Meniscus Variations

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Abstract

The lateral meniscus is more variable than the medial meniscus morphologically regarding the size, thickness, shape, and mobility. The most common lateral meniscal variant is discoid in shape, which implies greater coverage of the tibia and usually increased thickness. Many stable lateral meniscal variants are asymptomatic and are found incidentally. The most common symptoms, which usually occur during childhood and adolescence, are a clunking sound with flexion of the knee, pain, a decreased range of motion, joint line tenderness, sensation of a foreign object within the knee, quadriceps atrophy, and effusion. Since it was first described, several classifications were proposed using clinical, radiologic, and arthroscopic findings. Although most of these classifications are descriptive, newer systems focus on influencing treatment. The treatment options for the various lateral meniscal variants include observation, partial meniscectomy with or without reattachment, total meniscectomy, and for a normally shaped unstable lesion reattachment to the adjacent capsule. It must be kept in mind that there may be no good treatment option; rather, the only choice may be the lesser of two evils. During arthroscopy a tear may not be visualized in some symptomatic discoid menisci. Therefore, a preoperative MRI is mandatory for all discoid menisci, because the absence and presence of shift and the direction of the shift must be carefully assessed before surgery since it alters the therapeutic approach. In the presence of a shift, the meniscus must be reduced before starting the excision. After resection, the tear in the opposite horn should be repaired with sutures. This chapter reviews the anatomy, embryology, etiology, and classification of discoid menisci as well as their clinical presentations, accompanying conditions, tears, and treatment.

History

The menisci consist of semilunar fibrocartilage, partly filling the space between the femoral and tibial bones. The most common meniscal anomaly is a discoid shape of the lateral meniscus. Other anomalies are hypoplasia, abnormal insertions, and a double-layered lateral meniscus.

Discoid lateral and medial menisci were first described in cadaver specimens (Young 1889; Watson-Jones 1930). Kroiss attributed the term "snapping knee syndrome" to it (Kroiss 1910). A more precise diagnosis and classification was made much later (Watanabe et al. 1979).

Embryology

The normal menisci differentiate within the limb bud from mesenchymal tissue early during fetal development. They are clearly defined at the 8th week of gestation and gain mature anatomical shape at the 14th week (Andrish 1996), without ever possessing a discoid shape (Kaplan 1957).

Anatomy

The lateral meniscus is somewhat more circular than the C-shaped medial meniscus. This is because the posterior and anterior horns of the lateral meniscus attach to the nonarticular area of the tibial plateau. A normal lateral meniscus forms five-sixths of a circle. It has an average width of about 12 mm and a height of 4–5 mm, although the normal anatomy varies considerably with regard to dimension and shape.

In adults, the C-shaped medial meniscus covers 50 % of the medial tibial plateau and is connected firmly to the joint capsule by coronary, meniscotibial, and deep medial collateral ligaments, whereas the lateral meniscus covers 70 % of the lateral tibial plateau and has firm anterior and posterior attachments, while its lateral joint capsule attachment is loose because there is no attachment at the popliteal hiatus and fibular collateral ligament. Therefore, the normal lateral meniscus has more mobility than the medial meniscus, allowing an increased excursion of the lateral meniscus on the lateral tibial plateau. Variably present posterior and anterior meniscofemoral ligaments (Wrisberg and Humphrey ligaments) pass from the medial aspect of

the notch to the posterior horn of the lateral meniscus. The Wrisberg ligament passes posteriorly to the posterior cruciate, and the Humphrey ligament passes anteriorly. Usually, only one of these structures is present, and they vary quite markedly in size. The posterior third of the lateral meniscus receives a strong insertion from the popliteus muscle into its posterior horn, which allows the meniscus to be pulled posteriorly as the knee flexes (Johnson and Beynnon 2001). Together with the popliteus tendon, the lateral meniscus stabilizes the knee against excessive posterolateral rotational forces.

The most common lateral meniscal variant is discoid in shape, which implies greater coverage of the tibia and usually increased thickness. Formerly, it was believed that this variant may involve only part of the meniscus (in which case it was so-called an anterior or posterior megahorn (Jordan 1996)), or it may involve the entire meniscus. Recent studies suggest that these megahorns can be caused by partial tears of the relevant meniscal part and are not congenital variants. Variants can be normal in shape but hypermobile due to abnormal insertions or abnormal in shape, such as circular (ring-shaped) meniscus (Kim et al. 1995a; Monllau et al. 1998; Choi 1999; Arnold and Van Kampen 2000; Atay et al. 2002). Other anomalies of the lateral meniscus include a partially duplicated lateral meniscus and double-layered lateral meniscus (Suzuki et al. 1991; D'Lima et al. 1995; Kim et al. 1998).

Epidemiology

The actual incidence of lateral meniscus variations is difficult to estimate due to the high rate of asymptomatic patients. The reported prevalences of discoid lateral meniscus vary, depending on the method of investigation, the selection criteria, and the patient population. The Wrisberg type is considered to be less common.

Earlier studies suggested the prevalence of a discoid lateral meniscus in symptomatic patients who underwent open meniscectomy ranged from 2 % to 5 % (Smillie 1948; Watanabe et al. 1979). More recent arthroscopic studies have recorded prevalences varying from 0.4 % to 16.6 % (Fujikawa et al. 1981; Dickhaut and DeLee 1982; Ikeuchi 1982; Albertsson and Gillquist 1988; Neuschwander et al. 1992). These studies may be a more accurate representation of the true prevalence, because asymptomatic discoid menisci are also included. Cadaveric studies suggest a prevalence ranging from 0 % to 7 % (Noble 1977; Casscells 1978; Woods and Whelan 1990). Discoid menisci have been reported more frequently in Asian countries than in other regions of the world (Ikeuchi 1982; Kim et al. 1995b). Bilateral occurrence has been reported in 20 % of patients with discoid lateral menisci (Bellier et al. 1989).

Etiology

The underlying causes of lateral meniscal abnormalities are multifactorial. Several theories try to explain the etiology of the variant lateral meniscus. Smillie (1948) hypothesized that the discoid meniscus results from the lack of resorption of a central cartilaginous disk during normal development. Others (Kaplan 1957; Clark and Ogden 1983; Andrish 1996) later disputed this theory, because they could not identify a discoid meniscus at any stage of the embryonic development. The menisci are clearly defined at the 8th week of gestation and gain mature anatomical shape at the 14th week. Kaplan (1957) suggested that a normally shaped meniscus with abnormal attachments would have abnormal medial-to-lateral motion which will cause repetitive trauma that results in a change in the meniscal shape. During extension, due to the tension in the meniscofemoral ligaments, the meniscus subluxates posteromedially into the notch, and due to the pull of the popliteus and capsule, it reduces back into the joint on flexion (Kaplan 1957). The abnormal lack of a posterior tibial attachment could be a failure of formation due to phylogenetic incompletion (Le Minor 1990). A circular meniscus (Kim et al. 1995a) could be further evidence of this implication. The problem with this theory is that stable discoid menisci with normal attachments have been identified.

Some authors (Clark and Ogden 1983; Woods and Whelan 1990) favor a congenital origin. Woods and Whelan explain the unstable discoid meniscus as being a congenitally stable discoid-shaped meniscus that became unstable by posterior capsular separation due to increased shear forces. The causes of the other unstable types are even less clear. Originally, Watanabe et al. (1979) described the Wrisberg type as a normally shaped meniscus with abnormal attachments. Since then, other unstable variants have been included in this category; these probably represent several subtypes and as many different origins (Dickhaut and DeLee 1982; Ikeuchi 1982; Neuschwander et al. 1992).

Kaplan (1957) described a normally shaped meniscus with abnormal attachments due to repeated trauma. Later, a stable discoid meniscus that becomes unstable due to shear forces was described (Hayashi et al. 1988; Woods and Whelan 1990). A third possibility is a discoid meniscus without posterior tibial attachments. A fourth type as a normally shaped meniscus with lack of posterior tibial attachments was also described (Neuschwander et al. 1992). These all suggest a wide range of abnormalities leading to an unstable meniscus presenting with similar symptoms and often resulting in the "snapping knee" syndrome. It remains unclear whether all unstable types have the presence of the meniscofemoral ligament in common, which would allow subluxation and reduction to occur, accompanied by snapping (Jordan 1996). The author believes the primary pathology derives from the lack of a posterior tibial attachment in the presence of a meniscofemoral ligament attachment. The meniscofemoral ligament acts like a checkrein, allowing subluxation and reduction rather than dislocation.

Classification

The lateral meniscus is more variable than the medial meniscus morphologically regarding the size, thickness, shape, and mobility. Abnormal lateral menisci are classified as stabile or unstable according to its attachments. Less common abnormalities are hypoplasia, partial deficiency (Tetik et al. 2003), and double-layered lateral meniscus.

The traditional classification of the discoid menisci was made by Watanabe et al. (1979): (1) complete discoid meniscus, (2) incomplete discoid meniscus, and (3) Wrisberg-type meniscal variant. The authors depicted the Wrisberg type as a nearly normal-shaped meniscus but hypermobile due to the lack of posterior tibial attachments (Watanabe et al. 1979). Since then, other unstable menisci with both normal and discoid shape have been included as Wrisberg type (Kaplan 1957; Dickhaut and DeLee 1982; Woods and Whelan 1990). A lateral meniscal variant with the absence of the posterior coronary ligament that is nearly normal in morphology but lacks a posterior tibial attachment, which results in hypermobility, was described (Neuschwander et al. 1992), which nowadays can be classified within the Wrisberg type.

This traditional classification was expanded in 1998 (Monllau et al. 1998). They have added a fourth type to describe a ring-shaped meniscus characterized by a ring-shaped morphology with a normal posterior tibial attachment (Fig. 1).

Jordan (1996) proposed a new classification based on both arthroscopic and clinical findings, which describes more completely the various

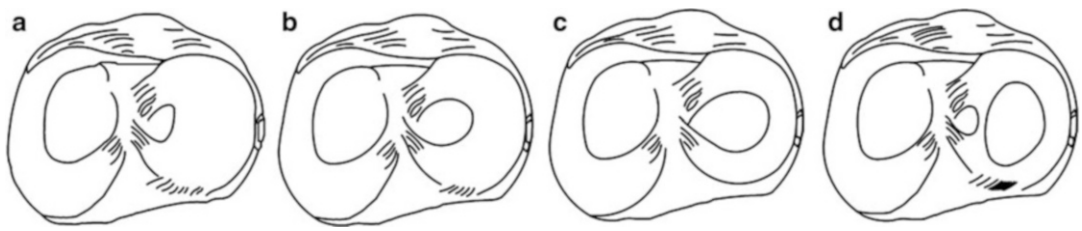

Fig. 1 Schematic drawing of modified Watanabe classification for lateral meniscal variants. (**a**) Complete discoid meniscus. (**b**) Incomplete discoid meniscus. (**c**) Wrisberg type. (**d**) Ring-shaped meniscus

Table 1 Classification of lateral meniscus variants proposed by Jordan (1996)

Classification	Correlation	Tear	Symptoms
Stable	Complete/ incomplete	Yes/ no	Yes/no
Unstable with discoid shape	Wrisberg type	Yes/ no	Yes/no
Unstable with normal shape	Wrisberg variant	Yes/ no	Yes/no

lateral meniscal types and how they influence treatment (Table 1).

A more recent article (Ahn et al. 2009) suggests a classification based on magnetic resonance imaging (MRI) findings. In their study of 82 knees, they classified the findings in four categories: (1) No shift: The peripheral portion of the discoid meniscus is not separated from the capsule, and the meniscus is not displaced. (2) Anterocentral shift: The periphery of the posterior horn is detached from the capsule, and the meniscus is displaced anteriorly or anterocentrally; as such, the anterior horn appears to be thick in sagittal sections. (3) Posterocentral shift: The periphery of the anterior horn is detached from the capsule, and the meniscus is displaced posteriorly or posterocentrally; as such, the posterior horn appears to be thick in sagittal sections. (4) Central shift: The periphery of the posterolateral portion is torn and loosens, and the entire meniscus is displaced centrally toward the notch (Ahn et al. 2009). Although a meniscus can be reduced at the time the MRI is performed and therefore a meniscus that has a peripheral tear might appear as "no shift." Nonetheless, in their study, they have found that a significantly larger number of repairs and subtotal meniscectomies were performed for the shift groups than for the no-shift group (Ahn et al. 2009). So, it can be predicted that knees with a shift on the MRI are more likely to be treated with repair or meniscectomy than knees with no shift.

Tears

Discoid menisci are more prone to mechanical trauma because of their thickness, relatively poor vascularization, and weak attachments to the posterior capsule (Hayashi et al. 1988). A recent study has shown that discoid menisci have decreased amount of collagen fibers and that the fiber is arranged heterogeneously, which may contribute to vulnerability of the discoid meniscus (Atay et al. 2007). However, patients with a tear of the discoid meniscus may not have a history of traumatic events. Tears are more common after the age of 15 (Dickason et al. 1982; Rao et al. 2001). Discoid menisci are associated with an increased incidence of tears ranging from 38 % to 88 % (Smith et al. 1999; Bin et al. 2002; Atay et al. 2003). The most common tear pattern is that of degenerative horizontal cleavage, which comprises 58–98 % of all cases of symptomatic discoid meniscal tears (Bellier et al. 1989; Aichroth et al. 1991; Pellacci et al. 1992).

Lateral meniscal variants have been classified into six tear patterns by modifying O'Connor's (Shahriaree 1992) classification (Kim et al. 2006). This classification includes six simple and comprehensive categories (Fig. 2): (1) a simple horizontal tear; (2) a combined horizontal tear, in which the major tear component is horizontal and another tear component is accompanied (Bin et al. 2002); (3) a longitudinal tear including peripheral tear; (4) a radial tear including an oblique and a flap tear; (5) a complex tear including a degenerative tear, which is a combination of two major components except a horizontal tear or a combination of three or more major tear components including a horizontal tear; and (6) a central tear which is a broad spectrum of the wear in the central portion of the discoid meniscus as a result of repeated maceration (Kim et al. 2006). Figures 3 and 4 demonstrates MRI and arthroscopic views of discoid lateral menisci from the authors' clinic with a radial and horizontal tear.

Clinical Presentation

Many stable lateral meniscal variants are asymptomatic and are found incidentally. Moreover, patients might have unilateral symptoms but have bilateral discoid menisci.

The most common symptoms, which usually occur during childhood and adolescence, are a

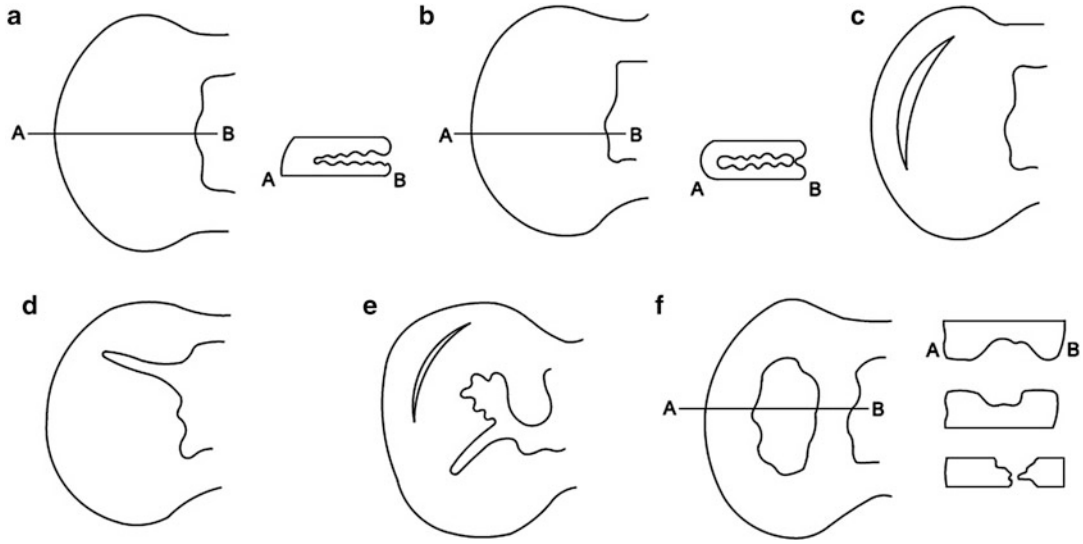

Fig. 2 Schematic drawings of the modified O'Connor's classification for lateral discoid meniscal tears: (**a**) Simple horizontal. (**b**) Combined horizontal. (**c**) Longitudinal (**d**) Radial (**e**) Complex (**f**) Central

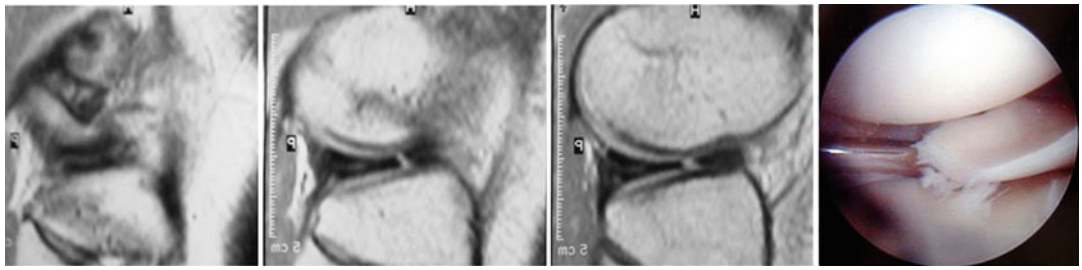

Fig. 3 MRI and arthroscopic views of a radial tear of a discoid lateral meniscus

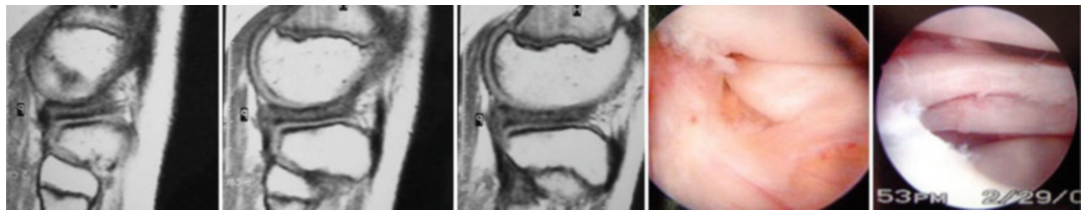

Fig. 4 MRI and arthroscopic views of a horizontal tear of a discoid lateral meniscus

clunking sound with flexion of the knee, pain, a decreased range of motion (usually lack of full extension), joint line tenderness, sensation of a foreign object within the knee, quadriceps atrophy, and effusion (Dickhaut and DeLee 1982; Ikeuchi 1982; Hayashi et al. 1988; Vandermeer and Cunningham 1989; Aichroth et al. 1991; Neuschwander et al. 1992; Washington et al. 1995; Rao et al. 2001).

The sound and feeling of this clunking and popping is attributed by the term "snapping knee syndrome" to describe a discoid meniscus

Video 1 Demonstration of snapping of the knee in flexion and extension.

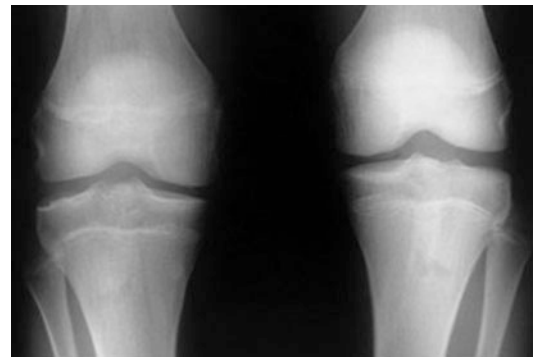

Fig. 5 Anteroposterior x-ray of a knee with bilateral discoid menisci

(Kroiss 1910) (See Video 1). Yet, pain is the predominant symptom in the majority of the cases. Pain generally begins with a minor trauma and is not always associated with a tear (Asik et al. 2003).

According to Ahn et al. (2001), the type of the discoid meniscus is associated with the clinical symptoms. In his study, he concluded that a lack of extension is more common when the anterior horn thickness is greater than 7.7 mm and extension is full when the thickness is less than 4 mm.

Accompanying Conditions

Lateral meniscal variation can be associated with other musculoskeletal anomalies. High fibular head, fibular muscular defects, hypoplasia of the lateral femoral condyle with lateral joint space widening, hypoplasia of the lateral tibial eminence, abnormally shaped lateral malleolus of the ankle, and enlarged inferior lateral geniculate artery are examples of such anomalies.

One of the most clinically demanding conditions is the association between a lateral discoid meniscus and an osteochondral lesion of the lateral femoral condyle (Irani et al. 1984). Osteochondritis dissecans of the lateral femoral condyle is relatively rare and oftentimes combined with lateral discoid meniscus and usually a torn discoid meniscus (Mizuta et al. 2001) and associated with a poorer prognosis when present. The discoid meniscus itself might produce an abnormal contact force onto the lateral femoral condyle even if the meniscus is not torn. This abnormal contact force may lead to an osteochondritis dissecans lesion in the lateral femoral condyle (Mitsuoka et al. 1999). The presence of lateral discoid meniscus was reported to occur in a majority of the osteochondritis dissecans lesions that occurred in the lateral femoral condyle (Yoshida et al. 1998). A lateral discoid meniscus tear, young age and high activity, and valgus alignment can be predisposing factors for osteochondritis dissecans of the lateral femoral condyle (Terashima et al. 2005). Partial meniscectomy is shown to permit the healing of an osteochondral lesion (Yoshida et al. 1998).

Radiology: X-ray

Standard anterior-posterior, lateral, tunnel, and skyline views contribute significantly to the establishment of diagnosis (Picard and Constantin 1964) (Figs. 5 and 6). Lateral joint space narrowing, lateral joint lipping, squaring of the lateral femoral condyle, cupping of the lateral tibial plateau, flattening of the lateral femoral condyle, tibial eminence hypoplasia, calcification of the meniscus, fibular head elevation, obliquity of the joint space, and degenerative changes may be demonstrated (Kerr 1986; Woods and Whelan 1990). These radiographic findings are present only in some cases. Associated pathologies such as osteochondritis dissecans and lateral malleolus abnormalities may also be visualized.

Fig. 6 Lateral x-ray of a knee with discoid menisci

Radiology: Ultrasonography

Ultrasonographic imaging of the menisci may demonstrate a wide and irregularly shaped lateral discoid meniscus. Sonography has been used to evaluate meniscal tears due to its availability, multi-planar capability, and economic benefit. The use of high-resolution micro-convex probes, which better fit the anatomical concavity of the popliteal fossa, achieves a better sensitivity and specificity in detecting meniscal tears (Najafi et al. 2006). The disadvantage of the use of ultrasonography is that it is an examiner-dependent tool. The sonographic criteria for diagnosis of discoid meniscus in children is reported as the absence of a normal triangular shape, the presence of an abnormally elongated and thick meniscal tissue, and the demonstration of a heterogeneous central pattern (Achour et al. 2006).

Radiology: MRI

On magnetic resonance imaging (MRI), the presence of a discoid meniscus is suggested in 5 mm sagittal sections when three or more contiguous sections demonstrate continuity of the meniscus between the anterior and posterior horns. Normally, this black "bow tie" appearance (Figs. 7 and 8) would be seen only on two contiguous sagittal sections (Silverman et al. 1989; Burk et al. 1990). Although this is a useful sign, the finding will be absent in the unstable type if the meniscus has a normal shape. The presence of a discoid shape can be further confirmed if a coronal view demonstrates increased width of the mid-anteroposterior diameter. One may also note an increase in thickness of the anterior horn, the posterior horn, or the entire meniscus. >2 mm height difference or >15 mm transverse diameter in coronal view can suggest a discoid meniscus.

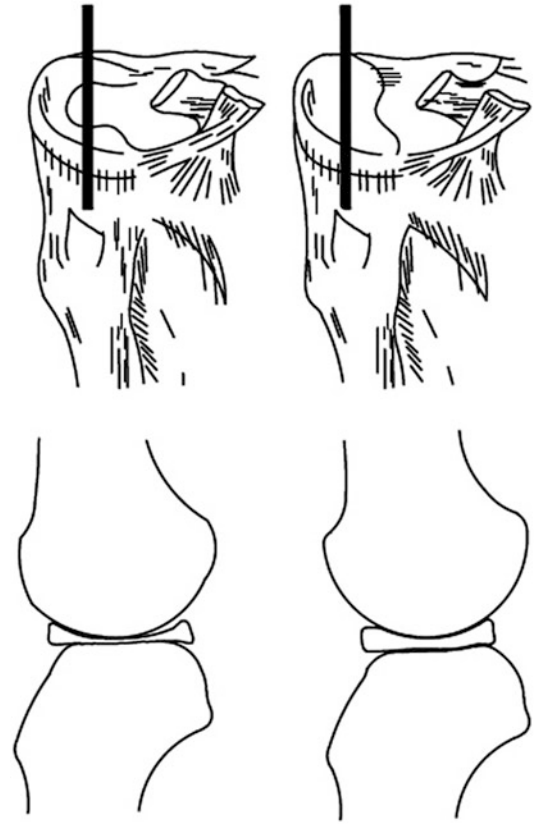

Fig. 7 Diagrammatic explanation of the bow tie appearance on sagittal MRI sections

MRI can also be useful for detecting intrasubstance tear and/or degeneration of lateral discoid meniscus (Hamada et al. 1994). Although

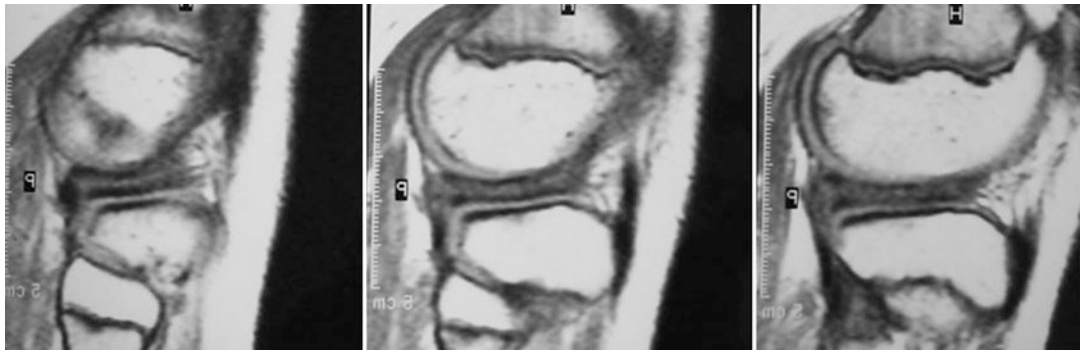

Fig. 8 Consecutive sagittal MRI sections showing bow tie appearance

valuable in the diagnosis of the discoid meniscus and tears, MRI can be insufficient in determining the type of the tear (Ryu et al. 1998).

Some authors indicate that the routine use of MRI is difficult and that arthroscopy should be used both for diagnostic and therapeutic purposes (Rao et al. 2001). A very recent study concluded that MRI is successful in determining the presence or absence of tears in discoid menisci; however, its ability to determine the tear types is questionable (Yilgor et al. 2013).

Treatment

The menisci serve in distributing loads and absorbing shock and have a role in joint stability, synovial fluid distribution, and cartilage nutrition. Partial meniscectomy of normal-shaped menisci was shown to increase the contact stresses in proportion to the amount of removed meniscus (Baratz et al. 1986). Following total meniscectomy, the contact area was decreased by up to 75 %, while contact stresses increased by 235 % (Baratz et al. 1986). A better understanding of the importance of the menisci to normal articular function has led to preservation of stable meniscal tissue as an important part of treatment planning.

Historically, the preferred treatment of a stable symptomatic lesion was open excision (Smillie 1948; Nathan and Cole 1969). However, total meniscectomy of a lateral non-discoid meniscus often leads to osteoarthritis (Fairbank 1948; Zaman and Leonard 1981; Manzione et al. 1983), and this is also true for discoid menisci in adults. In children, the risk of lateral degenerative arthritis after meniscectomy is greater than in adults; therefore, total meniscectomy for treatment of a discoid meniscus in children should be avoided whenever possible.

In order to properly choose the treatment method for the lateral meniscal variant, one must consider the age and activity level of the patient, the anatomy of the lesion, the duration and extent of the symptoms, and the amount of joint destruction. One must realize that the patient with a lateral meniscal variant usually has an abnormal knee at the outset. There may be no good treatment option; rather, the only choice may be the lesser of two evils.

The treatment options for the various lateral meniscal variants include observation, partial meniscectomy with or without reattachment, total meniscectomy, and for a normally shaped unstable lesion reattachment to the adjacent capsule. Many stable discoid menisci are found incidentally; therefore, it is reasonable to observe asymptomatic patients and inform them regarding an increased risk of having to undergo surgical treatment in the future. However, it should also be pointed out that the joint probably has adapted and could continue to function reasonably well. A snapping knee with no other symptoms and no radiographic signs of accompanying articular lesions can be followed-up and then treated should it become symptomatic. A patient may become symptomatic due to instability or a new

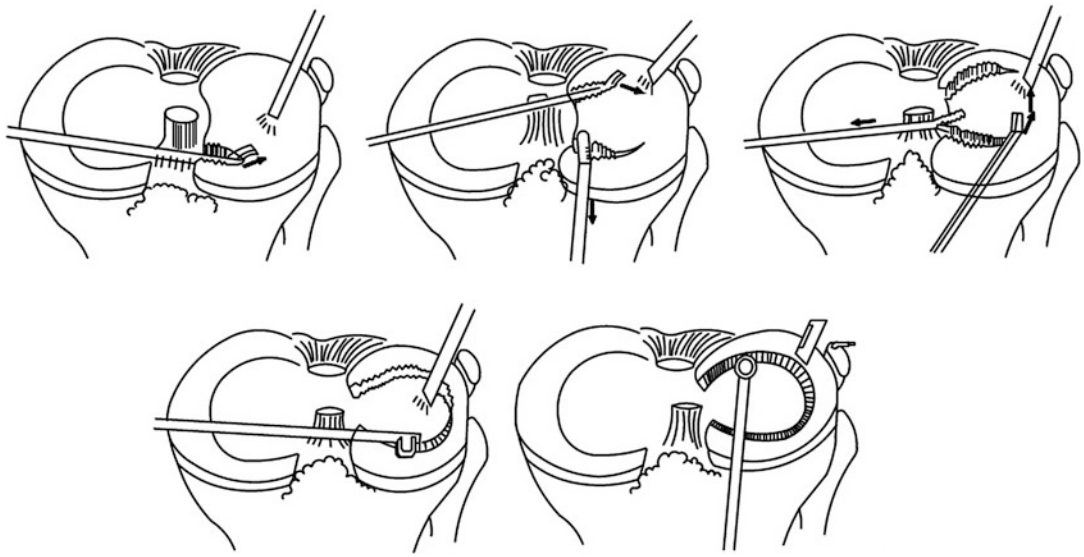

Fig. 9 Schematic explanation of one-piece excision technique

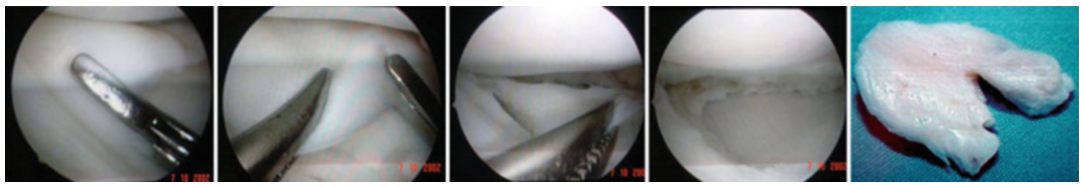

Fig. 10 One-piece excision of discoid lateral meniscus

tear of the meniscus or as the result of accompanying findings, such as osteochondral lesions to the lateral femoral condyle.

The current treatment of choice for a symptomatic stable, complete, or incomplete discoid lateral meniscus is arthroscopic partial meniscectomy (saucerization) (Ikeuchi 1982; Hayashi et al. 1988; Pellacci et al. 1992). Motorized and radiofrequency tools may be used for meniscal reshaping. In the past, some authors recommended total or subtotal meniscectomy as better than partial meniscectomy due to higher reoperation rates (Sugawara et al. 1991), because the increased thickness at the rim was thought to result in high shear forces concentrated at the resected margin due to the incongruity between meniscus and articular surface, which predisposed the abnormal meniscus rim to re-tear. Today, it is believed that a stable rim should be preserved, even though it may be composed of abnormal tissue (Fujikawa et al. 1981; Dickhaut and DeLee 1982; Bellier et al. 1989; Woods and Whelan 1990). The commonly used method for partial meniscectomy is one-piece excision that was described (Kim et al. 1996) (Fig. 9). Most authors agree that the width of the remaining peripheral rim should be between 5 and 8 mm to prevent impingement and instability of the remaining part that may lead to a future secondary meniscal tear and to decrease the rehabilitation time (Hayashi et al. 1988; Vandermeer and Cunningham 1989; Kim et al. 1995b; Smith et al. 1999). Saucerization and reattachment is also recommended for Wrisberg types (Rosenberg et al. 1987; Neuschwander et al. 1992).

During arthroscopy, a tear may not be visualized in some symptomatic discoid menisci. Therefore, a preoperative MRI is mandatory for all

Table 2 The knee rating system

Grade	Description
Excellent	No mechanical symptoms (click, locking), no pain, full range of movement
Good	No mechanical symptoms, occasional mild pain on exercise, full range of movement
Fair	Mechanical symptoms, mild to moderate pain on exercise, full range of movement
Poor	Mechanical symptoms, moderate to severe pain on exercise or pain at rest, limitation of movement

discoid menisci, because the absence and presence of shift and the direction of the shift must be carefully assessed before surgery since it alters the therapeutic approach. In the presence of a shift, the meniscus must be reduced before starting the excision (Yilgor et al. 2013). After resection, the tear in the opposite horn was repaired with sutures.

Figure 10 shows a one-piece excision performed at the authors' clinic step by step.

Treatment Outcome

The Ikeuchi rating system (Ikeuchi 1982) and Lysholm knee scale (Tegner and Lysholm 1985) are frequently used to evaluate the treatment outcome. Ikeuchi's system depends on mechanical symptoms, pain, and range of movement (Table 2). Lysholm's scale is a numerical scale where one gets points on limping, use of support, stair climbing, squatting, instability, swelling and pain of the knee, and atrophy of the thigh.

In 1991, it was reported that arthroscopic partial meniscectomy should be recommended only when the posterior attachment of the discoid meniscus is stable and that total meniscectomy is indicated for the Wrisberg ligament type of discoid meniscus with posterior instability (Aichroth et al. 1991). In the following years, results of longer follow-up studies showed that total meniscectomy results in osteoarthritic changes such as joint space narrowing and osteophytes in the lateral compartment (Washington et al. 1995; Raber et al. 1998; Aglietti et al. 1999). In 2003, excellent and good results were reported for partial meniscectomy in 85 % of their patients that had Watanabe complete- and incomplete-type discoid menisci (Atay et al. 2003). In the same year, others concluded that partial resection of discoid menisci is preferable in children, but in complete dislocation of the entire menisci, total removal may be necessary (Davidson et al. 2003). A more recent study concluded that although there were no differences in short-term follow-up for clinical results between the partial and subtotal/total meniscectomies, partial meniscectomy yielded better radiologic results for torn discoid lateral menisci in children (Lee et al. 2009). The long-term prognosis after arthroscopic meniscectomy for the torn discoid lateral meniscus was related to the volume of the meniscus removed (Good et al. 2007). Short-term results confirm that meniscal allograft transplantation after total meniscectomy could be reasonable in symptomatic patients (Kim and Bin 2006). However, long-term observations are required to evaluate these results.

Conclusion

It is suggested that there is a need for early diagnosis and greater caution in the treatment of discoid lateral menisci (Lee et al. 2009). Current classification of discoid menisci should include details about tear, symptoms, and shift besides their anatomical properties. Heightened awareness of the clinician to the possibility of discoid meniscus, its variable presentations and complications, and management considerations may improve therapeutic outcome (Yaniv and Blumberg 2007).

Cross-References

- ▶ Anatomy and Biomechanics of the Knee
- ▶ Arthroscopic Repair of the Meniscus Tears
- ▶ Asymptomatic Meniscal Tears
- ▶ Degenerative Meniscal Tears: Meniscal Cysts
- ▶ Human Meniscus: From Biology to Tissue Engineering Strategies

- Lateral Knee Pain
- Meniscal Injuries and Discoid Lateral Meniscus in Adolescent Athletes
- Meniscectomy
- Role of Biologicals in Meniscus Surgery

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