Meniscoplasty for lateral discoid meniscus tears: Long-term results of 14 cases

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A B S T R A C T

Introduction: Discoid lateral meniscus lesions are relatively rare. The objective of this study was to determine the long-term results of 14 cases of discoid lateral meniscus tears treated by arthroscopic meniscoplasty between July 1991 and May 2009, and to assess the development of osteoarthritis in the lateral compartment.

Methods: The series consisted of 10 patients (14 knees): 3 girls under the age of 15, 3 men and 4 women aged from 16 to 47 years (mean age: 31.4 ± 11.1 years). The main reason for consultation was pain in 10 cases, locking in 2 cases and pain associated with locking in 2 cases. The diagnosis was confirmed pre-operatively by MRI in 10 cases, CT-arthrography in 1 case and arthrography in 3 cases. The indication for surgery was made because of a symptomatic discoid lateral meniscus. All cases were treated by arthroscopic meniscal reshaping. Functional results were evaluated using the Lysholm–Tegner, IKDC, KOOS and satisfaction scores. Radiological results were evaluated based on the modified Ahlbäck classification for osteoarthritis (OA) changes.

Results: No complications were found. Two patients were lost to follow-up. The remaining eight patients (12 knees) were reviewed at a mean of 157.5 ± 72.1 months (61–276). The mean Lysholm–Tegner score was 88.9 ± 10.6 points (67–100), the mean KOOS was 92.4 ± 9.5 (65–100) and the mean IKDC score was 85.4 ± 16.5 points (65–100). All eight of the reviewed patients were satisfied or very satisfied with the result. Radiological analysis found that five knees had no signs of OA, five knees had stage 1, one had stage 2 and one had stage 3. At last follow-up, no patient had been reoperated.

Conclusion: Meniscoplasty of discoid lateral meniscus tears leads to excellent long-term functional results despite signs of osteoarthritic changes in the lateral compartment of the knee.

Level of evidence: IV (retrospective study).

1. Introduction

The knee’s lateral meniscus can be affected by congenital abnormality, such as the discoid meniscus first described by Young in 1889 [1]. The prevalence of discoid meniscus is 0.4% in Caucasians and 20% in Asians [2–4]. Because of its shape, this type of meniscus type is subjected to shear stresses during anteroposterior translation of the lateral femoral condyle [5]. The result is damage to the lateral discoid meniscus due to repeated trauma [6,7] or dysplasia of the meniscal tissue [8].

Total meniscectomy of the lateral meniscus is no longer performed because it leads to development of premature degenerative osteoarthritis in the lateral compartment [9]. The gold-standard treatment is now arthroscopic meniscal reshaping or meniscoplasty, where the central part of the meniscus is removed so as to restore its normal crescent shape. Meniscus repair or peripheral reattachment can be performed at the same time if there is associated instability. Surgical treatment is guided by the type of discoid meniscus as defined by Watanabe et al. [10] and more recently Ahn et al. [7].

The objective of this study was to evaluate the long-term functional and radiological outcomes after meniscoplasty of symptomatic ruptured lateral discoid menisci. We hypothesized that meniscoplasty of the lateral discoid meniscus will lead to osteoarthritis in the lateral compartment as does total lateral meniscectomy.

2. Material and methods

2.1. Patient series

Between July 1991 and May 2009, 14 arthroscopic meniscoplasty procedures were performed in 10 patients (4 bilateral
cases) who had a symptomatic ruptured lateral discoid meniscus. The average patient age at the time of surgery was 26.1 ± 12.6 years (range 12 to 47). Three patients where less than 15 years of age (all girls) and seven were adults (4 women, 3 men) who had an average age of 31.4 ± 11.1 year (range 16 to 47). Pain was the primary reason for consultation in 10 cases, locking in 2 cases and pain associated with locking in 2 cases. Clinical examination found snapping in 4 cases, flexion deformity in 2 cases and synovial effusion in 2 cases. Only three knees had suffered a traumatic injury. Standard A/P and lateral knee X-rays provided little information to support the diagnosis, but were indirectly suggestive: angled lateral tibial plateau in 2 cases, square lateral femoral condyle in 3 cases and joint space widening in 1 case (Fig. 1). All patients underwent additional preoperative imaging tests to confirm the diagnosis: MRI in 10 cases (Fig. 2), CT-arthrography in 1 case and arthrography in our first 3 cases. The mean time between the start of symptoms and surgery was 19.1 ± 17 months (3 to 60).

2.2. Surgical treatment

All procedures were performed arthroscopically by the same senior surgeon (DS). Patients were set up with their thigh in the knee vice, the leg hanging down and a tourniquet placed at the vice. The lateral tibiofemoral compartment was explored with the knee slightly flexed and in forced valgus. The type of discoid meniscus was classified according to Watanabe et al. [10]. Nine were type I (incomplete), 5 were type II (complete) and none were type III (hypermobile Wrisberg). In 3 cases, the meniscus had a displaced longitudinal bucket-handle tear and in 11 cases, the meniscus had a horizontal fissure that was more or less associated with a radial tear. One female patient also had sequelae of osteochondritis of the lateral femoral condyle with a loose body in the joint. Meniscalplasty was performed in 11 cases to excise the damaged portion of the meniscus (Fig. 3). The goal was to restore normal meniscal shape by removing the central portion of the discoid meniscus from central to peripheral. In the three cases with a bucket-handle tear, the handle portion was removed and the remainder of the meniscus was reshaped. The remaining meniscus was stable in the joint. The meniscus was not repaired in any of the cases.

2.3. Postoperative recovery

The postoperative course was the same one used with standard arthroscopy procedures: immediate weight-bearing with early mobilization.
2.4. Assessment methods

The functional outcomes were evaluated with the Lysholm-Tegner, KQOS and IKDC scores [11–13]. Radiological outcomes were evaluated on A/P, lateral and Schuss views of the knee to look for osteoarthritis (OA), which was classified according to a modified Ahlbäck classification system [14]. Eight patients (12 knees) were reviewed by an independent examiner; two patients were lost to follow-up. For the statistical analysis, quantitative variables were expressed as mean values and qualitative variables were given as their absolute value and percentages. Continuous variables were compared with Student’s t-test, with a type I risk of 5%.

3. Results

No complications were observed.

The mean follow-up was 157.5 ± 72.1 months (61 to 276) and 85.7% of patients were reviewed. The mean Lysholm-Tegner score was 88.9 ± 10.6 points (67 to 100), the mean KOOS was 92.4 ± 9.5 points (65 to 100), and the mean IKDC score was 85.4 ± 16.5 points (41 to 100). The eight reviewed patients (12 knees) were either satisfied or very satisfied with the outcome. According to the modified Ahlbäck classification, five patients were at stage 0, five were at stage 1, one was at stage 2 and one was at stage 3 (Table 1). The likelihood of OA increased as the follow-up time increased. The mean follow-up of patients classified as stage 0 (78.8 months) was significantly less than those classified as stage 1 or higher (188.7 months) (P=0.0004). None of the patients required another surgical procedure.

4. Discussion

This study’s main limitation is the small number of cases; however, this number of cases is acceptable within the realm of relevant published studies [7,9,15–18]. Its strong points are the long follow-up and low rate of patients lost to follow-up. To our knowledge, no previous study has reported the long-term results of meniscectomy of the lateral discoid meniscus in an adult population (>16 years of age).

The discoid meniscus is congenital abnormality that is almost exclusively found in the knee’s lateral compartment. The etiology of this meniscal malformation has not been established. It is accepted that if an adult has an asymptomatic discoid meniscus, it should not be treated [19], nor should it be treated if it is discovered by chance when evaluating another pathological condition [6,20]. If the discoid meniscus is symptomatic, surgical treatment is carried out as a general rule.

In children, Gicquel et al. [19] have stated that there is no need to distinguish between pain, flexion deformity or locking on one hand and simple snapping on the other. Washington et al. [15] believe that latter only requires monitoring. They have also shown that the occurrence and worsening of a meniscal fissure is correlated with the duration of the symptoms, even when only knee snapping is present. After 2 years of symptoms, the risk of meniscal fissure is significantly higher. Past this threshold, the patient is exposed to more severe lesions, making it likely that extensive meniscectomy is required instead of meniscectomy.

Historically, total meniscectomy was the recommended treatment for symptomatic discoid meniscus [21]. But the risk of progression to severe OA in children [9] and adults [18] has been well documented. The advent of arthroscopy has led to the development of meniscus-sparing strategies [22] that were nearly impossible when open meniscectomy was the only option. Arthroscopic meniscectomy is perfectly suited to this strategy, as its goal is to reduce the size of the meniscus by taking away the damaged area but leaving the largest possible meniscal wall. However, the extent to which the resection depends on the severity of the lesion, which is not always easy to evaluate intraoperatively. It is important not to let a lesion persist by trying to perform an inappropriate repair that will be the source of a poor outcome requiring arthroscopic revision [23].

Beaufils et al. [22] propose sutureting the meniscus after the meniscal reshaping if there is associated instability, but this was not needed in our patients. In children, most studies report good clinical results when meniscal repair is performed with meniscoplasty. In particular, Ahn et al. [7] observed little to no functional disability after more than 4 years of follow-up.

Although this study found very good subjective and objective results, it also revealed OA progression in the lateral compartment in 58% of cases after a mean follow-up of 13.1 years (Table 2), confirming our hypothesis. With a much shorter follow-up (26 months), Lee et al. [26] found 85% good and very good results after meniscoplasty only. Ahn et al. [24] observed similar results in children with good clinical outcomes, except for progressive degenerative changes in 40% of the patients after 10.1 years of follow-up.

These reported osteoarthritic changes after meniscoplasty are no different from those observed after lateral meniscectomy in a non-dysplastic meniscus (53% osteoarthritis after 22 years follow-up) by Hulet et al. [25].

### Table 1
Radiographic results as a function of age at enrollment and follow-up.

<table>
<thead>
<tr>
<th>Number of cases</th>
<th>Age at enrollment</th>
<th>Follow-up</th>
</tr>
</thead>
<tbody>
<tr>
<td>No OA 5</td>
<td>19.8 ± 9.4</td>
<td>78.8 ± 17.5 (61–108)</td>
</tr>
<tr>
<td>Stage 1 5</td>
<td>27.4 ± 12.6</td>
<td>187.6 ± 53.5 (144–276)</td>
</tr>
<tr>
<td>Stage 2 1</td>
<td>27</td>
<td>198</td>
</tr>
<tr>
<td>Stage 3 1</td>
<td>43</td>
<td>185</td>
</tr>
<tr>
<td>Stage 4 and 5 0</td>
<td>–</td>
<td>–</td>
</tr>
</tbody>
</table>

OA: osteoarthritis.

### Table 2
Summary of various studies documenting long-term osteoarthritic changes.

<table>
<thead>
<tr>
<th>Surgical treatment</th>
<th>Age at enrollment</th>
<th>Follow-up (years)</th>
<th>OA prevalence (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Räber et al. [9]</td>
<td>Total meniscectomy</td>
<td>13.6</td>
<td>19.8</td>
</tr>
<tr>
<td>Aglietti et al. [16]</td>
<td>Total meniscectomy</td>
<td>31.2</td>
<td>10.1</td>
</tr>
<tr>
<td>Habata et al. [18]</td>
<td>Total meniscectomy</td>
<td>35</td>
<td>22</td>
</tr>
<tr>
<td>Ahn et al. [24]</td>
<td>Meniscal reshaping</td>
<td>26.1</td>
<td>13.6</td>
</tr>
<tr>
<td>Hulet et al. [25]</td>
<td>Total meniscectomy</td>
<td>35</td>
<td>22</td>
</tr>
<tr>
<td>Current study</td>
<td>Meniscal reshaping</td>
<td>26.1</td>
<td>13.6</td>
</tr>
</tbody>
</table>
5. Conclusion

Meniscectomy of the lateral discoid meniscus in the context of meniscal fissure leads to good long-term functional outcomes, despite the osteoarthritis progression found in the lateral compartment in 58% of cases after 13.1 years of follow-up.

Disclosure of interest

The authors declare that they have no conflicts of interest concerning this article.

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References