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Arthroscopic partial meniscectomy for horizontal tear of discoid lateral meniscus

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Abstract A new method of arthroscopic partial meniscectomy for horizontal tear of discoid lateral meniscus was devised to preserve as much meniscal tissue as possible. To evaluate the clinical result of this method for horizontal tear of discoid lateral meniscus, 31 knees (30 patients) were reviewed at an average follow-up of 35 months (range 14–48 months). Horizontally torn discoid lateral menisci were classified as incomplete (11 cases) or complete (20 cases) by the Watanabe classification; no Wrisberg type was noted. Partial meniscectomy was performed in all cases. For the technique of a new method of partial meniscectomy, the unstable leaf of the horizontally torn meniscus was removed to the peripheral rim, but the stable one was preserved and reshaped to produce the similar appearance to the normal lateral meniscus in terms of width and thickness. It was trimmed to have a balanced rim of meniscal tissue about 6–8 mm in width. Meniscal repair was added to partial meniscectomy in one case. All the cases were rated using the Lysholm Knee Scoring Scale and were reviewed to recognize retear clinically. The scores increased after partial meniscectomy by average 20.7 (from 73.0 to 93.7). Recurrence of tear or aggravation of symptoms was not noted at the final follow-up.

Keywords Discoid meniscus · Horizontal tear · Arthroscopic partial meniscectomy

Introduction

The discoid lateral meniscus is a congenital anomaly which was first described by Young [31] in 1889. The prevalence of discoid lateral meniscus has been found to be 5% in a large group of cadaver knees. The prevalence reported in arthroscopic studies ranges from 0.4% to 16.6% [3, 7, 10, 13, 19] with highest value being reported in Japanese population [13]. Although discoid meniscus is often asymptomatic, it can be easily damaged and often needs proper treatment. Among the several methods of meniscectomy, partial meniscectomy has been recommended over other treatments [8, 20, 22, 24]. Partial meniscectomy preserves more of the meniscus, and therefore it reduces the possibility of degenerative changes at long-term follow-up. This is reasonable because the meniscus plays an important role in the transmission of load and in the stability of the knee joint [5, 27].

Resection of horizontal tear is difficult, and deciding how much of the meniscus to remove is a challenge. Moreover, some authors prefer to remove more of the meniscus because horizontal tear tends to recur following partial meniscectomy [17]. Regarding horizontal tear of discoid meniscus, we have seen no reports that suggest the extent of resection. We think the conventional method of partial meniscectomy removing all the parts to which tear extends can increase the direct contact area between femoral condyle and tibial plateau, which may cause osteoarthritic change and instability in the long run. We tried

to find the most appropriate method of arthroscopic meniscectomy to protect cartilage and prevent retear of meniscus. We performed the newly designed partial meniscectomy in horizontal tear of discoid lateral meniscus.

Materials and methods

From September 1996 to September 1999, 109 knees underwent arthroscopic meniscectomy for discoid lateral meniscal tear at the Orthopedic Clinic of the Asan Medical Center. Among these, 39 knees had the horizontal type of tear. We evaluated 31 cases (bilateral in one case) which were treated with arthroscopic partial meniscectomy, excluding 8 cases treated with subtotal or total meniscectomy. All the procedures were performed by a single surgeon (B.S.I.). The patients' mean age at the time of operation was 29.3 years (range 6–62), and there were 10 male and 20 female patients.

All the patients were symptomatic at the time of surgery. The mean duration of symptoms before surgery was 13.9 months (range 1–60). The main symptom was pain in all cases; locking and loss of extension were also observed in some cases. The clinical findings were graded according to the Lysholm Knee Scoring Scale [26], which was originally developed to evaluate the subjective symptoms and ligament instability of patients. The patients indicated their limp, support, locking, instability, pain, swelling, and difficulty in stair climbing. The mean preoperative Lysholm score was 73.1 (range 52–81).

Magnetic resonance imaging (MRI) was performed to rule out other injury in all cases. All the surgical procedures were performed with pneumatic tourniquet. The anteromedial and anterolateral approaches were used for the arthroscope and instruments. Discoid lateral menisci were classified as incomplete (11 cases) or complete (20 cases); no Wrisberg type was noted [29]. Simple horizontal tear was found in 11 cases and horizontal tear combined with other types of tear in 20. All the cases underwent arthroscopic partial meniscectomy. To create normal shape and physiological function of menisci, we used a new method of partial meniscectomy. The unstable leaf of the horizontally torn meniscus was removed to the peripheral rim, but the stable one was preserved and reshaped to produce the similar appearance to the normal lateral meniscus in terms of width and thickness. The stability of each leaf was determined by excursion on probing and substantial integrity. In the case that each leaf had similar consistency and redundancy we removed the inferior leaf. Remaining meniscal tissue was trimmed to have a balanced rim of 6–8 mm in width and near-normal thickness (Figs. 1, 2). If possible, we tried to perform partial meniscectomy. In cases of unstable attachment of peripheral rim of both leaves we performed subtotal or total meniscectomy, which were excluded in this study. Meniscal repair was added to partial meniscectomy in one case due to deep horizontal tear in a child.

Results were evaluated according to the Lysholm Knee Scoring Scale and clinical examination for recurrence of tear. The mean follow-up period was 35 months (range 14–48).

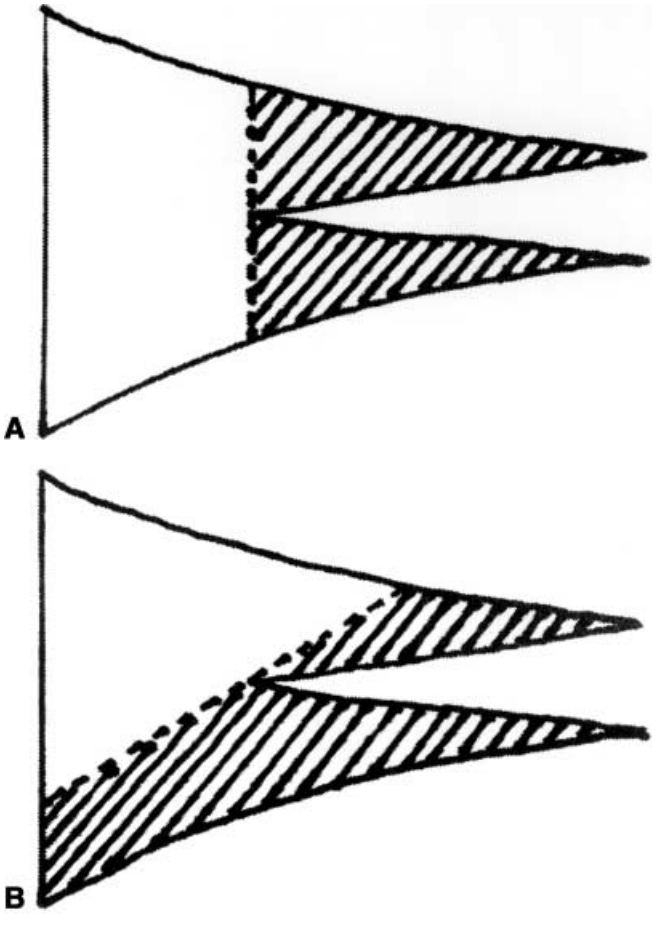

Fig. 1 Lines of resection (*broken line*) and amount of removal (*shaded area*) in conventional partial menisectomy (**A**) and "conservative" partial meniscectomy (**B**)

Results

The average preoperative Lysholm score was 73.1 (range 52–81), which increased to 93.6 (range 87–98) at last follow-up. In the 11 cases of simple horizontal tears the Lysholm score increased by average 21.9 (range 16–39) after partial meniscectomy. In the 20 cases of horizontal tears combined with other types of tear the Lysholm score increased by average 16.5 (range 15–39) after partial meniscectomy (Table 1). Even with lateral femoral cartilage of degenerative change over grade III in 6 cases the Lysholm score improved by average 21.5 (range 17–27). There was no correlation with age or duration of symptoms. There was neither lateral instability nor retear after partial meniscectomy in spite of reduction of height. Recurrence or aggravation of symptoms was not noted at the final follow-up.

Discussion

The normal anatomy of the lateral meniscus varies much more than that of the medial meniscus in size and shape [6]. It also has a much greater normal excursion of up to 1 cm with flexion and extension of the knee [9]. A discoid meniscus is so wide that it covers a larger area of the tib-

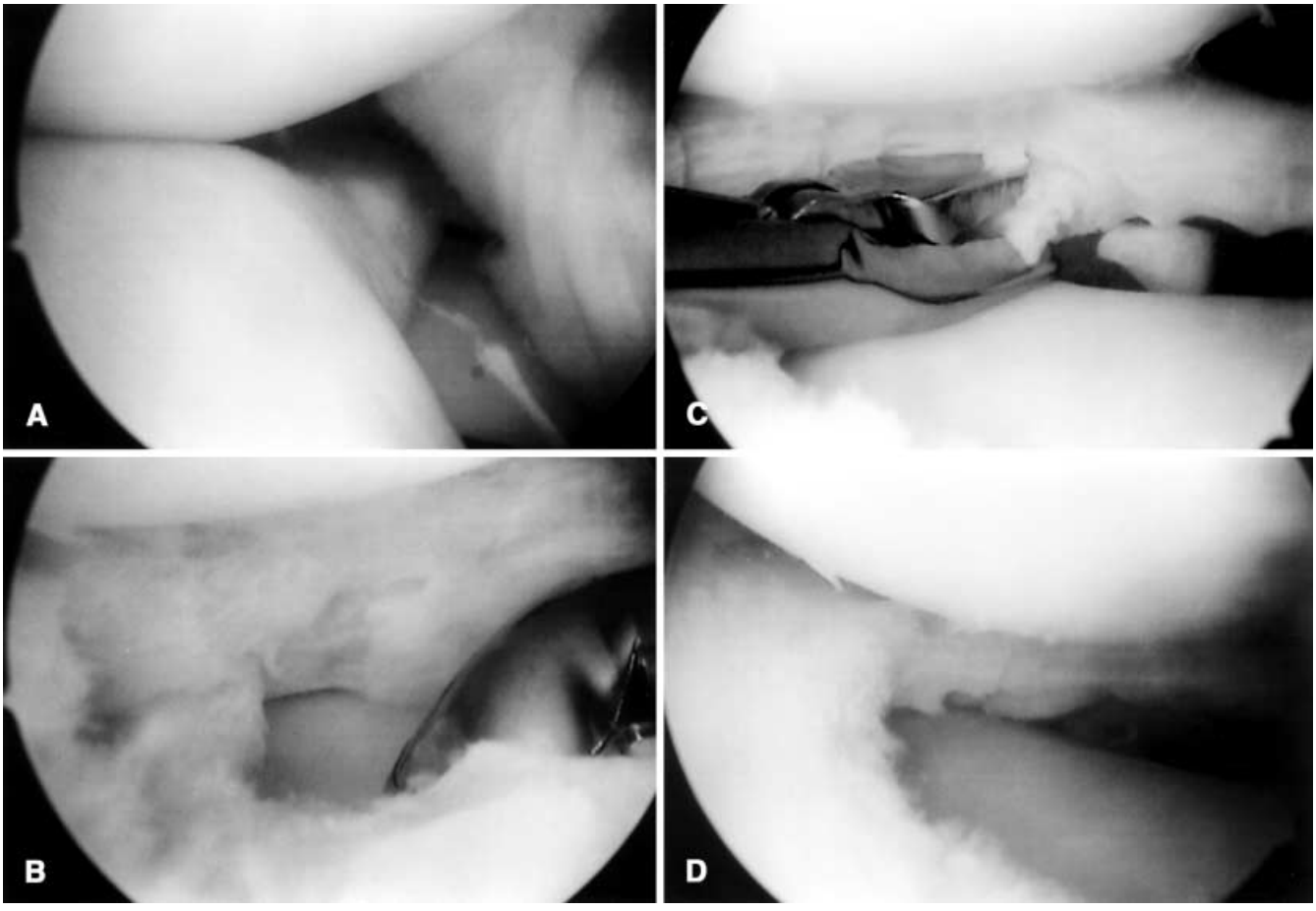

Fig. 2A–D Arthroscopic photographs of a "conservative" partial meniscectomy. **A** Initial view. **B** Obvious horizontal tear after a few bites. **C** Note menisectomy is focused mainly on the inferior leaf, sparing superior leaf. **D** Final view after completion of a "conservative" partial meniscectomy

Table 1 The average Lysholm score after arthroscopic partial meniscectomy for horizontal tear of lateral discoid meniscus

	n	Preoperative	Postoperative
Simple tear	11	72.3	94.2
Complex tear	20	76.9	93.4
Total	31	73.1	93.6

ial plateau but is also much thicker than a normal meniscus [13, 20]. It has been postulated that this increased size results from abnormal motion of the meniscus during range of motion of the knee [14].

Although discoid meniscus is often asymptomatic, it can be easily damaged. In our patients pain was the predominant symptom. MRI was helpful in the diagnosis of lateral discoid meniscus (Fig. 3). The sensitivity of MRI in the diagnosis of lateral discoid meniscus was 100% in our study. MRI was also of value in determining intrasubstantial degeneration and tears that are difficult to be evaluated arthroscopically in the symptomatic patients.

In the past, open total lateral meniscectomy was the treatment of choice for lateral discoid meniscal tears [18, 23]. However, it often led to progressive osteoarthritis and lateral instability [12, 21]. In spite of the introduction of arthroscopic technique some authors believe the total meniscectomy is favorable despite demonstrable radiographic arthritic change [2, 13, 15, 25, 28]. With the development of arthroscopy, partial meniscectomy for symptomatic incomplete or complete discoid meniscus has been preferred [1, 7, 8, 10, 11, 13, 20, 22, 24]. The short-term results show only little differences between total and partial meniscectomy [16]. Moreover, better results with total and subtotal meniscectomy have been reported than with partial meniscectomy [11]. However, long-term follow-up studies show the superiority of partial meniscectomy because of the high prevalence of osteoarthritic changes or lateral instability after total meniscectomy [7, 12, 15, 18, 28, 30].

Conventional partial meniscectomy as well as subtotal or total meniscectomy has limitations due to the increment of direct contact area between femoral and tibial articular cartilage, and a thick meniscus remains after conventional partial meniscectomy. Thus we believe con-

Fig. 3 Sagittal MRI showing horizontal tear of lateral discoid meniscus

ventional partial menisectomy alone may cause the same problem as osteoarthritis or retear in the long term. In the case of horizontal tear we think the conventional partial meniscectomy has a limitation due to the recurrence of tear. After conventional partial meniscectomy in cases of horizontal tear there are chances of remaining of deep cleft which may cause recurrence of tear easily [17].

In our study a "conservative" method of partial meniscectomy was performed. The unstable leaf of the horizontally torn meniscus was removed to the peripheral rim, but the stable one was preserved and reshaped to produce similar appearance to the normal lateral meniscus in terms of width and thickness. Then it was trimmed to have a balanced rim of meniscal tissue about 6–8 mm in width. The symptoms improved and the Lysholm score increased after partial meniscectomy. The results showed no significant difference in results between simple horizontal tears and horizontal tears combined with other types of tear.

Because the arrangement of collagen fibers of discoid meniscus differs from that of normal meniscus [4] there still is possibility of retear. However, there was no clinical evidence of retear in our study. Although long-term follow-up is required to evaluate the effectiveness, we think this "conservative" partial meniscectomy is a reasonable method in cases of horizontal tear of lateral discoid meniscus.

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