress of the case is related. Following a careful course of intestinal antisepsis, the cyanosis has shown great abatement. Spectroscopically the blood shows no abnormality, only the oxyhæmoglobin band being present. There is still, however, a trace of nitrite, but no *Bacillus coli* can be grown from it.

SURGERY.

UNDER THE CHARGE OF

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On the Treatment of Sarcoma.

Within the last few years surgeons have shown a distinct tendency to adopt a more conservative attitude with regard to the treatment of sarcomata, particularly sarcoma of the bones of the extremities. The operation of high amputation, formerly recommended for all sarcomatous growths, has failed to justify the claims put forward for it. The first