

Bilateral Discoid Medial Menisci of the Knee

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No doubt exists that a discoid meniscus is an abnormal condition of the knee, but whether this anatomic derangement necessarily leads to abnormal function or susceptibility to injury is debatable. The issue is complicated by the fact that several variants of the discoid meniscus have been described and that there is a continuous range of variation between normal, C-shaped menisci and those that extend completely across the lateral or medial joint space.¹⁻³

Discoid lateral menisci are believed to cause problems in children and adolescents.^{4,5} The general trend noted in the discoid medial meniscus literature is for the menisci to be symptomatic in adulthood, especially if bilateral.⁶

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As opposed to the snapping knee associated with some discoid lateral menisci, patients with discoid medial menisci often do not present with classic signs associated with a discoid meniscus.^{6,7} Plain radiographic films may reveal widening of the medial joint space, squaring of the medial femoral condyle or cupping of the medial tibial plateau, proximal medial tibial epiphyseal collapse, and late degenerative joint disease,⁸⁻¹⁰ but in many cases, plain radiographs are negative. Magnetic resonance imaging (MRI) is the technique of choice for evaluation and will demonstrate meniscal morphology and accompanying degeneration within or tearing of the meniscus.¹¹

It is apparent from the literature that discoid menisci are most commonly found in the lateral compartment of the knee and that medial discoid menisci are less common.^{2,12-14}

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Cases of bilateral discoid menisci—that is, in the lateral compartments of both knees or in the medial compartments of both knees—are said to be rare.^{1,15-18} However, it is possible that many cases are missed because the anomaly may not appear on radiographs and the definitive diagnostic measures, MRI and arthroscopy, are not usually applied to both knees unless both are symptomatic.

We recently encountered a case in which the patient had injured a discoid medial meniscus in his right knee more than 10 years after a similar injury to a discoid medial meniscus in his left knee. We questioned whether the first event should have prompted a suspicion that the condition would be bilateral and, if it were found to be so, whether the patient should have been warned of an increased risk of future problems. While we were considering this, a second case of a discoid medial meniscus presented to us. In light of our concerns arising from the prior case, we obtained an MRI of the contralateral knee of this patient and found that he, too, had a discoid medial meniscus in the opposite knee.

The following report describes our findings in these 2 bilateral cases, reviews the literature, and discusses whether the finding of a discoid medial meniscus in 1 knee should prompt an investigation of the contralateral knee.

CASE REPORTS

Case 1

A man in his early 30s first presented with a locked left knee following an acute twisting injury. The patient described medial-sided knee pain increasing over the previous several years. Physical examination revealed a knee locked at 30° of flexion and a small effusion. The medial joint line was moderately tender.

At arthroscopy a central flap tear of a complete discoid meniscus (Watanabe's classification³) was discovered. The periphery was noted to be intact. The articular cartilage of the medial tibiofemoral joint was normal. Partial medial meniscectomy was performed with resection of the central portion of the discoid meniscus.

The patient returned 13 years later complaining of medial-sided left knee pain that was aggravated by racquet sports. On examination the patient had moderate medial joint line pain and pain with McMurray's maneuver. No significant effusion was found. Atrophy of the vastus medialis was mild. Range of motion was 0° to 140°, and the ligamentous examination was unremarkable. On radiological examination, posteroanterior views in 45° of flexion revealed narrowing of the medial compartment

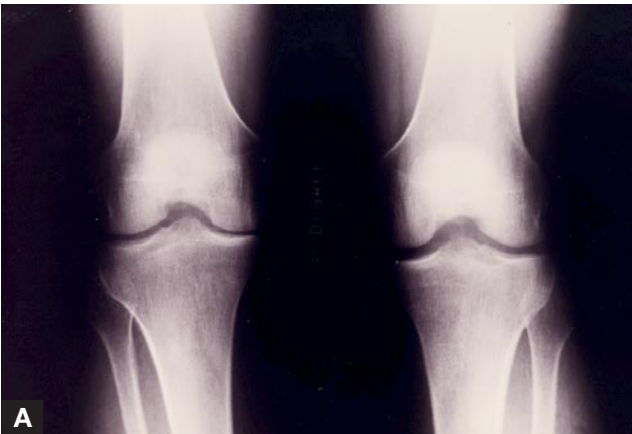


Figure 1. Plain radiograph of case 1, posteroanterior standing in 45° of flexion. A discoid medial meniscus has been completely removed from the left knee. In the right knee a discoid medial meniscus is still present. Note the relative widening of the medial joint space.

with early degenerative changes. The medial compartment of the right knee was noted to be widened.

At the second arthroscopy of the left knee, degenerative tears were found in the remaining rim of the medial meniscus. Some fissuring of articular cartilage and small areas of partial-thickness articular cartilage loss also were found in the medial compartment. Complete meniscectomy was performed.

Two years later this patient was seen in the office to evaluate his right knee. He had not had any problems with that knee until an acute twisting injury while playing racquetball that resulted in persistent medial-sided knee pain and swelling. His pain increased with any deep knee flexion or with certain pivoting activities. On physical examination he had significant medial joint line pain and a trace effusion. Pain without a click was present upon McMurray's maneuver. Active range of motion was 0° to 135°, although the knee was stiff in the last 5° of extension. The ligamentous examination was unremarkable. Posteroanterior radiographs revealed a widened medial joint space (Figure 1).

At arthroscopy the discoid medial meniscus was found to be intact with the exception of mild peripheral meniscocapsular degeneration. This region was débrided with a shaver. The articular surfaces of the medial tibiofemoral joint appeared normal, as did the remainder of the knee.

Over the next year the patient developed intermittent but significant medial-sided right knee pain. He continued playing racquet sports. He presented to the clinic with a trace effusion and significant medial joint line pain. Pain without a click was present upon McMurray's maneuver. Range of motion was 0° to 140°, and the ligamentous examination was unremarkable.

At the second arthroscopy of the right knee, degenerative tears were found within the central portion of the discoid medial meniscus. Articular surfaces were without sig-



Figure 2. Magnetic resonance image of case 2, left knee. A discoid medial meniscus is present with some evidence of intrasubstance degeneration. The knee is asymptomatic.

nificant chondral pathology. Partial medial meniscectomy (saucerization) was performed.

At last follow-up, the patient reported with continued pain in the left knee, 4 years after complete meniscectomy. The patient describe the pain as being of a different nature than the pain he had before his meniscal procedures. A left knee unloader brace allowed him to continue to play racquet sports. He had no complaints about his right knee at that time, which was 6 months after partial meniscectomy.

Case 2

A 12-year-old boy presented with a 2-year history of intermittent right knee swelling associated with pain. On physical examination he had significant medial joint line pain and a trace effusion. Pain without a click was present upon McMurray's maneuver. Range of motion was 5° to 135°. Ligamentous examination was unremarkable. A plain radiograph (of the right knee only) showed a widened medial joint space. Magnetic resonance imaging revealed a complete discoid medial meniscus with degeneration and tearing of the central portion (Figure 2). At arthroscopy a complex tear was found in the central portion of a discoid medial meniscus. Articular surfaces were without significant chondral pathology. Partial medial meniscectomy was performed to remove the degenerative central portion.

Our experience with case 1 prompted us to obtain an MRI of the asymptomatic contralateral knee in this case for study purposes. An intact complete discoid medial meniscus was discovered.

In order to estimate the incidence of discoid medial menisci in our patient population, we searched a database of MRI studies. Among 14,844 knees examined by MRI, only 7 were diagnosed as having a discoid medial meniscus. In none of those subjects was the contralateral knee examined (the 2 cases we are reporting were not included in that particular database), and none had a lateral discoid meniscus in addition to the medial discoid meniscus.

DISCUSSION

In case 1, we were concerned that perhaps that injury to a discoid medial meniscus in the left knee should have prompted some counseling that the contralateral knee might be similarly deranged. This brings up 2 questions: What is the incidence of bilaterality of discoid medial menisci? And is a discoid meniscus more likely to be injured than a normal meniscus? To answer these questions, we reviewed the literature to survey whether a discoid medial meniscus predisposes to injury, and we performed a meta-analysis to determine whether the bilateral incidence is greater than expected from the unilateral incidence.

Bilaterality is uncertain because of systematic biases in the diagnosis of discoid menisci. Radiographs usually do not reveal any sign of the derangement.^{6,7} In some cases, radiographs may show a widened medial compartment with squaring of the femoral condyles¹⁹ or depression of the tibial plateau,⁹ but those features alone would not be sufficient for diagnosis of a discoid medial meniscus. Arthrography²⁰⁻²² and MRI^{1,14,16,19,23} appear to be reliable for detection of a discoid meniscus, and arthroscopy provides a definitive diagnosis, but these procedures are usually done unilaterally unless both knees are symptomatic. This is exemplified by the 2 cases reported here. In the first case the symptomatic knee was submitted to arthroscopy, but the contralateral knee was examined only by radiography until it too became symptomatic. Prompted by our curiosity in the second case, the asymptomatic knee was examined by MRI. In 5 other published reports^{1,8,9,16,17} the bilaterality of discoid medial menisci was discovered in a similar way; that is, MRI of the asymptomatic knee was performed on the basis of suspicion.

Because unilateral diagnostic measures tend to bias toward underdiagnosis of bilateral discoid menisci, the estimates of bilaterality reported in the literature are probably too low. A number of investigators have collectively surveyed more than 35,000 medial menisci and found 32 with discoid medial menisci, for an incidence of 0.089% (Table I). Of those 32 deranged knees, 4 were from 2 patients with bilateral discoid medial menisci, making the incidence of bilateral cases 0.0056% in the general population and 6.7% among patients with at least 1 discoid medial meniscus. If some of the 28 apparently unilateral cases were in fact

occult bilateral cases, then the population incidence would be higher than 0.0056%, to the limit that if all cases were bilateral, then the population incidence would be 0.084% (30/35,852). Bilaterality of discoid medial menisci could well be universal, or nearly so, considering that there are 6 reports (including this one) in which a bilateral condition was sought and found, and there are no reports in the literature of a unilateral case being confirmed as unilateral after a definitive examination (by MRI, arthrography, arthroscopy, or autopsy) of the contralateral knee. However, it is interesting that Noble²⁵ found discoid lateral menisci in 14 of 200 cadavers, and the condition was bilateral in only 9 of those cadavers. Thus the bilaterality of discoid lateral menisci can be estimated as 64% (9/14).

The literature also provides some insight as to whether a discoid medial meniscus predisposes the subject to injury or discomfort. There are 2 points to consider: First, in case reports that included notes of whether the patient had a traumatic onset of symptoms, 60% of the cases were atraumatic, usually with gradually increasing pain and sometimes accompanied by swelling, locking, clicking, or stiffness. This implies that the mere presence of a discoid medial meniscus can cause problems. Second, if discoid medial menisci were vulnerable to injury, it might be expected that, on the average, those injuries would occur at an earlier age than injuries to normal menisci. The case reports summarized in Table II support that hypothesis. Among 19 cases of discoid medial menisci in patients with a history of trauma (Table II), the mean age of the patient was 28 years (± 13). This is significantly ($P = 0.02$) younger than the population of 6039 meniscectomy patients described by Poehling and colleagues,³⁸ which had an average age of 38 years (± 17).

Although the tear patterns in discoid medial meniscus have been categorized by Dickason and colleagues⁶ and others,^{2,15,21,32} there is little information in the literature concerning meniscal degeneration or tear progression. In our cases the discoid medial menisci degenerated and tore on their inferior surfaces. The articular cartilage of the medial joint spaces appeared to be normal prior to partial meniscectomy. Complete meniscectomy in case 1 led to degenerative joint changes.

We feel that the principles in managing a discoid

TABLE I. INCIDENCE OF DISCOID MEDIAL MENISCI

Authority	Number of Knees	Population	Incidence, %	Bilateral cases	Bilaterality, %
Jeannopolous, ¹² 1950	1	580	0.17	0	0
Nathan and Cole, ¹³ 1969	3	*869	0.35	0	0
Smillie, ² 1970	5	5702	0.09	1	25
Ruszkowski and Pecina, ²⁴ 1971	1	1017	0.10	0	0
Dickason et al, ⁶ 1982	10	8040	0.12	1	11
Hermann and Berson, ²¹ 1984	3	800	0.38	0	0
Silverman et al, ¹⁴ 1989	2	4000	0.05	0	0
This report	4	14,844	0.03	2	100
Consensus	32	35,852	0.089	2	6.7

*Estimated number of medial menisci, assuming that Smillie's proportion of medial vs. lateral (71% vs. 29%, respectively) could be applied to Nathan and Cole's 1219 total menisci.

TABLE II. CASE REPORTS OF DISCOID MEDIAL MENISCI

Authority	Age	Sex*	Notes	Trauma
Cave and Staples, ²⁶ 1941	8	M		Yes
Dwyer and Taylor, ²⁷ 1945	29	M		Yes
Jeannopolous, ¹² 1950	10	F	Medial and lateral discoid	No
Richmond, ²⁸ 1958	24	M		Yes
	18	M		No
Ross et al, ²⁹ 1958	27	F		No
Riachi and Phares, ¹⁸ 1963	28	M	Bilateral	No, no
Nathan and Cole, ¹³ 1969			3 Cases	
Smillie, ² 1970; and Murdoch, ³⁰ 1956	29	M		
	44	M	Bilateral	Yes, no
	34	M		No
	14	F		
Ruszkowski and Pecina, ²⁴ 1971	23	M		Yes
Weiner and Rosenberg, ¹⁰ 1974	13	M		No
Resnick et al, ²² 1976	29	M		Yes
	13	F		Yes
	16	M		Yes
Mazzarri and Lotti, ³¹ 1977	18	F		Yes
Berson and Hermann, ²⁰ 1979	56	M		Yes
Johnson and Simmons, ³² 1982	14	F		Yes
Dickason et al, ⁶ 1982				3 Yes, 5 no
	20	M		
	14	M		
	23	F		
	13	M		
	19	M		
	22	M	Bilateral	
	18	F		
Hermann and Berson, ²¹ 1984	47	M		Yes
	27	M		Yes
Comba et al, ³³ 1985	42	F		No
Patel et al, ³⁴ 1986	19	F		No
Stern and Hallel, ³⁵ 1988	9	F		No
Silverman et al, ¹⁴ 1989	11	M		
Woods and Whelan, ⁵ 1990	40	M	1 Case	
Blacksin et al, ¹⁶ 1992	15	M	Bilateral	No, no
Adriani et al, ³⁶ 1993	41	M		Yes
Lowenberg and Feldman, ¹⁹ 1993	23	M		Yes
Schonholtz et al, ³⁷ 1993	37	M	Bilateral	No, no
Auge and Kaeding, ²³ 1994	12	M	Bilateral	Yes, yes
Bellelli, ¹ 1996	40	M	Bilateral	Yes, no
Kim and Choi, ¹⁷ 1996	13	F	Bilateral	No, no
Akgun et al, ¹⁵ 1998	37	M	Bilateral	No, no
Narvekar et al, ⁸ 1999	11	F	Bilateral	No, no
Spicer, ⁷ 1999	28	M		No
Pinar et al, ⁹ 2000	16	M	Bilateral	No, no
	32	F	Bilateral	No, no
This report	31	M	Bilateral	Yes, yes
	12	M	Bilateral	No, no

*M indicates male; F, female.

medial meniscus should be similar to those for discoid lateral menisci.^{4,5,39-41} This would include preserving an asymptomatic meniscus, resecting the central portion of a meniscus with central degeneration or tearing, and avoiding complete meniscectomy unless peripheral tearing requires it.^{42,43} In addition, the patient with an apparently unilateral discoid medial meniscus should be counseled that (1) the condition is often bilateral; (2) a discoid medial meniscus in the contralateral knee, if it exists, could pose a greater-than-normal risk of degenerating or becoming injured; (3) radiographs and clinical examination may not reveal a discoid meniscus in the contralateral knee even if it were present; and (4) MRI would reveal the presence of an occult discoid medial meniscus, but the doctor and patient should consider whether the expense would be justified for an asymptomatic knee.

AUTHORS' DISCLOSURE STATEMENT

The authors report no actual or potential conflict of interest in relation to this article.

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