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Which meniscus injuries require surgery?

CLINICAL REVIEW

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Degenerative and traumatic meniscus injuries should be considered two completely different pathologies requiring treatment based on entirely different principles. Degenerative tears are part of the development of osteoarthritis and should generally be treated conservatively, whereas surgery should be considered for traumatic tears to help prevent the development of

osteoarthritis. In this article, we summarise which patients should be referred promptly to an orthopaedic surgeon, and which should be referred to a physiotherapist.

Over the last few decades, increasing access to MRI has helped to simplify the diagnosis of knee-related symptoms and has partly replaced the clinical diagnosis of meniscus injuries. In the same time frame, arthroscopic surgery has become much more common due to advances in technology. This combination led to a practice in which very many patients with knee pain and positive MRI findings underwent arthroscopic meniscectomy, with permanent loss of meniscus tissue as a result.

However, after many years with an increasing number of surgeries, a paradigm shift took place in the mid-2010s. In 2013, 15 588 meniscus procedures were performed in Norway. Three years later, this number had fallen by 42 % (figures from the Norwegian Patient Register). Similar developments were seen in Sweden and Denmark (1). The change occurred after randomised controlled trials (2–11) and systematic reviews (12–14) failed to show any benefit from surgical treatment up to five years after arthroscopic meniscectomy compared with physical therapy or sham surgery. These studies formed the basis for new international guidelines from the European Society of Sports Traumatology, Knee Surgery and Arthroscopy in 2016 (15). The guidelines concluded that patients with degenerative meniscal tears should undergo at least three months of conservative (non-surgical) treatment prior to any surgery (16).

As a result, the pendulum has now swung over to the opposite extreme. Our experience indicates that many patients are now *not* being referred for surgical assessment, and for those with certain types of meniscus injuries, this delay or ruling out of surgery can be harmful.

This clinical review, based on recent clinical research and the authors' own collective experience, provides an update on the different types of meniscus injuries and their treatment. The aim is to highlight the importance of distinguishing between degenerative meniscal tears, which are generally not amenable to surgical repair, and traumatic tears, where delaying surgery can lead to suboptimal outcomes or to the need to remove meniscus tissue, with an associated increase in the risk of osteoarthritis.

Different types of meniscus injury

In both elderly and younger patients, loss of meniscus tissue – including as a result of surgical resection – increases the risk of pain and loss of function, cartilage degeneration, cartilage damage and osteoarthritis (17). The greater the loss of meniscus tissue, the greater the risk of osteoarthritis (17, 18). In individuals with meniscus injuries, it is therefore important to save and preserve the meniscus tissue – to the greatest extent possible. A distinction must be made between degenerative and traumatic meniscus injuries, with these being regarded as two completely different pathologies that must be treated according to entirely different principles. For degenerative meniscus

injuries, the aim should be to avoid loss (surgical resection) of meniscus tissue, whereas for traumatic meniscus injuries the strategy should be early surgical repair, in order to save and preserve as much of the meniscus as possible.

Degenerative meniscus injuries

Degenerative meniscus injuries are seen most frequently in middle-aged and elderly individuals (19). The injuries are often atraumatic and occur gradually or following what is described by the patient as a trauma, but typically a low-energy trauma, such as twisting the knee, squatting or running for the bus. Typical symptoms and findings are pain along the joint line, mechanical symptoms (catching, buckling), effusion and a positive compression test.

However, degenerative meniscus tears can often be asymptomatic and may appear as incidental findings on MRI without clinical significance (20). The tears occur in degenerate tissue with reduced water content, fewer elastic fibres and increased stiffness, such that an axial load gives rise to shear forces that tear the connections between collagen fibres. The shape of the meniscus changes and its protective function in relation to the articular cartilage is reduced (21). The tears are described as complex (multiple tears), horizontal (Figure 1) or oblique (flap tears), and most often occur in the posterior part of the medial meniscus.

Figure 1 MRI of the knee, sagittal plane, showing a degenerative tear in the posterior horn of the medial meniscus. Photo: Martina Hansens Hospital

A degenerative meniscus injury must be considered the first sign of osteoarthrosis of the knee (22) and should be treated accordingly, with mainly conservative measures. Radiological evaluation of knee-related symptoms in middle-aged and elderly patients should typically be via standard X-ray, which is most suitable for osteoarthritis assessment, but MRI may be indicated if the X-ray does not show definite osteoarthritis.

Traumatic meniscus injuries

Traumatic meniscus injuries are most often seen in active younger individuals and are often high-energy injuries, not infrequently associated with damage to the anterior cruciate ligament (23). Typical traumatic tears are 'bucket handle'-shaped (longitudinal, vertical (Figure 2, Figure 3), and with the torn part of the meniscus potentially folded over towards the intercondylar eminence), radial, or flap-shaped. Folded bucket-handle tears can restrict both flexion and extension, and early repositioning and suturing are indicated to prevent shrinkage and destruction of the meniscus tissue.

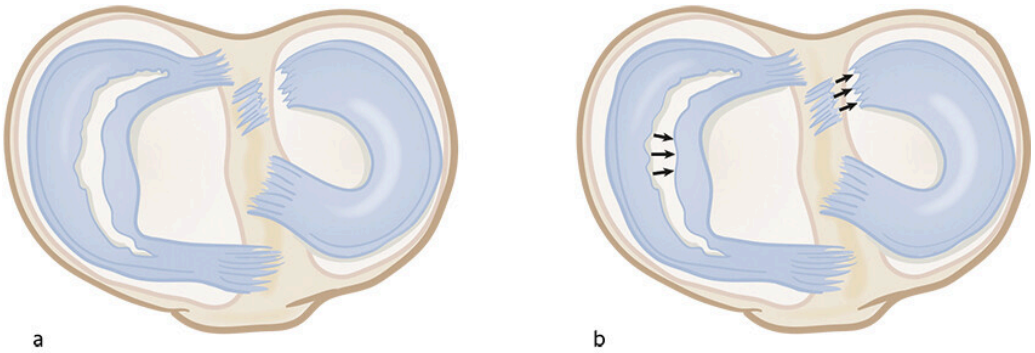

Figure 2 a) Bucket-handle tear in the medial meniscus (left) and posterior root tear in the lateral meniscus (right). b) The 'bucket handle' in the medial meniscus becomes displaced centrally in the joint, giving rise to an extension deficit. Tearing of the lateral meniscus posterior root causes the meniscus to lose its shape. Illustration: Illumedic

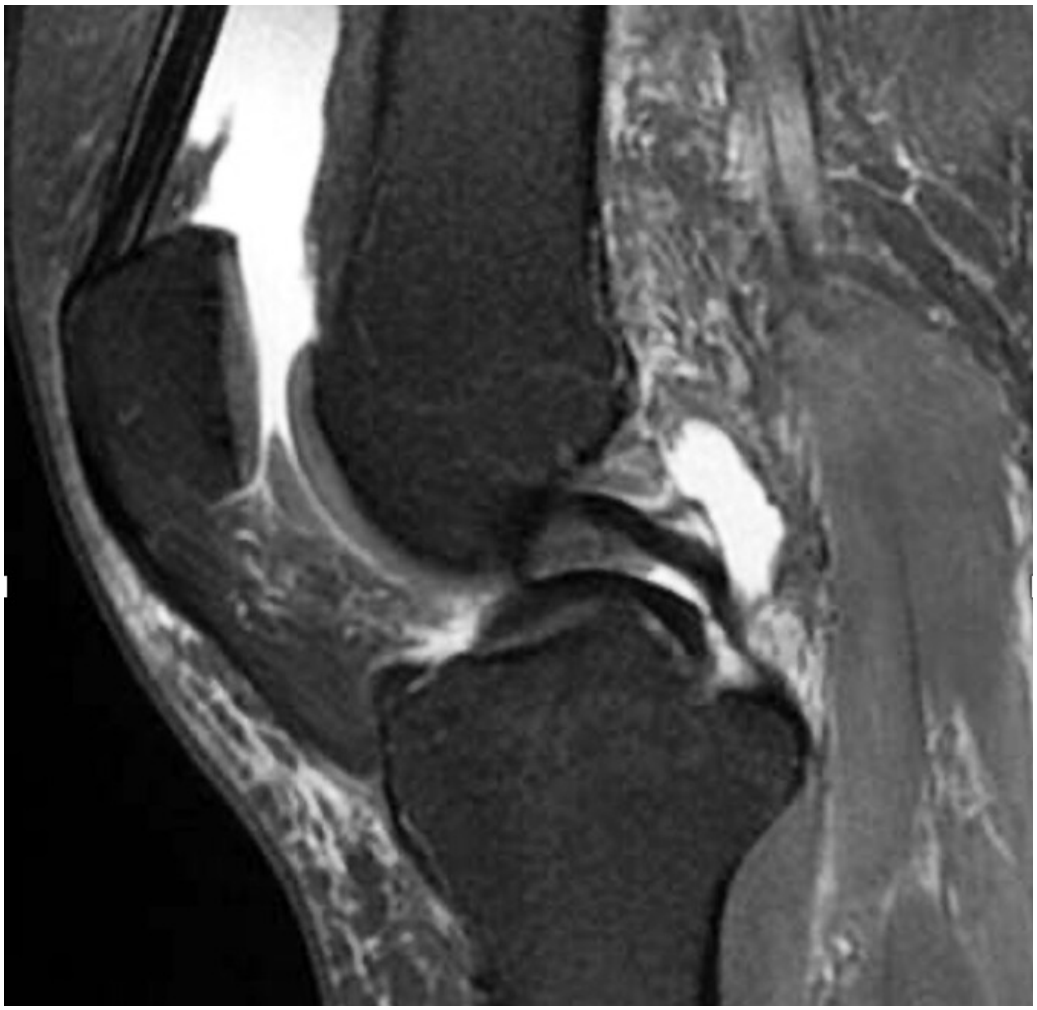

Figure 3 MRI of the knee, sagittal plane, showing a folded bucket-handle tear in the medial meniscus. Photo: Martina Hansens Hospital

Before MRI was widely available, clinical suspicion of a folded bucket-handle tear ('locked knee') was an indication for acute surgery. Today, patients are no longer admitted acutely, but if mechanical obstruction is suspected when testing passive movement after a trauma, an orthopaedic surgeon should be consulted, even if MRI has not yet been performed.

Meniscal root tears

Meniscal root tears are injuries at the site of or close to the posterior attachment of the menisci to the tibia (posterior root tears) (Figure 2) (24). Medial root tears are most often seen in degenerative knees as part of the development of osteoarthritis, and lateral root tears are most often seen in younger patients with damage to the anterior cruciate ligament. Root tears often cause more pain and effusion than other meniscus injuries.

Secondary MRI findings can include meniscal extrusion or associated bone marrow oedema (25). Extrusion occurs when the meniscus is either torn radially or close to the root (trauma) or stretched (degeneration) and thereby squeezed out of position in the joint. This leads to partial or complete loss of function of the meniscus – comparable to the effect of complete surgical resection (26). Meniscal extrusion is thought to increase the risk of rapidly progressive osteoarthritis (27).

Treatment

Degenerative meniscus tears should in principle be treated conservatively (16). Treatment can consist of lifestyle changes such as weight regulation and exercise, modifying physical activity for a period (to place fewer demands on the knees), medical treatment (anti-inflammatory drugs and analgesics) and individually tailored exercise therapy under the guidance of a physiotherapist. Exercise therapy should consist of 2–3 sessions a week and include progressive neuromuscular and strengthening exercises (28). If no effect is seen after 12 weeks, referral to an orthopaedic surgeon may be warranted. Surgical treatment, in the form of arthroscopy with resection of damaged meniscus tissue, may be indicated in rare cases.

Traumatic meniscus and root tears should be treated with arthroscopic surgery with repositioning of the meniscus and fixation with various types of sutures (Figure 4). Degenerative root tears are amenable to surgery in the absence of definitive osteoarthritic changes in the articular cartilage. Postoperative rehabilitation protocols diverge depending on the type of tear and repair, but as a rule of thumb, crutches to reduce weight-bearing are recommended for six weeks along with physiotherapy-guided strength training. Squatting is allowed after three months, and sports and physical activities can be resumed after 5–7 months (29). Various healing rates have been described in the literature, with a meta-analysis of bucket-handle tears reporting a rate of 77 % (30). In the case of root tears, healing of up to 93 % has been shown after two years (31).

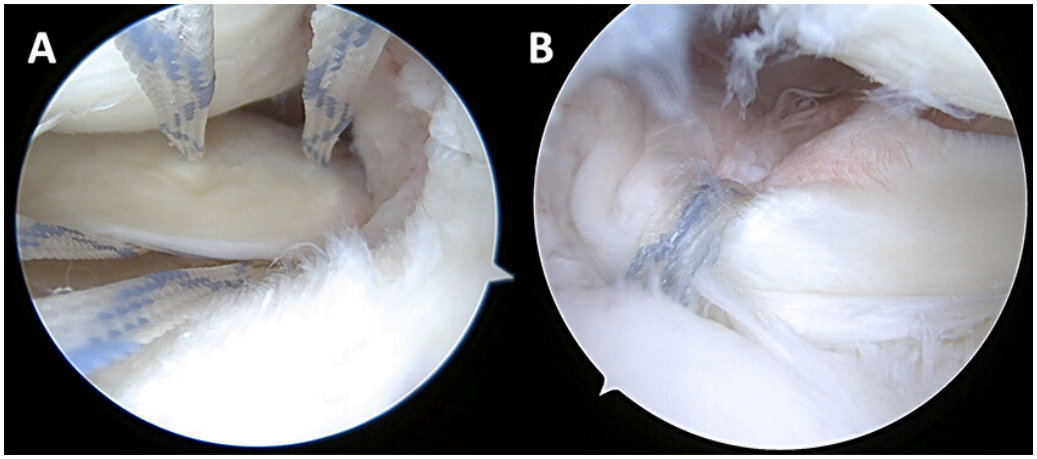

Figure 4 Arthroscopy. a) Medial root tear with sutures in the posterior horn of the meniscus. b) Sutures pulled down into the drill channel in the tibia. Photo: Martina Hansens Hospital

Preserving a functional meniscus is important to help counteract degeneration in the joint (32). This is particularly vital for younger patients with traumatic tears (33). A meta-analysis of randomised controlled trials showed poorer long-term patient-reported outcomes and lower activity levels in individuals with traumatic tears who underwent meniscectomy compared to meniscal repair

(34). In addition, meniscectomy is associated with a substantial risk of osteoarthritis, with the risk increased at least five-fold 16 years after the procedure (17). The risk is greatest with large resections (18).

Medial meniscal root tears are associated with poor subjective knee function (24), and a relatively high proportion of these patients (31 %) require a knee replacement within five years (35), emphasising that medial root tears are part of a general degenerative process.

Conclusion

Conservative treatment is recommended for patients with degenerative meniscal tears, including lifestyle changes and physical therapy as first-line options, and there is rarely an indication for surgery. Diagnostic imaging should initially be via standard X-ray.

Traumatic meniscal tears should undergo prompt evaluation for surgery and should be repaired to improve functioning and limit or delay the long-term development of osteoarthritis. Patients with a knee extension deficit after trauma (locked knee) should be evaluated quickly by an orthopaedic surgeon for a suspected bucket-handle tear and should not wait weeks for MRI. Rapid referral is also indicated if a bucket-handle tear is seen on MRI. Patients in unusually severe pain should be referred for MRI on suspicion of a meniscal root tear.

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