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Case Report

A case of bilateral posterior medial meniscus root tear: Partial menisectomy versus pull-out suture repair

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ABSTRACT

The meniscal roots are sites where the knee meniscus attaches to the central tibial plateau, adjacent to the tibial insertions of the cruciate ligaments. Medial meniscus root tears (MMRTs) are commonly associated with other intra-articular pathology and have a debilitating effect on knee kinematics due to loss of circumferential hoop stresses. Many surgical options for repair have been described in the literature including partial or total menisectomy, pullout sutures and suture anchors. We present a unique case of a 27 year old female who sustained a bilateral posterior horn MMRT. One knee was repaired using the pullout suture technique and the other knee underwent partial menisectomy. We found no significant difference in Lysholm scores in the short or medium term between the two methods. To our knowledge, this is the first reported case of a bilateral medial meniscus root tear.

1. Case report

A 27 year old female housewife presented with a 1 month history post-traumatic bilateral knee pain and intermittent swelling, interfering with her activities of daily living.

The patient allegedly had a twisting injury to both knees with subsequent pain and swelling and decreased range of motion bilaterally. The pain was continuous, non-radiating, aggravated on bending & sitting, relieved on lying. The patient complained of reduced mobility of both knees with an impact on her activities of daily living. There was no history of locking or giving way. There was no audible pop at the time of injury. There was no history of constitutional symptoms or any co-morbidities.

On examinations, both knees had postero-medial joint line tenderness with evidence of swelling. The medial McMurray test was positive bilaterally as was the squatting test and Thessaly test. The patient's range of motion was restricted bilaterally to 80° flexion. There was no evidence of ACL, PCL, MCL, LCL or lateral meniscus damage. There was no evidence of distal neurovascular deficit.

Lab investigations revealed elevated CRP (36.0 mg/L) but were otherwise normal. Radiographs revealed bilateral Kellgren-Lawrence Grade I osteoarthritic changes (Fig. 1). MR imaging revealed bilateral posterior medial meniscus root tears

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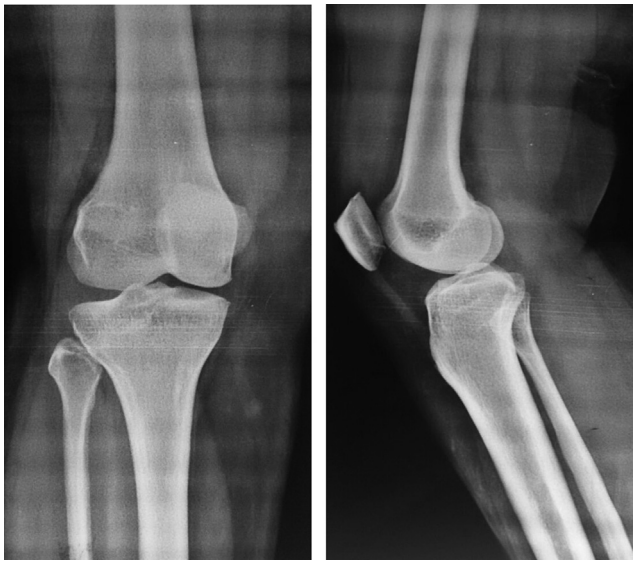

Fig. 1 – Pre-operative antero-posterior and lateral radiograph of the right knee.

with root extrusion posteriorly (Fig. 2). There was evidence of slight effusion but no other structural damage to the knee joint.

We performed a left knee arthroscopic pull-out repair of the MMRT, using Ethybond © 2-0 suture and Arthrex © suture disc, and a right knee arthroscopic partial menisectomy of the MMRT (Fig. 3 and Fig. 4). Post-operatively the patient was immobilized in a bilateral knee brace in extension with isometric strengthening exercises beginning on the first post-operative day. The patient was made full weight bearing as tolerated with crutches. Progressive active assisted range of motion exercises and active range of motion exercises were started at the end of the first post-operative week.

The Lysholm scores for the patient were recorded pre-operatively, at 2 weeks and at 3 months (Fig. 5). At 2 weeks and 3 months follow-up the patient was pain free and had good range of motion of both knees. There was no local or systemic post-operative complications. At around the 1 month mark the patient was able to return to most of her activities of daily living without pain.

2. Discussion

The meniscal roots are the sites where the knee meniscus attaches to the central tibial plateau,[1] adjacent to the tibial insertions of the cruciate ligaments. The posterior horn of the medial meniscus inserts directly anterior to the tibial insertion of the posterior cruciate ligament, on the down slope of the posterior intercondylar fossa behind the posterior horn insertion of the lateral meniscus.[2] The posterior root attachment site of the medial meniscus is critical for maintaining normal meniscal positioning, preventing extrusion and preserving meniscal function.[3] The partial immobility of the posterior horn, related to the adhesion of the medial meniscus to the MCL, makes this portion of the meniscus more susceptible to damage by axial and radial forces.[4,5]

The etiology of MMRTs is controversial. Most tears appear to be chronic and related to degenerative changes. A posterior horn MMRT is often associated with another intra-articular structural abnormality, association with MCL injuries, knee dislocations, reverse Segond fractures and marginal fractures of the medial tibial plateau have been reported.[6–8] In 1994, De Smet and Graf reported a case of posterior lateral meniscus root tear in a larger series of meniscal injuries in patients with an ACL tear.[9] A recent study found that in female patients, posterior MMRTs are associated with higher BMI, greater valgus mechanical axis angle and lower sports activity level.[10] It is thus postulated that intrinsic risk factors predispose to MMRTs.[8]

Medial meniscus extrusion (MME) is a significant medial displacement of the medial meniscus with respect to the central margin of the medial tibial plateau and is closely associated with MMRTs.[4] The meniscus is considered extruded when it extends beyond the tibial margin.[11] The critical length of extrusion is approximately 3 mm.[3,12] Other authors have attempted to correlate the ratio of extrusion length to maximal transverse length, defining an extrusion ratio threshold of 10%.[13]

Some authors have reported an association between medial subluxation or extrusion of the medial meniscus, medial femoro-tibial arthritis and posterior medial meniscus root tear.[4,12] These authors postulated that MMRTs disrupt the hoop stress function provided by circumferential fiber bundles of the meniscus. This permits radial expansion and displacement of the meniscus from the joint space (i.e. subluxation or extrusion). As such, axial compressive forces on the knee during weight bearing are transmitted directly to the articular cartilage, predisposing to premature cartilage degeneration and subsequent osteoarthritis. In a study of 293 patients with ACL tears, LMRTs were more prevalent than MMRTs, however meniscus extrusion was more common with the MMRTs.[1]

Many meniscal root tears remain unrepaired, potentially due to under-recognition and the technical challenge of repairing them.[7] When recognized, we advocate surgical intervention due to the crucial role of the roots in knee kinematics.

Many surgical options have been described in the literature. Partial or total menisectomy, commonly used in the past, relieves symptoms in most patients, with no effect on the progression of osteoarthritis.[14] Recently, the pullout suture[15] and suture anchor techniques[16] have been proposed. Because the meniscal root is vascularized,[17] it can be repaired. In acute cases, where severe cartilage damage has been excluded, the root can be repaired to restore the circumferential hoop tension, essential to guarantee the biomechanical functions of weight bearing and shock absorption.[8]

Pullout sutures reattach the detached portion of the meniscus to the tibia through a tibial tunnel from the anteromedial cortex of the proximal tibia to the insertion site of the posterior horn of the meniscus, using an ACL tibial drilling guide. When the meniscal root is attached non-anatomically, the conversion of femoro-tibial loads into circumferential