

Discoid Meniscus

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Abstract

The discoid lateral meniscus is often thicker and disc or saucer-shaped and more susceptible to tearing. The peripheral rim of the meniscus is more unstable and may be the reason for a higher rate of injury. MRI should be considered the standard for diagnosis. Symptomatic patients typically have meniscal tears. At imaging, these tears appear as degenerative damage or horizontal tears. Surgical intervention is only recommended for symptomatic patients. Patient age and the degree of tissue removed are the largest drivers regarding patient outcome. While acceptable clinical results were achieved around 10 years following surgery, 40% of patients developed degenerative changes in their knees.

Keywords: Musculoskeletal, Knee, Congenital

Case Summary

An adolescent boy presented to the orthopedic clinic with 3 months of medial knee pain with flexion. On examination, the patient had a full range of motion. However, there was medial joint tenderness, mild valgus alignment, and a snapping medial meniscus.

Imaging Findings

Knee radiograph (Figure 1) showed mild widening of the medial joint space. Subsequent knee MRI (Figure 2) showed a discoid medial meniscus with a large horizontal cleavage tear.

Diagnosis

Discoid meniscus

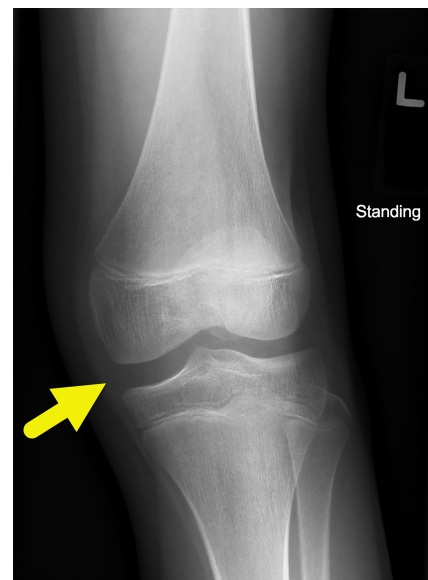
Discussion

The knee joint is comprised of a medial and lateral meniscus located between

the corresponding femoral condyles and tibial plateau. The menisci are necessary for a healthy joint. The menisci play a crucial role in load bearing, load transmission, shock absorption, plus lubrication, and nutrition of articular cartilage.¹ In contrast, the discoid lateral meniscus (DLM) is often thicker and disc or saucer-shaped and more susceptible to tearing.² The peripheral rim of the meniscus is more unstable and may be the reason for a higher rate of injury. DLM is a congenital variant most often involving the lateral meniscus, where the meniscus is discoid rather than semilunar and wedge-shaped. The condition is commonly referred to as “snapping knee syndrome” because of its clinical presentation. However, the condition may be unrecognized and go untreated.

Patients with a discoid meniscus can present with knee pain, locking, or a clicking sound. However, in many instances, a discoid meniscus is asymptomatic, making the true incidence rate unknown. Studies report that a

Figure 1. Knee radiograph showing mild widening of the medial joint space (arrow).



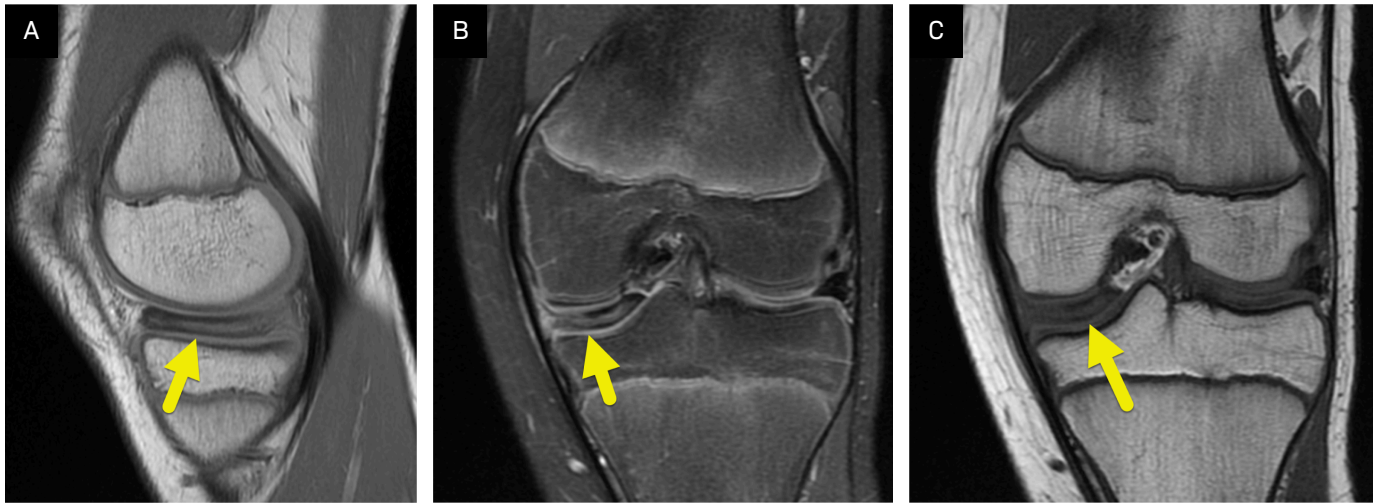
discoid meniscus occurs in 3-5% of Western populations and 15-25% of Asian populations.¹ Typically, the lateral meniscus is affected. A discoid medial meniscus is rare, affecting only 0.06-0.3% of the population.^{3,4} While it is most commonly a unilateral process, up to a quarter of those affected have a discoid meniscus in each knee.

Diagnosis of discoid meniscus follows the Watanabe classification system where there are 3 classes: incomplete, complete, and hypermobile type. Patients with

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Figure 2. (A) Sagittal proton density images showing a slab-like configuration of the medial meniscus (arrow). There is an abnormal increased signal within the meniscus. (B) Coronal intermediate-weighted and (C) T1-weighted MRI showing the discoid medial meniscus (arrow). A horizontal increased signal is present within the meniscus extending to the peripheral margin.



an incomplete type have a thickened, semilunar meniscus covering <80% of the lateral tibial plateau, whereas the complete type covers the entire lateral tibial plateau. Both the incomplete and complete types have normal posterior meniscal attachments. This differs from the hypermobile type, which lacks the posterior horn coronary ligaments and is only stabilized posteriorly by the posterior meniscomfemoral (Wrisberg) ligament.^{5,6} An MRI-based classification describes a discoid meniscus tear by its displacement, with the categories being no shift, antero-central shift, postero-central shift, and central shift.^{3,7,8} This approach provides information for predicting the location of the peripheral tear and determining the surgical procedure. However, the classification was limited to the peripheral tear and its accuracy, sensitivity, and specificity were not good and did not help decide on the arthroscopic procedure. The conclusion was that MRI can be complimented by physical and arthroscopic examinations.

Plain films can provide evidence that can suggest a discoid meniscus. The findings include femoral condyle squaring, increased lateral joint space,

and tibial plateau cupping. Unfortunately, a normal radiograph does not exclude the diagnosis.

MRI is the modality of choice to confirm the diagnosis of discoid meniscus.²⁻⁴ Diagnosis is made by showing a ratio of the minimal meniscal width to the maximal tibial width of >20% on coronal imaging and the ratio of sum of the width of both lateral horns to the maximal meniscal diameter on the sagittal image of >75%.⁶ A diagnostic indicator of a DLM is the “bowtie sign.” When the bowtie sign is present, the midportion of the meniscus is visible on a continuous sequence of 3 or more ≥ 5 mm thick sagittal images showing continuity of the meniscus. A negative bowtie sign suggests a meniscal injury. Coronal images are useful in visualizing complete and incomplete meniscal thickening when assessing the tibial plateau coverage. T2 imaging reveals increased intrasubstance signal in the meniscus, which can be the result of peripheral tears or myxoid degeneration associated with congenital deformation of the collagenous network in meniscal tissue. In the case of meniscal tearing, tears are more likely to be horizontal or bucket handle and degenerative in nature,

as opposed to the longitudinal or radial tears seen in normal menisci.^{3-5,9}

Treatment is not indicated for those with an asymptomatic discoid meniscus. Surgical intervention is reserved for those with symptoms, namely knee locking caused by the meniscus getting caught in the joint space. The new onset of symptoms like snapping, knee locking, and pain strongly suggests the presence of a meniscal tear. Only 27.8% of symptomatic patients do not have an associated tear.¹⁰ Traditional surgical intervention for symptomatic patients without a meniscal tear was a partial or total meniscectomy; however, the approach to therapy has changed to minimally invasive arthroscopic saucerization or reshaping of viable tissue into a stable, functional meniscus. This is to reduce osteoarthritic degeneration due to loss of meniscal tissue. In the case of discoid menisci with tears, the meniscus is reshaped, and any tears are repaired. Peripheral rim detachments are sutured to the joint capsule or tibial rim to provide stabilization to the meniscal tissue.^{7,10}

The outcomes of surgical repair, reshaping, and excision of discoid meniscal tissue depend upon the degree

of tissue resection and patient age. Patients treated with a subtotal or total meniscectomy experienced a higher degree of degenerative arthritis than those with partial meniscectomy and reshaping. Satisfactory pain reduction was achieved after following up with a mean of 10.1 years after surgery. However, there was an incidence of progressive degenerative changes in 40% of patients.^{7,10}

Conclusion

DLM is often thicker and disc or saucer-shaped and more susceptible to tearing. The peripheral rim of the meniscus is more unstable and may be the reason for a higher rate of injury. MRI should be considered the standard for diagnosis. Symptomatic patients typically have meniscal tears. At imaging, these tears appear as degenerative damage

or horizontal tears. Surgical intervention is only recommended for symptomatic patients. Patient age and the degree of tissue removed are the largest drivers regarding patient outcome. While acceptable clinical results were achieved around 10 years following surgery, 40% of patients developed degenerative changes in their knees.

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