A Lecture

ON THE

ACUTE NECROSIS OF GROWING BONES.

DELIVERED AT THE HOSPITAL FOR SICK CHILDREN.

BY

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I HAVE chosen for the subject of my lecture to-day a disease, with the ordinary progress and consequences of which you are all sufficiently familiar in the full-grown adult, but which in children and growing adults presents certain peculiarities, which I cannot but think worthy of your attention.

The acute necrosis of young children is the disease which, perhaps, beyond all others, has most impressed me as deserving of more notice than it has hitherto met with; and that on account of its frequency, the serious consequences it produces, and the want of a definite or detailed account of it in the surgical treatises of the day. The most complete—and, so far as I know, the only—history of this affection is to be found in Mr. Holmes's article on the Diseases of the Bones, in the third volume of his *System of Surgery*.

As most of you are aware, the increase of the body in height is mainly dependent upon the growth of the bones of the lower limb and of the bodies of the vertebræ. This growth of the femur and tibia in a longitudinal direction is due to the continual increase and synchronous ossification of the layer of cartilage separating the epiphyses from the diaphyses of these bones; while the spinal column adds to its length by the growth and ossification of the cartilage lying between the bony body of the vertebra and the interarticular fibro-cartilage, and subsequently by the formation of a secondary centre of ossification at the upper and lower rim of the body of each vertebra.

Of course, the increasing depth of the pelvis and the growth of the tarsal bones add somewhat to the general stature; but I repeat that the chief additions to the length of the human body are made at the epiphysal lines of the bones of the lower limb and at those of the bodies of the vertebræ.

The growth of the spinal column in length may be roughly but strikingly illustrated by comparing its increase with that of the spinal cord, and noticing the degree of obliquity of the roots of the lower lumbar nerves. The point at which each nerve leaves the spinal cord indicates the part of the cord which was originally opposite the foramen, out of which the nerve leaves the spinal canal; and the distance between the point of exit from the cord and from the canal shows how much the spinal column has outgrown the spinal cord in that region. (See Humphry, *On the Human Skeleton*.) At the third month of foetal life the spinal cord reached as low as the last bone of the sacrum; in the adult, it extends only as low as the second lumbar vertebra. But this growth of the spinal column, great as it is, is far exceeded by that of the femur;

which of all the long bones is the first to show an epiphysis or secondary centre of ossification. Indeed, at birth, the only epiphyses which are formed among the long bones of the body are those at the lower end of the femur and at the upper end of the tibia; and, in accordance with the general rule with regard to epiphyses, that those first formed are the last to disappear, this lower epiphysis of the femur is the last to ossify to its corresponding shaft—remaining separate until about the twentieth to the twenty-fifth year.

From tables constructed by Dr. Humphry, to be found in his work *On Osteology*, it appears that the relative lengths of the spinal column and the femur at birth may be stated as 7 for the spine to 4.3 for the femur; while, when growth is just complete, the spine stands at 18.5 to 15.8 for the femur. Thus, while from birth to manhood the spine has grown a little more than its own length and a half, the femur is three and a half times as long as it was at birth.

From the same source, we can gather that at birth the femur forms 22.94 per cent., or nearly a quarter of the whole length of the body; in adult life, it forms 27.51 per cent. of the same; while the spine at birth is 31.48 per cent., in adult age 34.15 per cent. of the whole body.

To further illustrate the great activity of growth in the epiphyses of the femur, let me remind you that the growth of the spinal column is carried on at twenty-four different ossific centres; that is, at the central bony nucleus in each vertebra, while the longitudinal increase of the femur takes place but at two points, the upper and lower epiphysal lines.

I have ventured to occupy your time with these details, as I believe their consideration may help to explain the frequency of necrosis and other allied affections in certain bones of children and growing adults. It is in these parts of the osseous system where are found separate centres of vitality and growth, that disease is most likely to occur; and the more active the growth at any one point, the more prone to disease will that point be. In the long bones, or those parts of them covered by periosteum; and where the compact structure predominates, or where they are exposed to changes of temperature and external violence—the disease of the bone will generally be sudden in its access and rapid in its progress, and will quickly produce those changes which we sum up under the term necrosis; while, if the bone be chiefly composed of cancellous tissue and surrounded by soft parts; if it be but little invested with periosteum; and be, from its position, protected from external violence and changes of temperature—the disease will be gradual in its onset, insidious in its progress, and will more slowly produce that gradual destruction of the osseous tissue termed caries.

To quote a few examples in illustration of my meaning, I would point to the bodies of the vertebræ, which, from their position and connection with surrounding parts, will, if my statement be true, be liable to caries, and but little exposed to necrosis. In the last two years, I have collected, from my outpatients' books, ninety cases of caries of the bodies of the vertebræ, and all well marked instances of the disease. I have never seen, and probably you have never seen, a case of necrosis of the same bones.

Again, it is very uncommon to meet with an instance of acute necrosis of the head of the femur—though I have known the occurrence of such an affection—and this is as one would expect from the position and connections of this part of the bone; while, during the last two years, fifty cases have come to this out-patients' room, of hip-joint disease, where there was evidence of a carious condition of the head of the bone. On the other hand, the shaft and lower end of the femur are commonly enough attacked by necrosis. Again, I would remind you of the extreme infrequency of necrosis of the bones of the tarsus and carpus; of their liability to caries; of the liability of the phalanges of both fingers and toes to necrosis; of their general exemption from caries.

This difference in the liability of bones to be attacked by one of the two diseases, necrosis or caries, seems to depend (I repeat)—

1. On the composition of the bone, whether the cancellous or compact structure predominate;
2. On the position of the bone, whether it be protected from external violence and changes of temperature, or not;
3. On the presence and extent of, or the absence of, a fibrous periosteal investment.

To both necrosis and caries, the bones of children and growing adults are particularly liable; and I believe this liability is due to the increased vascularity and sensibility of these parts during their period of growth and development; rendering them highly resentful of external injuries, and prone to serious disturbances in their circulation, when exposed to extremes or sudden variations in the external temperature.

If any one will take the trouble to examine the membrane covering one of the long bones of a child, in its soft, vascular, and almost succulent texture, and in the ease with which it is separable from the bone, he will scarcely recognise its identity with the dense, dry, and tightly clinging, fibrous periosteum of a full-grown adult, from which it differs in texture almost as much as does a mucous from a serous membrane. During the last years of growth, and the early period of manhood, when growth has ceased, the soft, vascular, and rapidly ossifying structure forming the deepest layer of the periosteum, disappears; the membrane itself becomes thinner, from ossification of its deeper layers; it is denser, and more tightly stretched over the subjacent bone, with which its vascular connections are now less intimate, the blood-vessels having diminished both in number and size.

It is to this vascularity of the deeper periosteal layer in young persons that I would direct your attention, since it is this that peculiarly predisposes them to subperiosteal effusions from slight external causes—a condition, as I hope to show you, always imperilling the vitality of the bone, and not unattended with danger to the individual.

[To be continued.]

A CAPITAL OPENING FOR A PHYSICIAN. At 2 P.M. this morning, a noted physician of Carlisle reached Harrisburgh, Pennsylvania, in a buggy, having left that place two hours previously under the impression that the rebels were within one mile of him. He abandoned his house, furniture, and property of all description. (Telegram.)

Clinical Lectures

DELIVERED AT

CHARING CROSS HOSPITAL.

BY

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LECTURE VII.—ON PLEURISY. (Concluded.)

Case II. Case III. The Pain of Pleurisy. The Diagnostic Bearings of Pain in the Side. The Nature of Pleuritic Pain; its Non-dependence on Friction; its Non-coincidence with the Inflammation; is probably Reflex. The Diagnosis of Pulmonary from Costal Pleurisy. Important Part which the Inflammatory Results play. The Pathology of Catarrhal Pleurisy. Prognosis. The Persistence of Pleuritic Friction. What determines the divers Results of Pleurisy? Treatment.

CASE II. Sarah Russell, aged 19, presented herself among the out-patients at Charing Cross Hospital, May 2nd, complaining of severe stitch in her side, just under the right breast. It is much aggravated by attempting to take a deep breath; indeed, the pain is so great on trying to make a full inspiration that it is almost impossible to do so. She cannot lie on her right side. She dates the pain from a severe cold she caught on the night of the illuminations celebrating the Prince of Wales's marriage. This cold was attended with shivering, pains in the limbs, feverishness, and cough. A few days later the pain in the side was superadded, and has not left her since. She has now had it for three weeks.

On examining the chest, a strong pleuritic friction was heard at the seat of the pain, at the termination both of inspiration and expiration, especially the former. In every other respect the sounds of the chest were natural. There was no fever; the patient was pale and weak, with a depressed and rather anxious expression. I ordered perfect rest, the infraction of a sedative liniment, and internally opium, chloric ether, and quinine. I advised this patient to come into the hospital, but she refused.

A week afterwards she presented herself again, and reported that the right side was quite well, but that the pain had moved to the left side. Bearing in mind the physical evidence of the organic nature of the cause of the pain, I felt rather sceptical of this migration. On applying my stethoscope to the original seat of the sound and pain I found that all trace of rubbing was gone. But what was my surprise, on applying the stethoscope to the opposite side, to find an exactly similar friction-sound in an exactly corresponding situation! So that while the pleurisy, with its results, had been vanishing on one side it had been developing itself on the opposite. The two points, right and left, where the friction was heard, were exactly symmetrical; its disappearance on the right side was complete—not a trace was left; whilst on the left it was even louder than it had been on the right. The patient appeared to have caught no fresh cold; in her general condition she was better; and, had it not been for the pain, would have considered herself well, except that she was weak. She still refused to come into the hospital, and I prescribed the same treatment as I had done before. Since that time I have not seen her.

CASE III. Thomas Wingall, aged 17, a tall, well-made youth, with very little aspect of illness about him, a but-