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OSSIFICATION OF REGENERATED MEDIAL SEMILUNAR CARTILAGE

By

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About ninety cases of calcified meniscus of the knee had been reported up to 1939 including described by Eck (2). The first of fourteen subsequently recognized ossifications of the semilunar cartilage was reported by Wollenberg (7) in 1931. Evidently ossification is a rare occurrence. Still rarer is ossification of *regenerated* semilunar cartilage as described in the following report:

A white girl, aged 21, twisted her left leg while playing tennis in 1954. It caused pain on the medial side of the knee but play was not interrupted. Subsequently pain persisted and the joint locked on several occasions. After a month medial meniscectomy was performed and a plaster cast applied for ten days. The sutures were removed and physiotherapy and active exercise were prescribed, but the recommendations were ignored after three days. Nine months later flexion was limited to 125 degrees. There was no pain nor swelling of the knee but despite limited motion she continued to play tennis and soccer, using the left leg to kick.

At examination in December 1956, the scar was healed and flexion without pain was restricted as stated. The right thigh was 2.5 cm. larger than the left at the level of 20 cm. above the posterior edge of the patella. A limp was detectable only while running. There was a protuberance of about 0.5 cm. on the medial surface of the knee that enlarged at hyperextension. It disappeared at flexion of 150 degrees. Roentgenograms are illustrated in Figures 1A and 1B. The medial meniscus is abnormally dense (calcified?) and displaced 5 mm. into the soft tissue. There is osteoporosis, no fracture, and the articular space is normal. The right knee was visualized as normal. The blood

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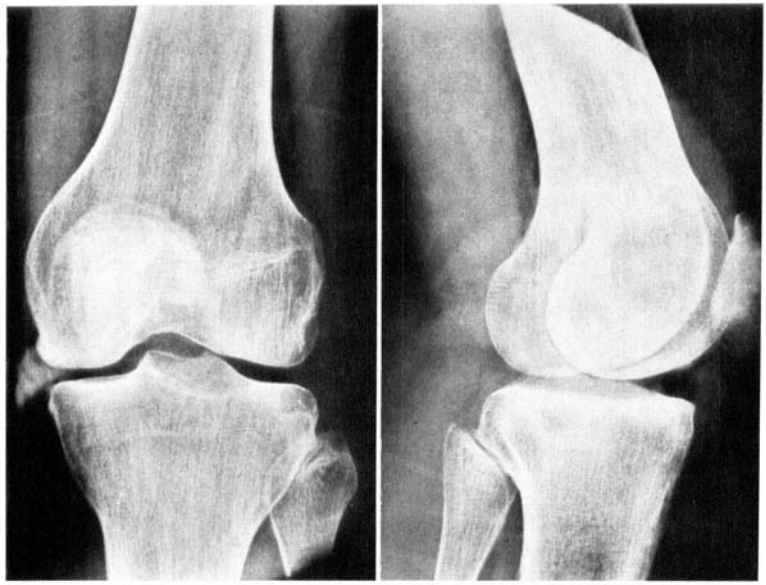

Fig. 1 A. *Fig. 1 B.*
Antero-posterior and lateral roentgenograms of the left knee.

count, hemoglobin, blood uric acid, sugar, calcium and phosphorus were normal in amount. The basal metabolism was —23 and —20.

A diagnosis was made of adhesions in the knee joint after removal of the medial meniscus, and possible calcific deposit in the place of the excised meniscus.

Under general anaesthesia, flexion beyond 125 degrees was not possible. After incision, the capsule contained a small amount of clear fluid and dense adhesions occupied the space between the medial femoral and tibial condyles. The regenerated medial meniscus was removed.

After this procedure the lateral stability of the knee seemed to be satisfactory. During flexion to 60 degrees other small adhesions were disrupted. The incision was closed and 25 mg. hydrocortisone was injected for the purpose of inhibiting formation of granulation tissue and subsequent new adhesions. Injection was repeated three and six days later. Posterior and anterior splints were applied. After twelve days, the splints were removed and active exercise begun.

About two months later there was active flexion to 85 degrees and passive flexion to 80 degrees. Extension was normally accomplished. The patient could walk and run with no pain and no restriction.

The Ossification: The excised regenerated semilunar cartilage mea-

Fig. 2 A. *Fig. 2 B.*

Fig. 2 A: The femoral face of the regenerated meniscus with two pieces of the fibrocartilage tissue from anterior and posterior horn. The semilunar surface is smooth and glossy.—*Fig. 2 B:* The tibial face of the semilunar cartilage shows the rough surface.

sured 6 by 2 cm. A denser central portion was 2 cm. in diameter and 9 mm. thick. The density on histologic examination proved to be osseous tissue not calcium as suspected. It was surrounded by fibrocartilage corresponding with the anterior and posterior horns of the meniscus. (See Figures 2A, 2B, 3A and 3B).

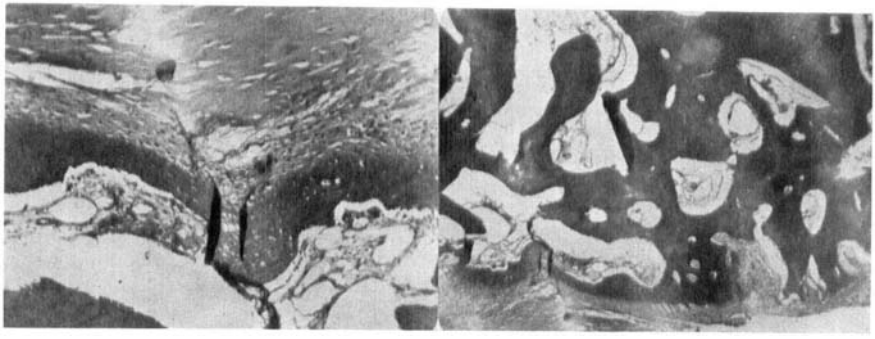

Fig. 3 A. *Fig. 3 B.*

Small and large magnifications of the histologic slide of the regenerated ossified meniscus. The section shows bone with another layer of fibrocartilage. A vascularized stratum is present adjacent to the bone. The bone appears continuous with the fibro-cartilage (hematoxylin and eosin).

COMMENT

Apparently calcification of the medial meniscus may be primary or nontraumatic, or secondary after an injury (Mandle (4)). The same holds true for ossification. Primary changes occur more often in older persons (1, 5) probably as a result of nutritional defects, aging and degeneration. The supraspinatus tendon, femoral-trochanteric bursas and intervertebral discs also may be involved indicating a general metabolic disturbance. The secondary form occurs at all ages after injury.

According to Leriche and Policard (3) heterotopic bone develops in three stages as follows: (1) an ossifiable medium develops as a result of degeneration of connective tissue to an embryonic state after trauma or infection; this is followed (2) by a deposition and resorption of calcium, and (3) subsequent ossification of the area affected.

In the subject of this report, ossification of the disc no doubt was secondary to the injury sustained or to the first operation or to both. It is questionable if the voluntary restriction of flexion, the flouting of instructions to exercise, and disuse favored the development of ossification or if the reverse occurred. There was adequate exercise obtained in the continued participation in sports.

In most instances of traumatic ossification the chief difficulty lies in limitation of flexion or extension or both. There are pain, tenderness, weakness, recurrent effusion and instability of the joint. If the ossification is extensive and involves the anterior portion of the meniscus, terminal extension of 15 degrees may be limited by elastic resistance suggestive of an unreduced "bucket handle" rent in the cartilage. Clinically and roentgenographically the lesion may be regarded as "loose bodies in the knee joint". The patient described here complained only of limited motion which she wished to have corrected. In general, when ossification or calcification follows trauma, excision of the meniscus usually restores normal motion.

SUMMARY

The first instance of post-traumatic ossification of a regenerated medial meniscus with limitation of flexion of the knee joint was observed. The meniscus was removed and hydrocortisone was injected into the cavity of the joint. The treatment restored the normal use of the leg.

RESUME

Le premier cas d'une ossification post-traumatique d'un ménisque médial régénéré avec limitation de la flexion de l'articulation du genou a été observée. Le ménisque a été enlevé et de l'hydrocortisone a été injecté dans la cavité de l'articulation. Le traitement a restauré l'usage normal de la jambe.

ZUSAMMENFASSUNG

Der erste Fall einer posttraumatischen Verknöcherung eines regenerierten medialen Meniskus mit Einschränkung der Beugefähigkeit des Kniegelenkes wurde beobachtet. Der Meniskus wurde entfernt und Hydrocortison in das Gelenk eingespritzt. Die Behandlung stellte den normalen Gebrauch des Beines wieder her.

ACKNOWLEDGEMENT

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