

Arthroscopic lateral discoid meniscectomy. Case discussion and review of literature

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Citation

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Abstract

Discoid meniscus is a morphological anomaly which was described for the first time in the late nineteenth century. It is most commonly found on the lateral aspect of the knee and can be associated with significant morbidity. With the advent of arthroscopic surgical management, either partial or sub-total meniscectomy (depending upon the type of the anomaly) is replacing older techniques. We present our experience with four cases of discoid meniscus treated with arthroscopic partial meniscectomy.

INTRODUCTION

Discoid meniscus, a morphological anomaly of the normal meniscus [1], was first described in a dissecting room specimen as early as 1889 by Young. This anomaly occurs almost exclusively on the lateral side of the knee joint, reportedly resulting in 1.2% to 5.2% of all meniscectomies [2]. However, Ikeuchi [3] reported that, during a twenty-year period, almost half of the patients whom he managed for a meniscal lesion had a discoid lateral meniscus. He found a lateral discoid in 17% of the knees that were examined arthroscopically. Watanabe [4] classified this anomaly based on the degree of coverage of the tibial plateau and the presence or absence of normal posterior attachment. He identified these as complete, incomplete, and the Wrisberg-ligament type. The most common symptoms, which usually occur during childhood and adolescence, are a clunking sound with flexion of the knee, pain, and a decreased range of motion. Vague and intermittent symptoms associated with discoid meniscus may cause difficulty and delay in the diagnosis. Precise diagnosis has become possible using magnetic resonance imaging (MRI) and arthroscopy of the lesion.

In the past, failure of conservative treatment has led to open total resection of the anomalous structure [2] but nowadays arthroscopy permits a more accurate diagnosis and treatment of the lesion [5-7]. Recent biomechanical studies of knee function have revealed the importance of the menisci, and partial, instead of total resection of the meniscus is advocated to avoid stress concentration [8].

In 1957, Kaplan [9] recommended complete excision of a discoid meniscus through two incisions. Since then, several authors [10-12] have recommended partial arthroscopic meniscectomy. However, Aichroth et al. [5] preferred a total meniscectomy if the discoid lateral meniscus is unstable (Wrisberg-ligament type). The short-term (three-to-seven-year) clinical and radiographic results after partial or total removal of symptomatic discoid lateral menisci in children have been favorable [6, 13, 14]. However, studies of the long-term effects of partial or total lateral meniscectomy suggest that there is a high prevalence of osteoarthritic changes [2, 10, 12]. In addition, lateral instability has been reported after total removal of a discoid lateral meniscus, especially in children [8].

Abdon et al [1] reported that out of eighty-nine patients fifty-two (58%) had satisfactory results after total removal of a normal shaped meniscus with use of the Smillie technique [15]. According to the grading system of Ahlbäck [16], as modified by Johnson et al. [17] thirty-five patients (39%) had grade-I osteoarthrosis and eight (9%) had grade-II or III osteoarthrosis at a mean of seventeen years after the operation.

We report our experience with discoid meniscus and treatment of four cases with arthroscopic partial meniscectomy.

CASE SERIES

A total of 4 patients were diagnosed with lateral discoid meniscus at our institution from March 2002 to March 2007.

Pertinent patient characteristics have been included in Table 1. All cases had unilateral knee involvement and underwent partial meniscectomy following arthroscopy. The tabulated results were obtained at the last follow-up examination.

* Based on pre-operative MRI scan and arthroscopic finding

Figure 1

Table 1 – Patient demographic and clinical characteristics.

| Case no. | Age | Sex | Watanabe classification* | Presenting signs And symptoms | Period of follow-up (months) | Results According to Ikeuchi's criteria |
|----------|-----|--------|--------------------------|--|------------------------------|---|
| 1 | 12 | Male | Type II | Pain (left knee) for four years, limp, clicking sound from knee joint; 15° flexion contracture | 24 | Excellent |
| 2 | 14 | Male | Type III | Pain (right knee) for two years), limp, clicking sound from knee joint; 10° flexion contractures, lateral joint line tenderness. | 12 | Good |
| 3 | 39 | Female | Type III | Pain (left knee) and click | 18 | Excellent |
| 4 | 29 | Female | Type II | Pain (left knee) and click; 15° flexion contractures, positive Mc Murray sign | 12 | Excellent |

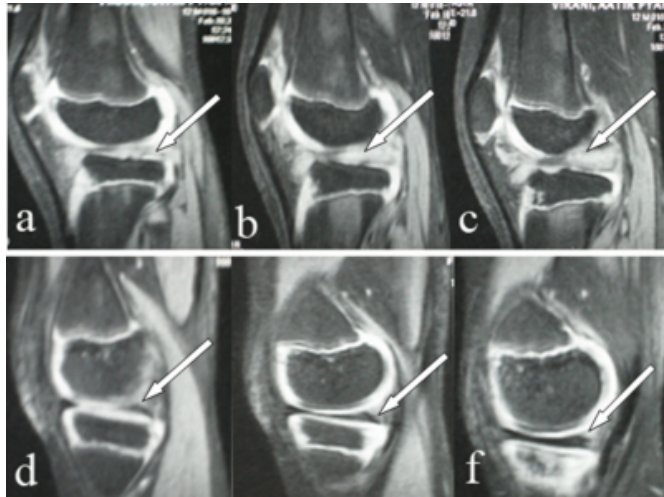
Figure 2

Fig1: Radiograph of patient 1 showing an AP view of the left knee joint. Increase in the lateral joint space can be seen (arrow).



Figure 3

Fig: 2 Fat saturated T1-weighted oblique sagittal images of the left knee joint. Arrows in "a", "b" and "c" marks the lateral discoid meniscus with a large medial extension. The usual triangular shape is not showing. Arrows in "d", "e" and "f" shows the normal medial meniscus



DISCUSSION

A normal lateral meniscus is "C shaped, forming five-sixths of a circle, and is larger and thicker than a normal medial meniscus. The lateral meniscus can be displaced anteroposteriorly as much as 12 millimeters [14]. Together with the popliteal tendon, the lateral meniscus stabilizes the knee against excessive posterolateral rotational forces. A total meniscectomy increases the degree of anteroposterior translation and, to a lesser extent, the degree of varus rotation of the knee joint. In 1948, Smillie wrote that "the menisci exist as cartilaginous discs at an early stage of development, and the congenital discoid meniscus is due to the persistence of the fetal state". He classified these menisci into three types: primitive, intermediate and infantile, and proposed that each type was susceptible to characteristic injuries. In 1957, Kaplan [1] concluded that in humans the discoid lateral meniscus occurs secondary to absence of the posterior tibial attachment of the normal meniscus. The meniscus subsequently undergoes repeated trauma and resultant thickening because of its connection to the ligament of Wrisberg. Both normal and abnormal posterior attachments of discoid menisci have been reported in the literature [6, 18, 19]. Watanabe [2] proposed a classification of discoid meniscus on the basis of arthroscopic evaluation. He combined the classification described by Smillie and by Kaplan in an attempt to explain the range of clinical findings. He classified discoid menisci into three types:

complete, incomplete, and the Wrisberg-ligament type [18]. With the Wrisberg-ligament type, the posterior meniscotibial attachment is absent, resulting in a hypermobile meniscus. This type often becomes symptomatic, whereas the complete and incomplete types are usually asymptomatic [18].

The statement by Smillie [2] that "the menisci exist as cartilaginous discs at an early stage of development, and the congenital discoid meniscus is due to occasional persistence of the fetal state" is no longer accepted as true. Smillie suggested that the shape of a normal meniscus is the result of gradual absorption of the central part of an originally complete plate during the latter half of fetal life. Kaplan, however, found that the menisci did not have a discoid shape at any stage of embryonic development. He concluded that the discoid shape develops gradually after birth in knees in which an absence of attachment between the tibia and the lateral meniscus results in abnormal motion of the meniscus.

A discoid meniscus not only covers a larger area of the tibial plateau but also is much thicker than a normal meniscus [17]. Ikeuchi [3] studied forty-nine excised discoid lateral menisci and noted a maximum thickness of fourteen millimeters (minimum, four millimeters). Smillie [2] examined fifteen discoid and thirty normal (non-discoid) menisci and found that the discoid menisci had a thicker-than-normal central portion (especially the free margin), but the greater thickness did not extend to the periphery.

A discoid lateral meniscus is more common than a discoid medial meniscus and causes symptoms mainly in children and adolescents [15, 18] usually as a result of a tear of the posterior segment [18]. The most frequent symptoms associated with a discoid lateral meniscus, as reported in the literature [5, 6, 14] are a history of locking of the knee, pain, and a snapping sound. In our study, all patients presented with pain and clicking sound with no history of locking of the knee, one patient related the onset of symptoms with minor trauma.

Discoid menisci have been reported more frequently in East Asian countries than in other regions of the world. Kim et al. [7] found a discoid meniscus in 77 (14 %) of 534 knees that were evaluated arthroscopically between July 1990 and September 1992. Fujikawa et al. pointed out that, in Japan, most problems related to the menisci in children are due to a discoid lateral meniscus[13].

Athroscopic partial meniscectomy is the treatment of choice for a discoid meniscus [3, 5, 6, 13, 14] However, despite the

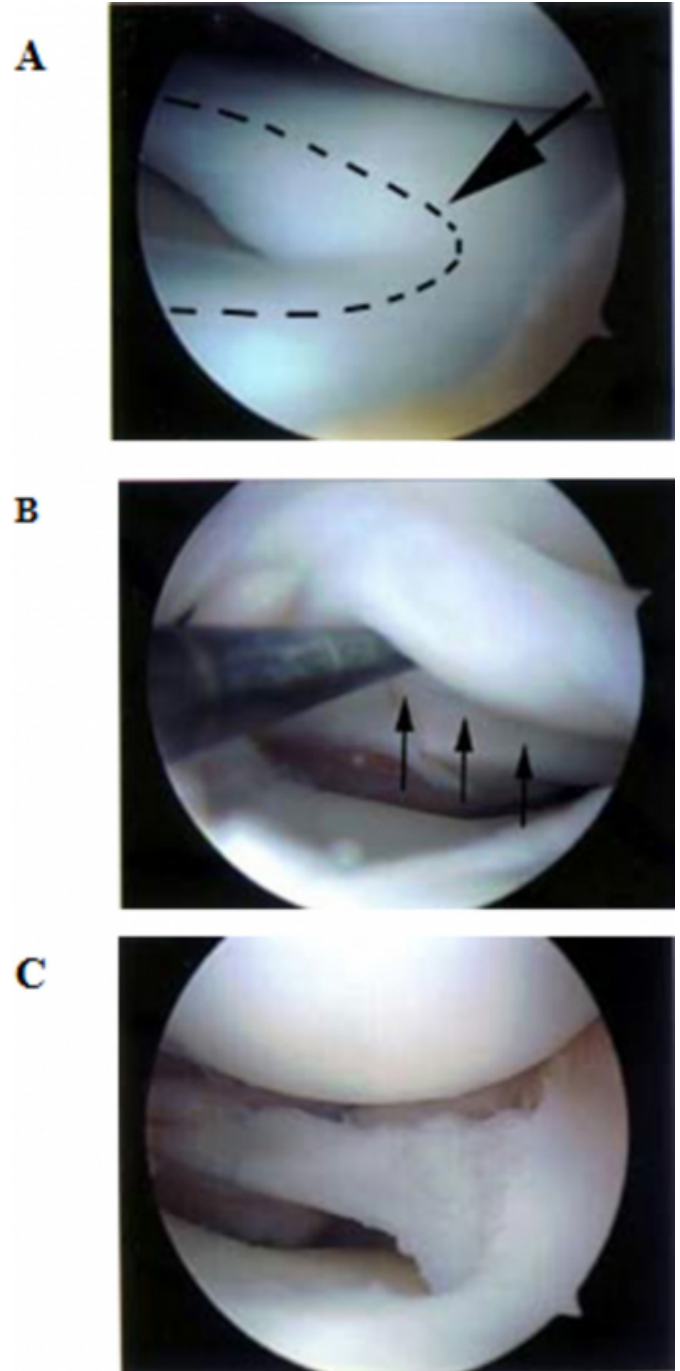
advances in arthroscopic techniques and instruments, a symptomatic discoid lateral meniscus remains difficult to treat [5, 14]. Aichroth et al. [5] noted the need for technical skill and experience in treating this condition. They recommended an arthroscopic partial meniscectomy for a complete or incomplete tear of a discoid meniscus with a stable posterior tibial attachment, and they recommended a total meniscectomy for an unstable Wrisberg-ligament-type meniscus, to avoid leaving an unstable rim. Arthroscopic partial meniscectomy should be the treatment of choice for the symptomatic lateral discoid meniscus, even if it is intact. Preoperative lack of the knee extension requires a gentle rehabilitation program postoperatively. In our study, two patients had complete menisci but intact posterior attachment (type 2), so we performed partial meniscectomy in these patients. While in the remaining two patients, menisci were complete but with absent posterior attachment (type 3), so we performed sub-total meniscectomy in these patients. Ikeuchi [3] reported the results of arthroscopic partial or total meniscectomies that had been performed to treat discoid menisci in 49 knees between 1968 and 1980. A partial meniscectomy was performed in 9 knees; peripheral reattachment, in 3; and total meniscectomy, in 37 patients. In 29 knees, the posterior fragments were first detached arthroscopically and the excision was completed through a two centimeter long anterior arthrotomy that also permitted reefing of the lateral aspect of the capsule to prevent lateral instability. The authors noted that the arthroscopic meniscectomies were very difficult because of the increased size and thickness of the meniscus.

CONCLUSION

Discoid meniscus is a rare cause of clicking and pain of knee joint in children and adolescents. Usually it involves the lateral side. Partial meniscectomy is the recommended treatment for type 1 and type 2 and sub-total or complete meniscectomy is treatment of choice for type 3. Although our series is very small, all of our results were good to excellent. This type of surgery is being reported for the first time in Pakistan. Considering the complexity of the procedure, we recommend proper training in arthroscopic surgery techniques before embarking on this challenging procedure.

Figure 4

Fig: 3 Arthroscopic view of a discoid lateral meniscus demonstrating the increased thickness and width of the meniscus (A) showing thickness of margins (B) resection margin marked (3) saucerized discoid meniscus with a 6-mm rim remaining



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