Acta orthop. scand. 53, 619–623, 1982

ENDOSCOPIC TOTAL ONE-PIECE MEDIAL MENISCECTOMY: ITS EFFECT ON THE MEDIAL COLLATERAL LIGAMENT

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Meniscus specimens from 10 patients subjected to endoscopic total medial meniscectomy were examined for remnants of the collateral ligament. Very small amounts were found in the postero-medial area of the specimens. None exceeded 2 mm in length or breadth and could be found in only one of the sections. With our technique for endoscopic total meniscectomy the integrity of the medial collateral ligament is not violated and ligamentous instability can be avoided.

Key words: arthroscopy; medial collateral ligament; meniscectomy; microscopy

Accepted 2.i.82

Total meniscectomy has been reported to have serious after-effects. A much higher frequency of osteoarthritic changes apparently occurs after total as compared with partial meniscectomy (Jackson & Dandy 1976, McGinty et al. 1977), possibly owing to the increase in the load transmitted to the surface of the tibia (Maquet 1976, Fukubayaski & Kurosawa 1980). Other workers have found medial laxity to follow open total meniscectomy (Cargill & Jackson 1976, McGinty et al. 1977). In animal studies Oretorp et al. (1978) found increased laxity and decreased strength of the medial collateral ligament after total excision of the medial meniscus. The intimate relation between the medial collateral ligament and the meniscus has been demonstrated in morphological studies (Oretorp & Risberg 1978). Thus it seems to be difficult to excise the meniscus without violating the integrity of the ligament. In all clinical studies to date, however, the patients have undergone open meniscectomy. This has been shown to be more traumatizing to the knee joint than endoscopic meniscectomy, as reflected by the faster rehabilitation after endoscopic than after open meniscectomy. Furthermore, in the hands of skilled surgeons, and with small instruments, endoscopic meniscectomy involves less surgical trauma to the joint surfaces. Our technique of endoscopic meniscectomy (Oretorp & Gillquist 1979a, b, Gillquist 1980) allows total excision of a meniscus in a similar way to the open technique.

To find out whether endoscopic total meniscectomy involved excision of fibres from the collateral ligament the following study was performed.

PATIENTS AND METHODS

Ten patients (4 women and 6 men) with meniscus lesions, for which partial meniscectomy would have been insufficient, were selected for this study. The mean age was 39.5 ± 3.6 years (range 18–52). Total meniscectomy was performed by a technique described elsewhere (Oretorp & Gillquist 1979b, Gillquist 1980). The specimen was mounted, immediately after removal, on a piece of cork and the anterior and posterior ends were indicated. The postero-medial "corner" was specially marked. This is the area between the posterior and the middle third of the meniscus where fibres from the medial collateral ligament usually enter the menis-

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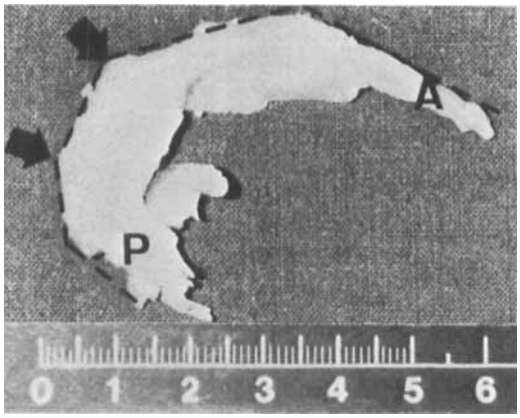


Figure 1. Specimen from a total meniscectomy. The postero-medial corner is indicated with arrows. A = anterior horn, P = posterior horn.

cus substance. The area is readily identified in the specimen as a corner where two straight incisions join in the posterior part of the meniscus (Figure 1). The area is close to the posterior part of the superficial medial collateral ligament and is the place where the posterior oblique ligament and the meniscus join. Identification is easy owing to the arthroscopic technique of excision.

The mounted specimens were fixed in neutral formalin and examined. Blocks for preparation of histological sections were cut out perpendicular to the long axis of the meniscus. At least one block from every specimen was cut through the postero-medial corner and other blocks were taken from each side of this corner at a distance of about 0.5 to 1.0 cm. The blocks were embedded in paraffin. Sections were stained with van Gieson, haematoxylin eosin and by Wiegert's method for elastic fibres. By these staining procedures and investigation in polarized light the structure of the deep collateral ligament could easily be distinguished from that of the medial meniscus, as described by Oretorp & Risberg (1978).

At follow-up, an average of 12 months (range 8–14 months) after operation, knee function was evaluated by a functional score with a maximum value of 95 points (Lysholm & Gillquist 1981a). A score below 77 points means that the patient has symptoms during activities of daily living and such patients are rated as fair/poor (Lysholm & Gillquist 1981a).

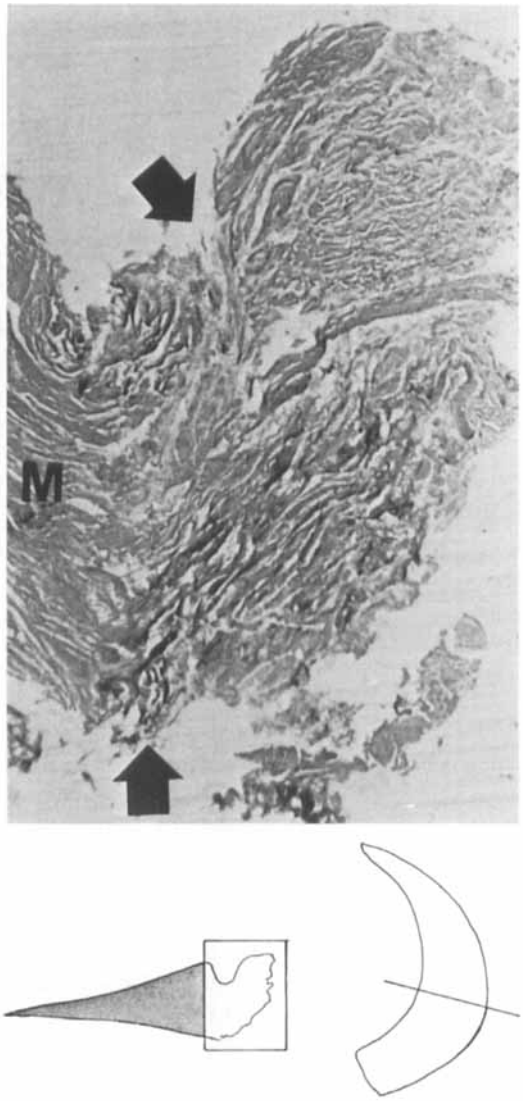


Figure 2. Section of the postero-medial corner showing a 2 mm wide ligament remnant (arrows). M = meniscus substance. Eosin stain. Magnification × 6.3 on film.

RESULTS

The average size of the excised fragments was 5 cm × 1.5 cm. There were no complications and the patients returned to work after an average of 10 days (range 2–21 days). The mean score was 82.5 ± 2.5 at follow-up. There was no clinically increased instability. Careful microscopic examination of several sections of the meniscus showed no ligament fibres in 6 out of 10 cases. Ligament fibres could be demonstrated in 4 but they were extremely small and measured only about 2 mm in width (Figure 2). Ligament fibres were seen

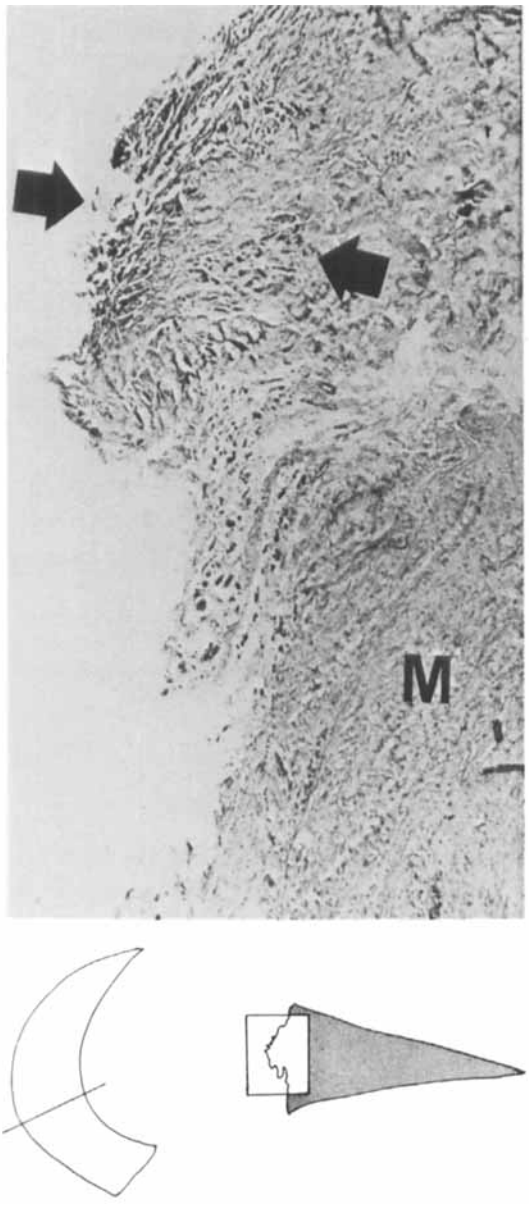


Figure 3. Section of the postero-medial corner showing very small ligament remnant (arrows). M = meniscus substance. Eosin stain. Magnification ×6.3 on film.

within only one section of the meniscus, at the postero-medial corner (Figure 3). In all cases degeneration and tears were present in the meniscus, and extended to the periphery in the posterior horn (Figure 4). No ligament fibres were found in the sections from the anterior and posterior ends of the meniscus. The anterior horn usually showed normal meniscus structure as described by Oretorp et al. 1978 (Figure 5). Whether or not ligament fibres were present in the specimen did not affect the functional score of knee.

DISCUSSION

Morphological studies have shown that the medial collateral ligament and the medial meniscus function as an integrated unit (Oretorp et al. 1978). Ligament fibres enter the meniscus at the postero-medial corner. Fibres from the deep portion of the ligament and the posterior oblique ligament apparently enter the lower half of the meniscus about 20 per cent of the distance from the periphery to the inner edge. This has been taken as an explanation for the instability found after excision of the meniscus in specimens tested under laboratory conditions (Oretorp et al. 1978). Increased medial laxity has also been found clinically after open meniscectomy (McGinty et al. 1977, Cargill & Jackson 1976). These findings have been offered as a possible explanation for the increased incidence of osteoarthrosis after total open meniscectomy compared with partial open meniscectomy (McGinty et al. 1977, Jackson & Dandy 1976). No comparison has been made between total and partial endoscopic meniscectomy. Since total meniscectomy is unavoidable in the presence of extensive tears, in order to remove all damaged meniscus tissue, a technique that will minimize the hazards involved is called for. There is no way of avoiding the increased load on the tibial surface created by total meniscectomy. We originally applied a conservative endoscopic treatment with such menisci and found a high incidence of reoperations for symptoms of meniscus remnants (Lysholm & Gillquist 1981b). We therefore started to do endoscopic total meniscectomy and have significantly reduced the number of reoperations. An important feature of the operative technique is to avoid excision of part of the medial collateral ligament. The present study shows that our goal has been reached with reasonable

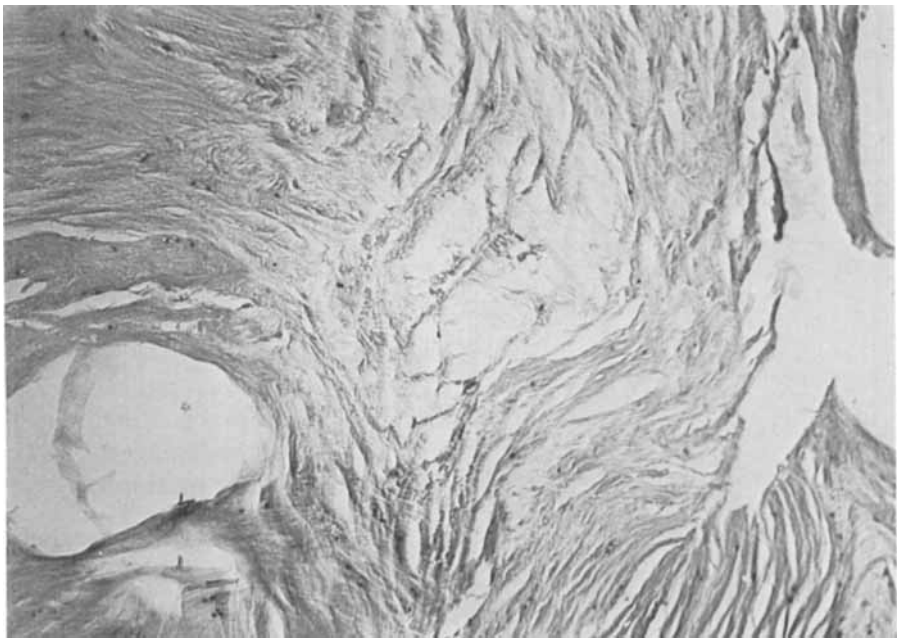
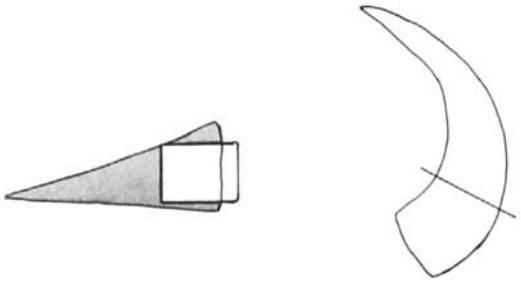


Figure 4. Section of the posterior horn showing severe degeneration at the periphery. Eosin stain. Magnification ×25 on film.



success. As a rule no ligament fibres were found in the meniscus specimen, and when such fibres were demonstrated they were very small. Endoscopic meniscectomy should cause less damage to the ligament than the open operation which involves pulling the meniscus towards the centre of the joint. During endoscopic meniscectomy a constant high fluid pressure is maintained in the joint, the capsule being forced outwards together with the meniscus. The incision can therefore be made within the actual meniscus substance. By tilting the knife and cutting obliquely through the meniscus it is possible to preserve the lower part of the meniscus where most of the ligament fibres are situated. Arthroscopy also allows more accurate location of the incision due to the magnification obtained by the scope. The posterior part of the meniscus which is the most important part with respect to the ligament can be seen in detail during arthroscopy whereas excision of the posterior horn at open operation is usually performed blind. This study shows that total endoscopic meniscectomy by our technique does not significantly violate the medial collateral ligament and should therefore not lead to increased laxity apart from that due to loss of meniscus volume. When the meniscus is severely damaged, total endoscopic meniscectomy seems to be a reasonably safe procedure.

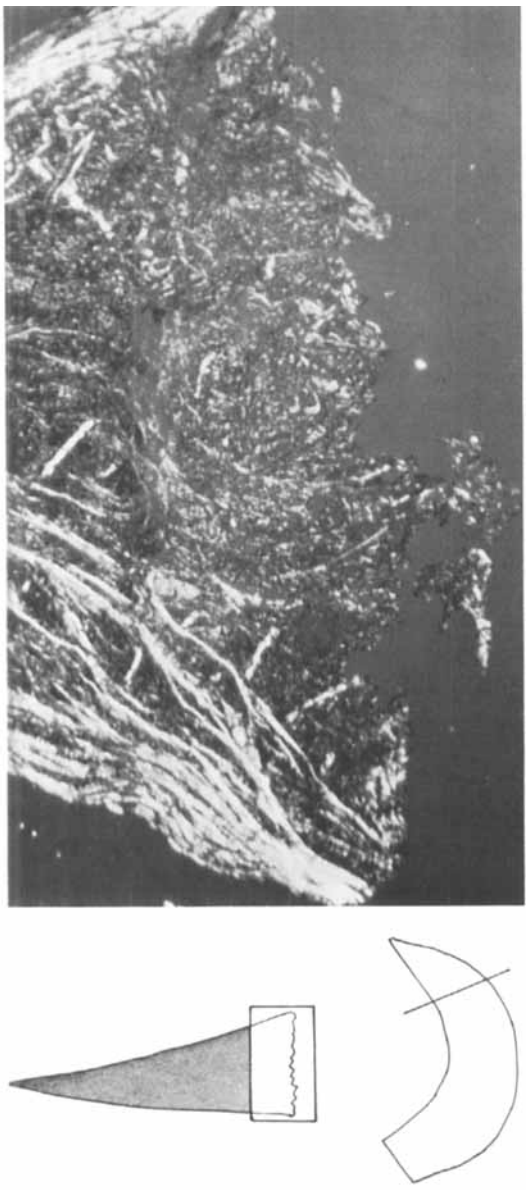


Figure 5. Section of the anterior horn showing normal meniscus tissue. No ligament remnants can be seen. Weigert's stain. Magnification ×6.3 on film.

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