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INCARCERATING MEDIOPATELLAR SYNOVIAL PLICA SYNDROME

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A series of patients with a long history of similar knee symptoms is described. In 79 cases a medial parapatellar fold of the synovial membrane was found. After removal of this fold, at follow-up, 66 patients were completely free of symptoms, 8 had minor complaints, 1 was unchanged, 1 was worse, 2 had chronic synovitis and 1 patient admitted to a psychiatric department would not take part in the follow-up.

Key words: knee joint; medial patellachondromalacia; synovial plica

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Some years ago, exploring a case of suspected patellar chondromalacia, the author found a long white parapatellar sickle-formed fold in the synovial membrane almost resembling a meniscus, which stretched from the anterior joint compartment through the cleft between the medial femoral condyle and the patella and further into the suprapatellar recess. On slight flexion of the knee the synovial fold or pseudomeniscus slid tightly over the medial femoral condyle and onwards between this structure and the cartilage on the distal part of patella (Figures 1 and 2).

Corresponding exactly to this fold was an area of local synovitis on the medial femoral condyle, and continuous with it an invasion of the synovial membrane for about 2 centimetres on the cartilaginous surface. A 2 centimetre square area of chondromalacia was found on the medial facet of the patellar cartilage.

While a synovial membrane normally consists of thin elastic tissue, this structure was a firm inelastic fold, which on slight flexion of the knee was forced in between the patella and the femoral condyle, creating an irregularity of the cartilage surfaces. This fold was removed and the patient's symptoms disappeared.

In all later cases a medial parapatellar incision was selected in order to avoid primary section of the suspected synovial fold.

While the synovial fold at first was regarded as an isolated curiosity, it soon became apparent that it was part of a definite and not uncommon syndrome. The findings were photographed during the operation. The synovial fold underwent a routine histological examination.

The interdependent relationships between the plica, pannus and patellar chondromalacia became increasingly clear.

MATERIAL

Over a period of 8 years, until April 1978, 79 plical folds in 71 patients (51 male and 28 female) were operated on and photographed. In 8 patients the findings were bilateral. All the operations were performed on the medial side of the knee, and there were equal numbers of right and left knees. The patients' average age at operation was 31.2 years. In general the patients were physically active and more than two thirds had been athletes.

Many conventional treatments had been tried, including operation, immobilisation, injection, radiotherapy and physiotherapy, without permanent improvement. Twenty-five of the 79 knees had previously been operated upon on the medial side of the knee once or several times at various hospitals. All

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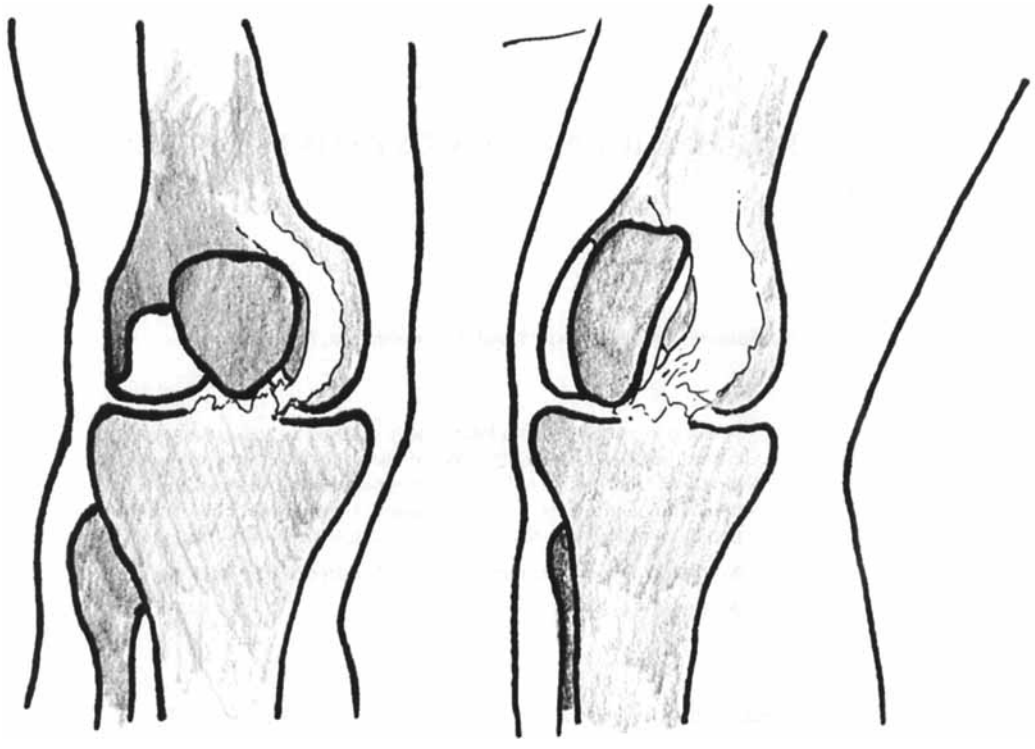

Figures 1 and 2. The position of the incarcerated fibrous plica which stretches from Hoffa's pad to the suprapatellar recess is shown. On slight flexion of the knee, the plica slides between the cartilage of the medial femoral condyle and the distal patella.

cases reported a long history of typical plica triad symptoms.

Seven of the cases also reported a shorter history of meniscus lesions, and upon examination bucket handle meniscus lesions were found. The meniscus lesion was the primary reason for operating, although both conditions were treated simultaneously.

Symptoms

The symptoms most frequently described are long periods with recurrent painful pseudolocking at the medial edge of the patella when the knee is passing 15–20° of flexion, frequently accompanied by an audible click and a tendency to give way. Not infrequently there is moderate pain on the inside of the knee at night which is relieved by straightening the knee. Swelling of the knee is unusual and is only slight.

Diagnosis

On examination a hard medial parapatellar band can usually be felt as it slides over the medial femoral condyle, there is usually local tenderness and frequently indirect pain on lateral rotation of the tibia. There is slight quadriceps atrophy, very slight or no effusion, normal movement of both knee and patella and normal position of the patella.

Arthroscopy which has been used as an additional diagnostic aid in the last 40 cases (with puncture lateral to the patellar ligament and 2 centimetres proximal to the joint line) gives exact diagnosis since the white sickle-formed fold can be seen in its full length.

Pneumoarthrography with axial views of the patella also offers a clear picture of the incarcerated fold *in situ* (Figure 3).

Operative findings

During the operation a medial parapatallar fibrous inelastic synovial fold was found running from the plica alaris and terminating in the suprapatellar recess or continuing into the edge of the opening into the suprapatellar bursa. The fold varied from a thin string 3–4 millimetres in thickness to a 26 millimetre broad, white meniscus-like structure tightly stretched in the sulcus between the medial femoral condyle and the patellar cartilage.

If the synovial membrane is dissected from the capsule before opening the joint, the deep interposition of

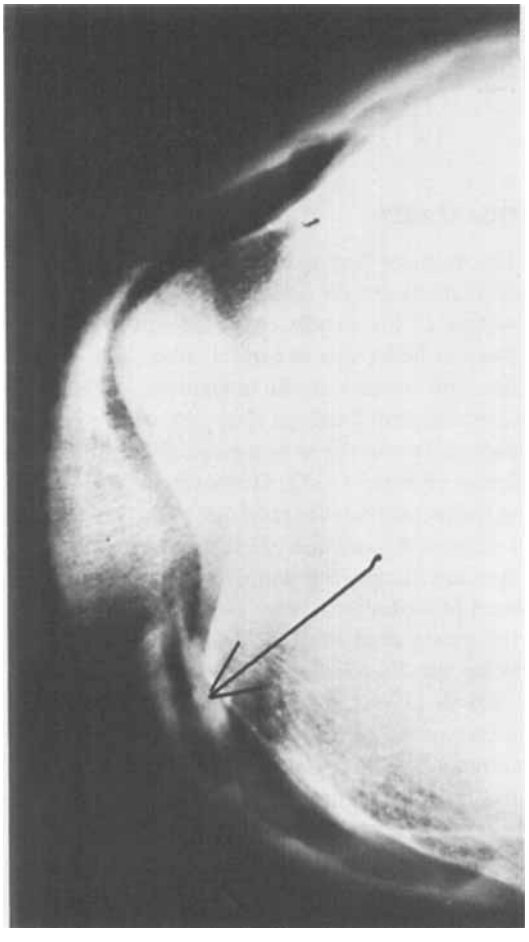

Figure 3. Pneumoarthrography of the knee in slight flexion clearly shows the incarcerated synovial plica.

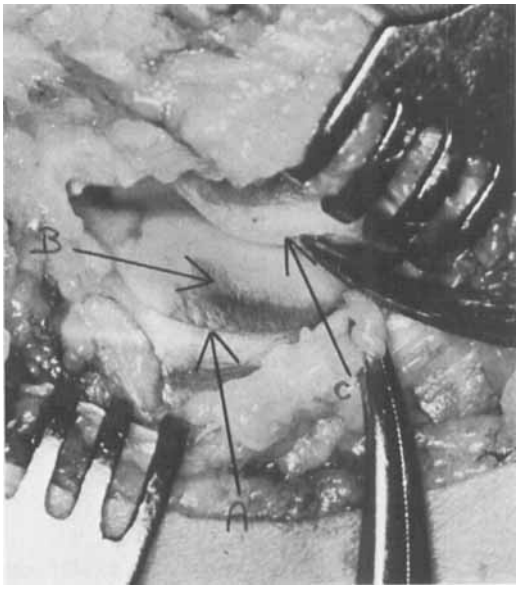

Figure 4. The fibrous synovial plica (A) which is stretched over the medial femoral condyle, the local synovitis (B) on the supramedial part of the femoral condyle, and the local chondromalacia (C) on the medial facet of the patella are clearly visible.

the plica between the cartilage surfaces can be seen. In the region where the plica forces itself in between the femoral condyle and the patella a local synovial invasion (pannus) is usually found on the femoral condyle, with more or less obvious synovial inflammation.

Additionally a local area of chondromalacia varying from a soft yellow fissured area to a more hypertrophic thickened soft cartilage was found near the "odd facet" distally and medially on the patella (Figures 4, 5 and 6).

OPERATIVE PROCEDURE

The treatment of the first 39 cases consisted of a medial parapatellar arthrotomy under tourniquet with removal of the plica, followed by a synovial Z-plasty with the knee in 20° of flexion to prevent renewed formation of the fold in the position in which symptoms occurred. In

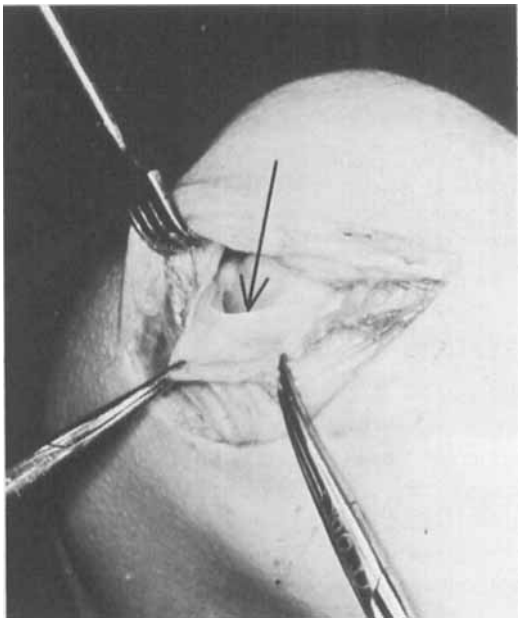

Figure 5. The incarcerated plica drawn to one side with forceps at the free synovial edge.

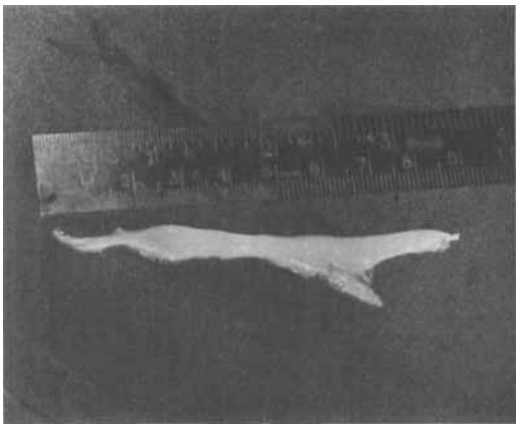

Figure 6. The meniscus-like fold after removal.

the remaining 40 cases the operative procedure was limited to removal of the fold and local synovectomy for a distance of 2 centimetres on both sides of the origin, without synovial suture or Z-plasty. The wound was closed and the joint forcibly distended with saline under pressure through a drain, which was then removed. This technique permits the application of an elastic bandage from toes to thigh (patellar concentric bandage) applied with more pressure than normal as the fluid in the joint is partly reabsorbed within the first few hours, and thus both external and internal knee pressures fall correspondingly. This procedure gives a good primary haemostasis, prevents intraarticular bleeding and the formation of adhesions, and permits small active flexion movements on the first postoperative day. Suction drainage or postoperative knee puncture has never been used.

With the exception of one case with capsule rupture treated by resuture, the postoperative course was without complications, and the average stay in the hospital was 4.5 days.

RESULTS

Of the 79 knees operated upon 78 were re-examined an average of 11 months after operation (in 2 cases, only 2 months after operation because of journeys abroad). One psychiatric patient refused examination.

Sixty-six of the 78 knees were completely without symptoms, although in 2 cases, only after re-operation with removal of proximal plica remnants. In 8 knees there were slight symptoms though they were greatly diminished after operation; in one knee symptoms were unchanged and one knee was worse after the operation. In 2 knees a chronic synovitis persisted.

DISCUSSION

The frequent finding of an isolated area of chondromalacia distally and medially on the articular surface of the patella is described by many authors as being due to special conditions of pressure and traction on the medial side of the knee. Concentrated stress on this part of the patellar joint surface has been suggested as an aetiological factor (Wiberg 1941). Furthermore, incongruity of the femoropatellar joint due to the existence of a ridge at the junction of the medial femoral condyle and the anterior part of the femoral shaft has been proposed as a factor contributing to the development of chondromalacia of the medial part of the patella (Outerbridge 1961, 1964).

Øwre (1936) suggested that chondromalacia occurs on the medial facet because the articular cartilage is thicker there than on the lateral facet, and he believed nourishment might be defective because of this additional thickness.

Goodfellow et al. (1976a, b) drew attention to the special load on the patellar ridge (which separates the medial from the "odd facet") during knee movement from extension to 90° of flexion.

Thus there is disagreement among authors as to the aetiology of the local lesion of the cartilage on the medial facet of the patella.

However, typically there is a history of frequent minor sports injury and also injury when kneeling at work. While the medial femoral condyle is well protected against direct trauma by the patella in the extended knee, this is not the case in the flexed knee. A greater area on the distally broader femoral condyle is then exposed medially to the patella, covered only by skin and the relatively thin capsule. Thus the tight synovial membrane is greatly exposed to direct trauma. Repeated minor episodes of traumatic synovitis are possibly an important factor in the activation of the "synovial scar", which on movements of the knee is drawn in and out between the medial

femoral condyle and the patella like a bowstring and thus acts as the precipitating factor in the "plica triad syndrome".

In his work on the arthroscopic anatomy of the knee joint, Iino (1939) was the first to describe the mediopatellar plica. He suggested that the plica represents a remaining part of a synovial septum of the fetal period.

This structure was found in about half of the knee joints he examined and its shape and size varied greatly from case to case. Iino called this medial parapatellar synovial plica the "band". Mizumachi et al. (1948) simply called it the "shelf" because of its shelf-like appearance.

Sakibara (1976) published an arthroscopic investigation of plica synovialis mediopatellaris ("Iino's Band") in a series of 100 knee joints prospectively selected among the Japanese. The existence of the plica was confirmed in 45 knee joints. According to the author, this medial plica only causes symptoms in the knee when it is so large that it completely covers the anterior surface of the medial femoral condyle or when it loses its elasticity. He found that derangement of the knee due to plica synovialis mediopatellaris seems to be rare, and concluded, "whether plica synovialis mediopatellaris is peculiar to the Japanese or not will be clarified in the future".

In our series we have found that the incarcerating mediopatellar synovial plica may cause an internal derangement of the knee, especially if the plica is thick, but also if it is thin and tightly stretched in the patellar-femoral sulcus. In all 79 operated knees the mediopatellar incarcerating string or plica was totally inelastic and probably caused the consistent finding of isolated chondromalacia near the "odd facet" and local synovitis on the femoral condyle.

Since the condition described in the present paper appears to be common, the question arises as to why it is not found in connection with routine arthrotomy of the knee. By using the parapatellar approach which is parallel to the plica, one avoids transsection of the structure which thus remains uninjured; if transsected the fold loses its tension and falls back along the capsule where it lies undetected unless the surgeon is aware of its existence and significance.

CONCLUSION

Sixty-six out of a series of 79 knees have been cured of symptoms by excision of the medial synovial plica.

It must be emphasised that most of the operated knees had been subjected to the full spectrum of conventional treatment, without permanent improvement. In fact, medical treatment had been abandoned in most cases. Since excision of the plica relieved the disorder in the majority of patients in this difficult category, the mechanical significance of the mediopatellar plica in the triad seems to be confirmed.

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