

ARTHROSCOPIC PARTIAL LATERAL MENISCECTOMY LONG-TERM RESULTS IN ATHLETES

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This is a retrospective case-control study of arthroscopic partial meniscectomy for isolated lesions of the lateral meniscus, performed between 1990 and 1995.

Thirty-one knees were evaluated after an average follow-up of 8 years : 48.4% had excellent/good IKDC-scores and 64.5% excellent/good Lysholm scores. The Tegner activity score dropped from 7.2 (competitive sports) to 5.7 (recreational sports). Fairbank changes were noted in 92.9% of the radiographs.

Deterioration of results after arthroscopic partial lateral meniscectomy is obvious. The extent of the resection is a significant factor.

Keywords : knee ; arthroscopy ; lateral meniscal tear ; athletes ; long-term follow-up.

Mots-clés : genou ; arthroscopie ; méniscectomies arthroscopiques ; sportifs ; résultats à long terme.

INTRODUCTION

The meniscus is a biconcave fibrocartilage whose principal functions are shock absorption and load transmission (10, 19, 26). It also contributes to knee joint lubrication, proprioception and stability (1, 16, 23). The lateral and medial menisci are quite different. The medial meniscus has a semi-circular shape and transmits 50% of the load on the medial compartment. The lateral meniscus is almost completely circular and under normal circumstances transmits 70% of the load on that compartment, leaving the remaining 30% to the articular cartilage. Furthermore, the lateral compartment has less congruency, and therefore lateral meniscal tears will result in greater loss of contact

area and greater rise of contact stress than medial meniscal tears.

Meniscal tears are treated nowadays very conservatively in order to preserve as much tissue as possible, since it has been demonstrated that total meniscectomy leads to early joint degeneration (7, 8, 14, 15). Several studies have shown deleterious effects of concomitant lesions (s.a. articular cartilage damage, ligament disruption or tears of both menisci) (2, 20, 22). In the past most clinical studies did not differentiate between medial or lateral meniscal tears. More recently arthroscopic partial medial as well as partial lateral meniscectomies have proven to yield good short-term results (5, 9, 11, 12) ; but there is reason to believe that the outcome deteriorates with time, especially for lateral tears (3, 4, 13, 20).

The purpose of this retrospective case-control study is to evaluate long-term results of arthroscopic partial meniscectomy for isolated lateral meniscal tears in a young and active population.

MATERIALS AND METHODS

Between 1990 and 1995 in A.Z. St. Jan Bruges, 75 arthroscopic partial meniscectomies were performed for isolated lateral meniscal tears. Included in this study were 20- to 30-year-old competitive sportsmen/women, with an otherwise intact knee and a negative history of

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previous injury or surgery on the involved knee. Knees sustaining further injury were excluded.

The patients responded to a questionnaire and underwent a clinical and a radiographic examination. Data were collected about the origin of the lesion (traumatic versus nontraumatic), the type of tear, the subjective and objective clinical and radiological status of the knee prior to surgery and at follow-up, the functional score of the patient, and the patient's body weight.

The meniscal tears were classified following Metcalf's arthroscopic description (18) (table I). Also, the extent of the tear was noted (limited versus subtotal). The questionnaire recorded detailed functional information using the International Knee Documentation Committee (I.K.D.C.) Subjective Knee Evaluation Form, the Lysholm score (17) (table II) and the Tegner score (25) (table III). The Tegner score was recorded at the time before the injury, at maximum improvement and at the time of the completion of the questionnaire.

The clinical examination was based on the I.K.D.C. (table IV) and was performed by the same physician. The Body Mass Index (B.M.I.) was calculated at the time of the examination. Posteroanterior weight-bearing radiographs in 45° flexion of both knees were taken, as well as a bilateral full-leg standing x-ray, in order to

Tabel I. — Metcalf classification

Flap tear
Radial tear
Bucket handle tear
Horizontal tear
Vertical tear
Parrot beak tear
Complex tear
Discoid meniscal tear

Tabel II. — Lysholm score

Instability	25 points
Pain	25 points
Locking	15 points
Swelling	10 points
Stair climbing	10 points
Limp	5 points
Support	5 points
Squatting	5 points

Excellent : 100-90 Good : 89-80 Fair : 79-70 Poor : < 69.

Tabel III. — Tegner score

Level	Intensity	Activity
10	competition	soccer (inter-)national
9	competition	soccer (lower league), hockey wrestling gymnastics
8	competition	hockey squash – badminton athletics (high jump) skiing
7	competition	tennis athletics motorcross soccer – basketball
	recreation	soccer hockey squash athletics cross country
6	recreation	tennis – badminton handball – basketball skiing jogging (five times a week)
5	competition	cycling langlauf
	recreation	jogging (twice a week)
	profession	heavy manual labor (eg. construction)
4	recreation	cycling langlauf jogging level terrain
	profession	moderate labor (eg. truck driver)
3	competition	swimming
	recreation	swimming
	profession	light work
2	recreation	walk on unlevel terrain
	profession	light work
1	recreation	walk on level terrain
	profession	sedentary
0		Unable to work because of knee problem

quantify the alignment. The patients were asked to bring their preoperative radiographs, but only one did. Hence we used the contralateral knee as a control. All radiographs were studied by one radiologist unaware of the site operated on. He was asked to indicate the involved knee and describe the presence of Fairbank changes (8) (table V).

Statistical analysis on functional, clinical and radiographic data was performed using the paired Student t-test for Windows Excel.

Tabel IV. — Modified I.K.D.C. clinical examination

Weight and height
General alignment
Patella
Quadriceps volume
Range of motion
Effusion
Local tenderness
Crepitus
Ligaments and Stability

Tabel V. — Fairbank changes

No change
Lipping of the tibial plateau
Flattening
Narrowing

RESULTS

Of the 73 initial patients, one patient died in a car accident, 15 were lost to follow-up owing to untraceable addresses and 27 patients did not respond to the two mailings we performed for this study.

We were able to evaluate 31 knees in 29 patients (9 women and 20 men), with an average follow-up of 8 ± 1.5 years. The mean age was 25 years at the time of surgery. The average Tegner score before the injury was 7.2 ± 1.9 (= competition level). Twenty patients indicated a traumatic event as the onset of their problem ; 11 had a gradual onset.

Arthroscopy identified 12 flap-tears, 6 radial tears, 5 bucket handle tears, 3 degenerative tears (discoïd), 2 horizontal tears, 2 parrot beak tears and one vertical tear. Limited partial meniscectomy (less than 50% of the meniscal tissue) was possible in 21 cases ; 10 cases required subtotal meniscectomy.

The Tegner score was 6.58 ± 1.89 at maximal improvement and 5.68 ± 1.85 (= recreation level) at completion of the questionnaire, indicating that the average activity level dropped from competition to recreation. Following the I.K.D.C. Subjective Knee Score 16.1% had excellent and 32.3% had good results, 22.6% had fair and 29.0% had poor results (fig. 1). The average score was $74.57 \pm 16.63\%$.

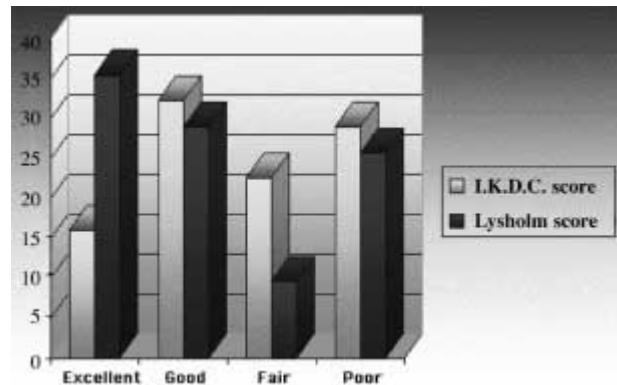


Fig. 1. — Subjective results of arthroscopic partial lateral meniscectomy.

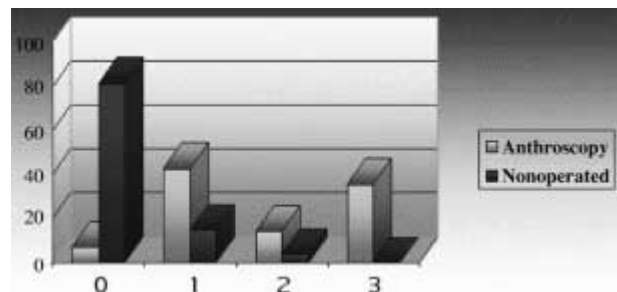


Fig. 2. — Radiographic results

The Lysholm score was excellent in 35.5%, good in 29%, fair in 9.7% and poor in 25.8%. The average Lysholm score was $81.45 \pm 14.33\%$.

All knees but one were normal on clinical examination : absence of localized tenderness, crepitus and joint effusion, normal stability, complete range of motion, and comparable thigh circumference of both sides. Alignment stayed within a normal range ($\pm 6^\circ$ valgus).

The operated knee was correctly identified by the radiologist in 84.6% of the cases. Only 3 knees had a completely normal radiographic image after arthroscopic partial lateral meniscectomy ; 42.9% showed one Fairbank change, 14.3% two changes and 35.7% all three Fairbank changes. Only 4 of the non-operated knees showed one change and one showed two Fairbank changes ($p < 0.0001$) (fig. 2).

Four patients had undergone a new arthroscopy during the follow-up period because of worsening

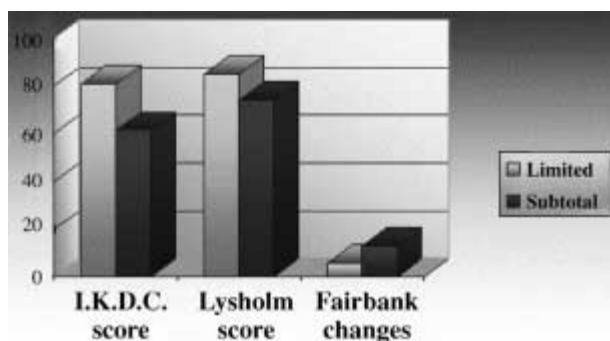


Fig. 3. — Outcomes of limited versus subtotal lateral meniscectomy.

complaints. All of them had severe degeneration (grade IV or V according to Defrère (6)) of the lateral compartment.

Subtotal meniscectomies had a less favorable outcome than limited partial meniscectomies. Subtotal meniscectomies had inferior results for the I.K.D.C. Subjective Knee Score ($p = 0.0005$) and for the Lysholm score ($p = 0.02$); furthermore, the follow-up radiographs showed more Fairbank changes ($p = 0.02$) (fig. 3).

No significant difference could be demonstrated between men and women ($p = 0.3$), between traumatic and nontraumatic injuries ($p = 0.15$) or between recreational and competitive sportsmen ($p = 0.35$).

The average B.M.I. was 25 ± 3.7 ; 6 patients were frankly obese

(B.M.I. ≥ 27), and 4 had a B.M.I. between 25 and 27 (= overweight). We did not find any significant difference between patients with normal weight and those who were overweight ($p = 0.4$).

DISCUSSION

Partial meniscectomy causes an important rise in contact stresses on the articular cartilage, distinctly more pronounced in the lateral than in the medial compartment of the knee (1, 2, 10, 16, 19, 23, 26).

Early degeneration of the affected compartment is to be expected, even if short-term results are excellent (3, 4, 13).

This retrospective study was limited to active young patients who returned to their preinjury sports level after their rehabilitation. In a similar short-term (follow-up of 3 years) study of isolated partial lateral meniscectomies (41 patients), 85% of the patients had excellent or good results (20). We had only 48.4% excellent or good I.K.D.C. scores and 64.5% excellent or good Lysholm scores after an average follow-up of 8 years.

A French multicenter study investigated the results of arthroscopic partial meniscectomy for isolated medial tears in 317 patients (5). After a follow-up of 11.5 years progression of radiographic changes comparing the operated knee and the non-operated knee was found in no more than 22.4%. In our study 92.9% of the radiographs showed one or more Fairbank changes. Recently a German study (75 patients) also presented the long-term results (mean follow-up of 12.3 years) of arthroscopic partial lateral meniscectomy in otherwise normal knees (24). Lysholm scores (66% excellent/good results) compared with ours, and Fairbank changes were present in 78%. No conclusive correlation was drawn from this study.

In our study the etiology of the injury (traumatic versus nontraumatic) did not affect the outcome. Some studies suggested that the type of tear was influential (20, 21). We could not confirm this with the limited number of patients in our study.

Nevertheless a significant correlation was found between the extent of the meniscectomy and the subjective symptoms, functional outcome and radiographic changes at follow-up.

We could not demonstrate a significant role for other factors such as gender, B.M.I. and sports level, although weight excess and intensive training at a high level must cause additional stress on the knee joint.

In conclusion, the early success of arthroscopic partial meniscectomy for isolated lateral meniscal tears is not maintained. Long-term results for lateral meniscal tears are less favorable than those for medial tears. Deterioration clearly correlates with the extent of the resection.

To determine the role of other factors, a study of a larger group is needed.

REFERENCES

1. Aagaard H., Verdonk R. Function of the normal meniscus and consequences of meniscal resection. *Scand. J. Med. Sci. Sports*, 1999, 9, 134-140.
2. Ahmed A. M. The load-bearing role of the knee menisci. In : Mow V. C., Arnoczky S. P., Jackson D. W. (ed.) *Knee Meniscus : Basic and Clinical Foundations*. New York, Raven, 1992, pp. 59-73.
3. Bolano L. E., Grana W. A. Isolated arthroscopic partial meniscectomy. Functional radiographic evaluation at five years. *Am. J. Sports Med.*, 1993, 21, 432-437.
4. Bonamo J. J., Kessler K. J., Noah J. Arthroscopic meniscectomy in patients over the age of 40. *Am. J. Sports Med.*, 1992, 20, 422-429.
5. Chatain F., Robinson A. H. N., Adeleine P. *et al.* The natural history of the knee following arthroscopic medial meniscectomy. *Knee Surg., Sports Traumatol., Arthrosc.*, 2001, 9, 15-18.
6. Defrere J. Value of arthroscopy in the study of mechanical problems in the knee articulation. *Acta Orthop. Belg.*, 1979, 45, 348-360.
7. Fahmy N. R., Williams E. A., Noble J. Meniscal pathology and osteoarthritis. *J. Bone Joint Surg.*, 1983, 65-B, 24-28.
8. Fairbank T. S. Knee joint changes after meniscectomy. *J. Bone Joint Surg.*, 1948, 30-B, 64-70.
9. Fauno P., Nielsen A. B. Arthroscopic partial meniscectomy : A long-term follow-up. *Arthroscopy*, 1992, 8, 345-349.
10. Fukubayashi T., Kurosawa H. The contact area and pressure distribution pattern of the knee. *Acta Orthop. Scand.*, 1980, 51, 871-879.
11. Hoser C., Fink C., Brown C. *et al.* Long-term results of arthroscopic partial lateral meniscectomy in knees without associated damage. *J. Bone Joint Surg.*, 2001, 83-B, 513-516.
12. Jaureguito J. W., Elliot J. S., Lietner T. *et al.* The effects of arthroscopic partial lateral meniscectomy in an otherwise normal knee : A retrospective review of functional, clinical, and radiographic results. *Arthroscopy*, 1995, 11, 29-36.
13. Jones R. E., Smith A. C., Reisch J. S. Effects of medial meniscectomy in patients older than 40 years. *J. Bone Joint Surg.*, 1978, 60-A, 783-786.
14. Krause W. E., Pope M. D., Johnson R. J., Wilder D. G. Mechanical changes in the knee after meniscectomy. *J. Bone Joint Surg.*, 1976, 58-A, 599-604.
15. Kurosawa H., Fukubayashi T., Nakajima H. Load-bearing mode of the knee joint. Physical behaviour of the knee joint with or without menisci. *Clin Orthop*, 1980, 149, 283-290.
16. Levy I. M., Torzilli P. A., Fish I. D. The contribution of the menisci to the stability of the knee. In : Mow V. C., Arnoczky S. P., Jackson D. W. (ed.) *Knee Meniscus : Basic and Clinical Foundations*. New York, Raven, 1992, pp. 107-115.
17. Lysholm J., Gillquist J. Evaluation of knee ligament surgery results with special emphasis on use of a scoring scale. *Am. J. Sports Med.*, 1982, 10, 150-154 .
18. Metcalf R. W. Arthroscopic meniscal surgery. In : McGinty J.B. (ed.), Raven , New York, 1991, pp. 203-236.
19. Mow V. C., Ratcliff A., Chern K. Y., Kelly M. A. Structure and function relationships of the menisci of the knee. In : Mow V.C., Arnoczky S. P., Jackson D. W. (ed.) *Knee Meniscus : Basic and Clinical Foundations*. New York, Raven, 1992, pp. 37-57.
20. Osti L., Liu S. H., Raskin A. *et al.* Partial lateral meniscectomy in athletes. *Arthroscopy*, 1994, 10, 424-430.
21. Pellacci F., Verni F., Gagliardi S., Goretti C. Arthroscopic lateral meniscectomy in adults with stable knees. A medium term evaluation of the results and comparison with similar lesions of the medial meniscus. *Ital. J. Orthop. Trauma.*, 1990, 16, 9-17.
22. Ronger C., Klestil T., Gloetzer W. *et al.* Osteoarthritis after arthroscopic partial meniscectomy. *Am. J. Sports Med.*, 1995, 23, 240-244.
23. Renstrom P., Johnson R. J. Anatomy and biomechanics of the menisci. *Clin. Sports Med.*, 1990, 9, 523-538.
24. Scheller G., Sobau C., Bülow J. U. Arthroscopic partial lateral meniscectomy in an otherwise normal knee. *Arthroscopy*, 2001, 17, 946-952.
25. Tegner Y., Lysholm J. Rating systems in the evaluation of knee ligament injuries. *Clin. Orthop.*, 1985, 198, 43-49.
26. Voloshin A. S., Wosk J. Shock absorption of meniscectomized and painful knees : A comparative in vivo study. *J. Biomed. Eng.*, 1983, 5, 157-161.

SAMENVATTING

I. BONNEUX, B. VANDEKERCKHOVE. Arthroscopische partiële laterale meniscectomie : lange termijn resultaten bij atleten.

Dit is een retrospectieve geval studie van arthroscopische partiële meniscectomies voor geïsoleerde letsels van de laterale meniscus, uitgevoerd tussen 1990 en 1995. Eenendertig knieën werden geëvalueerd na een gemiddelde follow-up van 8 jaar. 48.4% behaalde excellente of goede IKDC-scores en 64.5% excellente of goede Lysholm scores. De Tegner activiteit score daalde van 7.2 (competitiesport) tot 5.7 (recreatiesport). De radiografieën vertoonden Fairbank veranderingen in 92.9% van de gevallen.

Deterioratie van de resultaten na arthroscopische partiële laterale meniscectomies is duidelijk. De uitgebreidheid van de resectie is daarbij een bepalende factor.

RÉSUMÉ

I. BONNEUX, B. VANDEKERCKHOVE. Méniscectomie externe partielle par technique arthroscopique: résultats à long terme chez des sportifs.

Les auteurs ont réalisé une étude rétrospective des méniscectomies arthroscopiques partielles réalisées

entre 1990 et 1995 pour des lésions isolées du ménisque externe.

Trente et un genoux ont été évalués avec un recul moyen de 8 ans. Les résultats selon le score IKDC étaient excellents ou bons dans 48,4% des cas. Le résultat, évalué selon le score de Lysholm, était excellent ou bon dans 64,5% des cas. Le score d'activité selon Tegner est tombé de 7,2 (sport de compétition) à 5,7 (sport de récréation). Les radiographies montraient des signes de Fairbank dans 92,9% des cas.

La détérioration des résultats après une méniscectomie arthroscopique partielle externe est évidente. L'importance de la résection est un facteur significatif.