OSSIFICATION OF THE SYNOVIAL MEMBRANE OF THE LEFT KNEE-JOINT IN A YOUNG MAN.

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TRUE ossification of a synovial membrane is, so far as we can ascertain, very rare, if not unknown; for we can neither find any description of nor any reference to such a morbid change in these membranes. It is true that ossification frequently takes place in the "loose bodies" which arise as polypoid growths from the inner surfaces of the synovial membrane, especially from that of the knee; and it is not unreasonable to suppose that the cells composing the membrane have the power, given the necessary condition, to form bone. But whenever hard, bone-like plates have been found in synovial membrane, they have, we believe, without exception been found to be composed of calcified, altered and diseased tissues, there being no trace of bone structure in them.

In the pericardium, pleura and in the tunica vaginalis plates of calcareous material are not infrequently found, but in none of these membranes, so far as we are aware, does ossification ever occur. In the dura mater, however, either small pieces or very extensive plates of bone are found not infrequently. The formation of bone in this membrane is perhaps explained by the fact that the dura mater acts as a periosteum to the inner surfaces of the bones of the skull; and it is only after the cessation of the growth of these bones that the dura loses its firm and close attachment to them.

In the case which we shall presently describe, true ossification of the synovial membrane of the knee had taken place, and the condition is not only of pathological interest, and as it were a curiosity, but one that might give rise to difficulty in diagnosis and treatment, as in the instance before us.

The notes of the case are as follows:

E. H., aged 26 years, a shoemaker, was admitted into the Northampton General Infirmary on April 11th, 1893, with enlargement of the left knee. He was rather tall and thin, but a healthy-looking man. The left knee-joint was much swollen, especially above the patella, where there was to be felt a large mass of bony hardness. There was some fluid in the joint which was much hotter than that of the right limb. There was no undue thickening of the lower part of the femur which could be felt behind the mass. The movements of the joint were limited and there was much pain.

When 14 years old (1881) he fell over a tree and hurt his left knee, which swelled, and after a time got better without special treatment. Five years later (1886) he had rheumatic fever, but two months previous to this attack he noticed that the left knee was enlarged. The fever kept him laid up for four months. Afterwards the knee remained enlarged and stiff but not painful until the beginning of 1893, when he took to riding a bicycle. After the exertion of cycling the knee became very painful and he had to lay up. The swollen knee was painted with iodine; but, getting no better, he applied to the infirmary for admission. There is no tuberculous history in his family.

The limb was placed on a back splint and kept quiet for a month; but, as the knee remained swollen and painful, it was determined to explore, and if necessary excise the joint.

On May 23rd, 1893, while under the influence of ether, the joint was explored, the usual antiseptic precautions being observed, when it was found that the whole of the synovial pouch above the patella and in front of the lower end of the femur was transformed into a hard bone-like casing, enclosing a cavity containing slightly turbid fluid, and communicating with the synovial cavity; in short, a pouch of the synovial membrane. As this condition could not very well be dealt with in any other way, the joint was excised by R. A. M. according to the usual method. The patella and the bone-like case above it, together with the articular ends of the femur and tibia, were removed. At the back of the joint there was a good deal of pulpy material, which was carefully cut away. The femur and tibia were fixed together by means of two steel pins driven in across one another, and these kept the ends of the bones together in a very good position. The limb was fixed in a Howse's excision splint, and the wound was dressed with cyanide gauze. There was no rise of temperature, and the pins were taken out on the tenth day. Recovery was uninterrupted. He left the infirmary on August 4th, 1893, wearing a leather splint, the knee being firmly ankylosed, and capable of bearing his weight. In November, 1893, the limb was quite straight and firm, and he was doing his work, at which he stood most of the day.

The parts excised were as follows:

I. Attached to the patella, which was of natural size, was a large, thick-walled synovial pouch. This pouch measured about $3\frac{1}{2}$ inches in length, $2\frac{1}{2}$ in breadth, and $1\frac{1}{2}$ in thickness,

and was of a pyramidal shape with four sides, the base being near the patella. Some idea of both the shape and the size of this pouch may be gathered from the drawing (Fig. 1), which

Fig. 1.—Mesial section of patella and suprapatellar synovial pouch. (a) Patella, (b) bony plates in thickened and altered synovial membrane. Natural size.

was taken from a mesial section through the pouch and patella. Each wall, which measured at least $\frac{1}{2}$ inch in thickness, was composed of a number of small, thick, flat pieces of bone, which varied from $\frac{1}{4}$ to $\frac{1}{2}$ inch in thickness, and which were joined together by a thin layer of fibrous connective tissue. The exterior of the pouch was covered by a continuous layer of fibrous connective tissue, whereas the interior was smooth though uneven, the greater part of the pieces of bone being here covered by a layer of fibro-cartilage. The cavity, which was in free communication with that of the joint, contained slightly turbid and altered synovial fluid. The anterior wall of the pouch did not quite reach the patella by about half an inch, and it was connected with it by a thickish layer of synovial membrane, which presented on its inner surface innumerable slender and delicate polypi, such as are often seen in rheumatoid disease. The posterior wall terminated abruptly near to where the femur had been divided at the operation. The cartilage of the patella was somewhat frayed on the surface, but not otherwise altered. Under the microscope the bony plates were seen to be composed of cancellous bone, the trabeculae being thick and the spaces large. In the trabeculae the lamellae were not very distinct, and the bone corpuscles were few in number and imperfectly formed. The spaces for the most part contained vascular adipose tissue, in which there were here and there small groups of small round cells. At the periphery the lamellae of bone trabeculae passed directly into the fibrous connective tissue which usually invests the synovial membrane in this situation, there being no intervening cartilage, and, indeed, no evidence anywhere of the formation of hyaline cartilage (see Fig. 2).

Fig. 2.—Section of one of the bony plates in the suprapatellar pouch. (a) Fibrous layer on outer surface; (b) trabeculae of bone; (c) cancelli containing cellular connective tissue and fat cells. $\times 60$.

II. In the lower end of the femur the margins of the condyles as well as those of the trochlear portion were lipped

and overhanging, as in rheumatoid disease; the articular cartilage was thin, frayed and in places, especially on the inner condyle, grooved antero-posteriorly, but the articular plate of bone was nowhere exposed; thus eburnation, so characteristic of rheumatoid disease, was absent. Further, the synovial membrane that covers the outer sides of the condyles for about half an inch from the articular margin was covered, just as that immediately above the patella, by innumerable slender and delicate polypi. The chief changes in the articular end of the femur are well shown in Fig. 3.

Fig. 3.—Lower end of femur, showing lipping of articular margins and grooving of articular cartilage. Natural size.

III. In the articular end of the tibia similar changes were observed, but there was in addition, in the middle of the upper surface of the inner tuberosity, a small, soft, or carious area of the bone, about the size of a pea, over which the cartilage had disappeared. This was the only spot in the bones where the hard tissue was replaced by soft. Under the microscope this soft area was seen to be composed of vascular and cellular connective tissue, resembling granulation tissue, the surrounding bone being in a state of rarefaction, the cancelli large, and occupied by small round cells. In the soft tissue there were no giant-cell systems nor any other indication of the tuberculous process, but where the bone was undergoing absorption the giant cells peculiar to bone, osteoclasts, were seen. The articular cartilage covering both tibia and femur showed the usual changes—namely, proliferation of cells with fibrillation of matrix, seen in rheumatoid disease.

To recapitulate: the formation of bony plates in the synovial pouch above the knee was found associated with (1) lipping of the articular margins; (2) fibrillation and thinning of the articular cartilage; (3) grooving of the same; (4) innumerable polypi on the inner surface of the synovial membrane; (5) a small area of softening, or caries in the inner tuberosity of the tibia; and (6) much pulpy substance at the back of the joint, removed at the operation, and unfortunately not kept for microscopic investigation.

The cause or causes which gave rise to this unique condition of the synovial membrane must at present remain unknown. Some of the changes, such as the lipping of the articular margins, fibrillation and grooving of the cartilage, favour the view that the condition is of the same nature as rheumatoid disease; but the age of the patient (26 years), the onset of the malady after injury when 14 years of age, the existence of a soft or carious area in the inner tuberosity of the tibia, and the presence of soft pulpy tissue at the back of the joint taken together make us incline to the view that the condition is of the nature of a chronic tuberculous disease; and that during the retrogression (return to quiescence) of the disease the connective tissue cells in the altered and thickened synovial membrane of the suprapatellar (sub-crural) pouch were induced from some cause or other to form bone.

The lipping of the articular margins, the formation of polypoid growths from the inner surface of the synovial membrane, fibrillation and grooving of the articular cartilage, and indeed even well marked eburnation of the articular ends are not unknown in chronic tuberculous disease of joints. One of us met with an example of lipping and eburnation a few

years ago in a young woman, aged 28, who suffered from a chronic affection of the bones of the knee-joint. Excision was performed, and good recovery followed. Not many months after chronic tuberculous disease of the shaft of the femur began, and this has continued with more or less suppuration up to the present.

We, therefore, suppose that after the injury to the knee, at the age of 14 years, there developed the usual form of tuberculous disease of the synovial membrane, the bones becoming to some extent implicated. This was never very active, and, after a time, became quiescent, the swelling being present five years after (at 19 years), and noticed before the onset of the attack of rheumatic fever. It is probable that during these five years from the receipt of the injury, the thickened synovial membrane becoming less vascular, the connective tissue cells formed bone instead of the ordinary dense fibrous tissue. So long as the joint was kept fairly quiet it gave rise to no trouble, but when used vigorously, as must be the case in cycling, then the old inflammatory changes were set going, and the joint became painful.

Such a change in the connective tissue is comparable to the change that takes place when a tendon becomes transformed into bone, and also when the interstitial connective tissue of muscle becomes likewise converted into bone (myositis ossificans).

This case, then, is merely an example—a rare one, it is true—of the transformation of fibrous connective tissue into bone. The exact nature of the process which leads to the formation of the bone, as above stated, remains at present unknown.

THE COMPARATIVE SAFETY OF SUPRAPUBIC LITHOTOMY, OF LATERAL LITHOTOMY, AND OF LITHOLAPAXY IN YOUNG MALES.¹

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BRIGADE-SURGEON-LIEUTENANT-COLONEL KEEGAN has published a paper² on litholapaxy in male children, in which he makes some very objectionable remarks on the truthfulness of statistics by English surgeons. Whilst it is impossible here to discuss his insinuations, it is equally impossible to pass them over in silence, lest this might be construed as implying acquiescence in them. I simply content myself with saying that his attack was quite unjustifiable and uncalled-for.

To return now to the main purpose of his paper, which was to show the safety of litholapaxy in young males. The statistics he presented showed that the litholapaxies performed by eight surgeons in various parts of India numbered 663, with a mortality of 2.71 per cent. The author asks, "Can the advocates of the suprapubic operation show such results as these?" and says rightly that it is incumbent on those who practise this as a routine operation in children to show that it is a procedure not more dangerous than lateral lithotomy or litholapaxy.

In the Cavendish Lecture by Mr. Henry Morris³ on Diseases of the Urinary Organs, the surgery of the genito-urinary tract was reviewed. The part of this paper to which I now wish to refer is that which deals with the suprapubic operation for stone. Although I place a much higher value on the suprapubic operation for many purposes than Mr. Morris does—notably for removal of tumours, of stone in adults not suitable for crushing, and for prostatectomy—yet my inquiry goes far to prove that he is right when he says that lateral lithotomy in boys is a safer operation than the suprapubic.

The two papers to which I have referred induced me to look into the question of the relative safety of the various operations practised for vesical stone in children, and to gather statistics from the records of public institutions.

I do not propose to contrast the mortality of operations for

¹ Read at a meeting of the Birmingham and Midland Counties Branch of the British Medical Association on March 8th, 1894.

² *Lancet*, May 27th, 1893.

³ *Ibid.*, July 17th, 1893.