CONGENITAL DISCOID LATERAL MENISCUS IN CHILDREN

A FOLLOW-UP STUDY AND EVOLUTION OF MANAGEMENT

PAUL M. AICHROTH, DIPAK V. PATEL, CLARE L. MARX

From Westminster Children's Hospital and Hospital for Sick Children, London

Fifty-two children with 62 discoid lateral menisci were reviewed at an average follow-up of 5.5 years. Their average age at operation was 10.5 years and the mean delay in diagnosis was 24 months. Most of the children had vague and intermittent symptoms and the classical clunk was demonstrable in only 39% of the knees. An associated osteochondritis dissecans of the lateral femoral condyle was seen in seven knees.

Forty-eight knees with symptomatic torn discoid menisci underwent open total lateral meniscectomy, six had arthroscopic partial meniscectomy and eight knees with intact discoid menisci, were left alone. Based on Ikeuchi's grading (Ikeuchi 1982), 37% of the knees had an excellent result, 47% had a good result and 16% had a fair result: none was poor.

Arthroscopic partial meniscectomy is recommended only when the posterior attachment of the discoid meniscus is stable. A total meniscectomy is indicated for the Wrisberg-ligament type of discoid meniscus with posterior instability.

Young, in 1889, was the first to describe a discoid lateral meniscus in a cadaver specimen, and the term 'snapping-knee syndrome' was attributed to it by Kroiss (1910). The vague and intermittent symptoms associated with this anomaly may produce difficulty and delay in the diagnosis. Arthroscopy allows more precise diagnosis of the lesion (Watanabe, Takeda and Ikeuchi 1979; Ikeuchi 1982; Hayashi et al 1987), confirms the clinical diagnosis and can identify an associated tear (Bellier et al 1989).

The purpose of this study was to report our experience with the arthroscopic evaluation and overall strategy of management of the discoid lateral meniscus, and to determine the long-term results of operative treatment.

MATERIAL AND METHODS

In the past 25 years, 52 children with 62 discoid lateral menisci were treated at Westminster Children's Hospital and the Hospital for Sick Children, London. Their

average age at surgery was 10.5 years (range 4 to 18). The age distribution of the children at operation is shown in Figure 1. The mean follow-up was 5.5 years (range 2 to 18). There were 28 boys and 24 girls. The right knee was involved in 27 cases and the left in 35. Ten children had the condition on both sides. The interval between the onset of symptoms and the clinical diagnosis varied between three and 96 months (Fig. 2).

Pre-operative clinical and radiological features (Table I). Pain was the predominant symptom in the majority of the cases. Thirty children (36 knees) complained of a click or clunk in the knee. However, on examination, the 'classical' clunk so characteristic of the discoid meniscus was elicited in only 24 knees. Details of the pre-operative physical signs are shown in Table II.

Routine anteroposterior, lateral and intercondylar (tunnel) views were taken. Widening of the lateral joint

Table I. Pre-operative clinical symptoms

Symptom	Number of knees
Pain	55
Click or clunk	36
Swelling	30
Locking	17
Giving way	12
Preceding injury	5

P. M. Aichroth, MS, FRCS, Consultant Orthopaedic Surgeon
D. V. Patel, MSc Orth(London), FCPS Orth(Bombay), Honorary Clinical Assistant and Research Fellow
Westminster Hospital, Dean Ryle Street, Horseferry Road, London SW1P 2AP, England.

C. L. Marx, FRCS, Consultant Orthopaedic Surgeon
St Mary's Hospital, Praed Street, Paddington, London W2 1NY, England.

Correspondence should be sent to Mr P. M. Aichroth.

© 1991 British Editorial Society of Bone and Joint Surgery
0301-620X/91/6221 \$2.00
J Bone Joint Surg [Br] 1991; 73-B: 932-6.

space was seen in five knees and a sclerotic lateral tibial plateau in two. None of the radiographs showed squaring off of the lateral femoral condyle. Cupping of the lateral tibial plateau was present in three knees. Notable features of this series were an associated osteochondritis dissecans affecting the lateral femoral condyle in seven knees (Fig. 3) and ossification defects involving the lateral femoral condyle in four. The diagnosis of osteochondritis dissecans was confirmed at arthrotomy or arthroscopy in all

showed that the lateral compartment had been difficult to enter. The diagnosis of the discoid lateral meniscus had not been made initially. In such instances, it is best to use the medial portal first.

Several portals may be required for adequate visualisation and probing of the discoid meniscus, especially for a Wrisberg-ligament type. Stability of the discoid meniscus and whether it is torn or not must be determined using a hook.

Fig. 1

Fig. 2

Figure 1 – Age distribution of the children at operation. Figure 2 – Duration of pre-operative symptoms.

Table II. Pre-operative clinical signs

Physical sign	Number of knees
Locked knee	7
Joint-line tenderness	22
Effusion	12
Clunk	24
Patellar signs	4
None	12

seven cases and the unstable intra-articular fragment was excised from three knees.

The diagnosis of the discoid meniscus was confirmed at arthrotomy in 18 children (treated before 1974) and by arthroscopy in the remaining 34. Arthrography was performed in some cases but in small children this was not practicable because general anaesthesia was usually necessary. If general anaesthesia is to be administered, then arthroscopy is more useful. Magnetic resonance imaging was not undertaken.

Five children in this series were arthroscopied at other hospitals and in each case the operative records

Fig. 3

Osteochondritis dissecans of the lateral femoral condyle in a child with discoid lateral meniscus.

Arthrotomy/arthroscopy findings. There were 26 intact and 36 torn discoid menisci. Many of the intact menisci had an attachment to the Wrisberg ligament as described by Watanabe et al (1979) and Dickhaut and DeLee (1982). An abnormal attachment to the popliteus tendon was observed in two cases (Fig. 4).

Of the 36 torn discoid menisci, seven were cystic and the tears were of various types including 'bucket handle', longitudinal and horizontal. In 13 cases, the menisci were shredded, producing gross symptoms and signs.

TREATMENT

In the pre-arthroscopy era, total excision of the meniscus was the only surgical treatment. With the advent of arthroscopy, it became possible to differentiate between the various types of discoid menisci and deal with them differently.

Overall, 40 children (48 knees) in this review were treated by open excision of the whole of the discoid meniscus and six had arthroscopic partial lateral meniscectomy. Six children (eight knees) with minimal clinical symptoms but arthroscopically proven intact discoid menisci, were left alone.

Table III. The knee rating system (after Ikeuchi 1982, Vandermeer and Cunningham 1989)

Grade	Description
Excellent	No mechanical symptoms (click, locking), no pain, full range of movement
Good	No mechanical symptoms, occasional mild pain on exercise, full range of movement
Fair	Mechanical symptoms, mild to moderate pain on exercise, full range of movement
Poor	Mechanical symptoms, moderate to severe pain on exercise or pain at rest, limitation of movement

'Second-look' arthroscopies were performed in four knees, after an average interval of 18 months (range 10 to 22). An adequate peripheral fibrous rim ('pseudo-meniscus') was seen in three knees and the popliteus tendon was found to be covered. No degenerative changes were seen in the lateral compartment.

RESULTS

Clinical assessment. The results were analysed using the Ikeuchi grading system (Ikeuchi 1982; Vandermeer and Cunningham 1989); 37% of the knees had an excellent result, 47% were good and 16% were fair (Table III). None of the knees had a poor result.

At review, seven of the 46 children who underwent either open or arthroscopic lateral meniscectomy com-

plained of mild to moderate pain and five had swelling on exertion. None of them presented with recurrent episodes of locking nor giving-way. On examination, none of the knees had persistent effusion nor joint-line tenderness. All knees performed a full range of movement.

Radiological assessment. Early degenerative changes (Fairbank 1948; grade I) were seen in the lateral compartment in only three knees. These were older children, over 16 years of age with a follow-up period of 11, 13 and 18 years after total meniscectomy. No radiograph showed narrowing of the joint space. The lesions of osteochondritis dissecans had healed spontaneously in four cases where the stable fragment was left in situ.

DISCUSSION

The present series has revealed several points of interest. Pain was the most common pre-operative symptom rather than the conventionally described 'clunk'. The pain is probably due to the abnormal movement of the meniscus as a result of the instability and its lack of posterior capsular attachment.

Contrary to Picard (1964), we do not feel that

Fig. 4

Pathological specimen of a discoid lateral meniscus with unusual attachment to the popliteus tendon.

radiographs play a significant role in diagnosis. Only five knees in our series had the classical lateral joint space widening which has been described in previous reviews (Dickhaut and DeLee 1982; Bellier et al 1989).

The accepted method of classification for the discoid lateral meniscus is that of Watanabe et al (1979). They described three types: complete, incomplete or Wrisberg-ligament type, based on the degree of coverage of the lateral tibial plateau and the presence or absence of the

normal posterior meniscotibial attachment. The management of the meniscus is based on this system of classification. Complete and incomplete discoids with tears should be partially resected to a stable peripheral rim (Fujikawa, Iseki and Mikura 1981; Metcalf 1981; Ikeuchi 1982; Stone and Miller 1986; Hayashi et al 1988). Total meniscectomy is recommended for the Wrisberg-ligament type of discoid because the posterior meniscotibial attachment is deficient (Kaplan 1957; Tachdjian 1972; Dickhaut and DeLee 1982; Griffin 1986). Most authors agree that the intact discoid lateral meniscus, of the complete or incomplete type, should not be removed (Metcalf 1981; Dickhaut and DeLee 1982; Griffin 1986; Stone and Miller 1986).

In the earlier part of our series, before arthroscopy was employed, the differentiation between complete, incomplete and Wrisberg-ligament types of discoid meniscus was not made. Since then, our management protocol has evolved and we now follow the classification system suggested by Watanabe et al (1979). We became aware that the majority of the children treated in the past decade had Wrisberg-ligament type of discoid meniscus with posterior instability. This is in contrast to other series (Hayashi et al 1988; Vandermeer and Cunningham 1989) where no Wrisberg-ligament type of discoid lesions were reported.

In our series, 40 children (48 knees) with symptomatic torn discoid menisci underwent open total lateral meniscectomy. Of those cases in which the diagnosis had not been previously made, difficulty in introducing the arthroscope laterally was the first indication of the anomaly. Various authors (Fujikawa et al 1981; Dickhaut and DeLee 1982; Ikeuchi 1982; Hayashi et al 1988; Bellier et al 1989; Vandermeer and Cunningham 1989) have recommended arthroscopic partial or total meniscectomy for discoid lateral menisci. This is a difficult technique requiring considerable skill and experience particularly in dealing with the anterior horn (Bellier et al 1989). In fact, the earlier techniques described by Fujikawa et al (1981) and Ikeuchi (1982) were semi-arthroscopic meniscectomies.

We recommend arthroscopic partial lateral meniscectomy for torn, complete or incomplete discoid menisci with stable posterior meniscotibial attachment. However, in children with Wrisberg-ligament type or hypermobile discoid menisci we believe partial meniscectomy to be inappropriate as it leaves an unstable rim of meniscus to cause symptoms in the future. Therefore, we feel that a total meniscectomy should be recommended in such circumstances.

Rosenberg et al (1987) described a case in which a Wrisberg-ligament type of lateral discoid meniscus was reattached peripherally after central partial meniscectomy using the arthroscope. At 'second-look' arthroscopy, 12 months following surgery, healing was observed. We cannot report a similar experience.

After total lateral meniscectomy, we saw an adequate

'pseudomeniscus' through the arthroscope in three knees. We are aware that some authors (Arnoczky and Warren 1982; Danzig et al 1983) believe that regeneration of the lateral meniscus after total excision is unlikely to occur because there is no blood supply at the area of the popliteal tendon. However, their studies were performed in cadaveric knee specimens of adult and elderly patients. It is possible that the child's knee behaves differently.

Total meniscectomy of a lateral non-discoid meniscus often leads to osteoarthritis (Fairbank 1948; Kurosawa, Koide and Nakajima 1976; Zaman and Leonard 1981; Manzione et al 1983). This is also true for discoid menisci in adults. From our experience we believe that in children this may not occur. Hayashi et al (1988) reported that the axial alignment of the extensor mechanism and the pliability of immature tissue may allow adaptation of the knee to the stresses of activity. They reviewed 53 discoid menisci treated by arthroscopic partial or total lateral meniscectomy, and found no degenerative changes at an average follow-up of 31.2 months. Zaman and Leonard (1981) emphasised the hazards of total meniscectomy in children. They reported the results of meniscectomy carried out on 59 knees, at an average follow-up of 7.5 years. In their series, early degenerative changes were seen in 19% of the knees on radiological examination. In our series, only three knees showed early degenerative changes on radiological assessment at the time of review. As only four out of 62 knees had 'second-look' arthroscopy, we are unable to comment on the arthroscopic evidence of degenerative change. Whether osteoarthritis will develop in any of these knees in future is a matter for conjecture.

Many of the children treated in the early part of this series were under the care of the late G. C. Lloyd-Roberts. We are grateful to Dina Stanford for her assistance. The authors would like to thank the Medical Photography Department at Westminster Hospital for their help with the illustrations.

No benefits in any form have been received or will be received from a commercial party related directly or indirectly to the subject of this article.

REFERENCES

- Arnoczky SP, Warren RF. Microvasculature of the human meniscus. *Am J Sports Med* 1982; 10:90-5.
- Bellier G, Dupont J-Y, Larrain M, Caudron C, Carlioz H. Lateral discoid menisci in children. *Arthroscopy* 1989; 5:52-6.
- Danzig L, Resnick D, Gonsalves M, Akeson WH. Blood supply to the normal and abnormal menisci of the human knee. *Clin Orthop* 1983; 172:271-6.
- Dickhaut SC, DeLee JC. The discoid lateral-meniscus syndrome. *J Bone Joint Surg [Am]* 1982; 64-A:1068-73.
- Fairbank TJ. Knee joint changes after meniscectomy. *J Bone Joint Surg [Br]* 1948; 30-B:664-70.
- Fujikawa K, Iseki F, Mikura Y. Partial resection of the discoid meniscus in the child's knee. *J Bone Joint Surg [Br]* 1981; 63-B:391-5.
- Griffin PP. The lower limb. In: Lovell WW, Winter RB, eds. *Paediatric orthopaedics* 2nd ed. Philadelphia: JB Lippincott, 1986:887.
- Hayashi LK, Yamaga H, Mori R, et al. Clinical and arthroscopic study of discoid lateral meniscus in infants. *Central Japanese J Orthop and Traumat Surg* 1987; 30:639-45.

- Hayashi LK, Yamaga H, Ida K, Miura T.** Arthroscopic meniscectomy for discoid lateral meniscus in children. *J Bone Joint Surg [Am]* 1988; 70-A:1495-500.
- Ikeuchi H.** Arthroscopic treatment of the discoid lateral meniscus: technique and long-term results. *Clin Orthop* 1982; 167:19-28.
- Kaplan EB.** Discoid lateral meniscus of the knee joint: nature, mechanism and operative treatment. *J Bone Joint Surg [Am]* 1957; 39-A:77-87.
- Kroiss F.** Die Verletzungen der Kniegelenkswischenknorpel und ihrer Verbindungen. *Beitr Z Klin Chir Tubing* 1910; 66:598-801.
- Kurosawa H, Koide S, Nakajima H.** Results of meniscectomy. *Orthop Surg* 1976; 27:825-32.
- Manziona M, Pizzutillo PD, Peoples AB, Schweizer PA.** Meniscectomy in children: a long-term follow-up study. *Am J Sports Med* 1983; 11:111-5.
- Metcalf RW.** Operative arthroscopy of the knee. In: *AAOS Instructional Course Lectures*. St Louis, etc: CV Mosby, 1981; 30:357-96.
- Picard JJ.** Aspects radiologiques des ménisques discoides. *J Radiol Electr* 1964; 45:839-41.
- Rosenberg TD, Paulos LE, Parker RD, Harner CD, Gurley WD.** Discoid lateral meniscus: case report of arthroscopic attachment of a symptomatic Wrisberg-ligament type. *Arthroscopy* 1987; 3:277-82.
- Stone RG, Miller G.** Discoid lateral meniscus: diagnosis and treatment. *Arthroscopy* 1986; 2:113.
- Tachdjian MO.** *Pediatric orthopedics*. Philadelphia, etc: WB Saunders, 1972: 721-9.
- Vandermeer RD, Cunningham FK.** Arthroscopic treatment of the discoid lateral meniscus: results of long-term follow-up. *Arthroscopy* 1989; 5:101-9.
- Watanabe M, Takeda S, Ikeuchi H.** *Atlas of arthroscopy*. Third edition. Berlin, etc: Springer-Verlag, 1979.
- Young RB.** The external semilunar cartilage as a complete disc. In: Cleland J, Mackay JY, Young RB, eds. *Memoirs and memoranda in anatomy*. London: Williams and Norgate, 1889: 179.
- Zaman M, Leonard MA.** Meniscectomy in children: results in 59 knees. *Injury* 1981; 12:425-8.