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FROM THE FAMILY PRACTICE INQUIRIES NETWORK

For knee pain, how predictive is physical examination for meniscal injury?

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EVIDENCE-BASED ANSWER

No single clinical examination element, or combination of such elements, reliably detects meniscal injury. The McMurray test is best for ruling in meniscal pathology. Assuming a 9% prevalence of meniscal tears among all knee injuries (a rate reflecting national primary care data), the posttest probability that a patient with McMurray's sign has a meniscal injury ranges from <30% to 63% (strength of recommendation [SOR]: **B**). In contrast, the absence of any positive physical examination findings effectively rules out meniscal pathology, yielding a posttest probability of 0.8% for lateral meniscus injury, 1.0% for medial meniscus injury, and 3.8% for any meniscal injury among primary care populations (SOR: **B**).

EVIDENCE SUMMARY

The accuracy of physical examination findings for meniscal injury varies widely among meta-analyses. In a meta-analysis of 13 studies, no physical examination test—including assessment for joint effusion, McMurray test, joint line tenderness, or the Apley compression test—yielded clinically significant positive or negative likelihood ratios for a meniscal tear (**Table**). The McMurray test performed best, but at 9% to 11% pretest probability of JFP_1104_CI.final 10/18/04 11:06 AM Page 918 meniscal lesions, based on prevalence estimates among primary care/specialist populations,[2] the posttest probability of a positive exam is still <30%.

A meta-analysis of 4 studies by Jackson compared the utility of the McMurray test and joint line tenderness.[3] For detecting meniscal tears, the McMurray test had a clinically and statistically significant positive likelihood ratio of 17.33, corresponding to a posttest probability of nearly 61%. Negative likelihood ratios for the McMurray test and joint line tenderness (0.5 and 0.8) were not clinically significant, indicating that absence of the McMurray sign or joint line tenderness alone is of little benefit in ruling out meniscal injury.

In another meta-analysis including 9 studies of meniscal injury diagnosis,[4] individual tests for joint line tenderness, joint effusion, the medial-lateral grind test, and the McMurray test failed to yield statistically significant likelihood ratios for the presence or absence of meniscal tears (**Table** footnotes). Positive and negative likelihood ratios for aggregate physical examination were 2.7 (95% confidence interval [CI], 1.4–5.1) and 0.4 (95% CI, 0.2–0.7), which are statistically, but not clinically, significant values for ruling meniscal lesions in or out.

Jackson's meta-analysis also calculated the posttest probability of injury for a composite meniscal examination. Based on the positive likelihood ratio of 3.1 (95% CI, 0.54–5.7) and negative likelihood ratio of 0.19 (95% CI, 0.11–0.77), the posttest probability of a medial meniscal tear was 17% in the setting of composite physical exam findings and 1% in the absence of physical exam findings. For a lateral meniscal tear, based on the positive likelihood ratio of 11 (95% CI, 1.8–20.2), and negative likelihood ratio of 0.13 (95% CI, 0.0–0.25), the posttest probability of injury with a positive exam was 41% and with a negative exam 0.8%.

Authors of all meta-analyses noted the lack of standardization in physical examination maneuvers (especially the McMurray test)[5] and, in some cases, no specification of how physical examination tests were performed. Authors analyzed the utility of the aggregate and composite knee examinations without specifying what constituted such an exam. No study included in the meta-analyses used control subjects without meniscal pathology, and few studies were blinded. Lack of blinding may have introduced verification bias; use of specialty patients in all studies made referral bias likely. Studies were heterogeneous and results were associated with wide confidence intervals, introducing an element of random error into the processes of combining and interpreting data.

Physical exams for meniscal tear

	Solomon et al[4]	**Scholten et al[1]**	**Jackson et al[3]**
Summary characteristics	9 studies 1018 patients Specialist population Specialist examiners	13 studies 2231 patients Specialist population Specialist examiners	4 studies 424 patients Specialist population Specialist examiners
	Positive likelihood ratio (95% CI)		
McMurray	1.3 (0.9–1.7)	1.5–9.5	17.3 (2.7–68)
Joint line tenderness	0.9 (0.8–1.0)	0.8–14.9	1.1 (0.7–1.6)
Aggregate exam	2.7 (1.4–5.1)	—	—
Aggregate exam, medial meniscus tears	—	—	3.1 (0.54–5.7)
Aggregate exam	—	—	11 (1.8–20.2)

lateral meniscus tears			
	Negative likelihood ratio (95% CI)		
McMurray	0.8 (0.6–1.1)	0.4–0.9	0.5 (0.3–0.8)
Joint line tenderness	1.1 (1.0–1.3)	0.2–2.1	0.8 (0.3–3.5)
Aggregate exam	0.4 (0.2–0.7)	—	—
Aggregate exam, medial meniscus tears	—	—	0.19 (0.11–0.77)
Aggregate exam, lateral meniscus tears	—	—	0.13 (0–0.25)

Note: The results are presented as likelihood ratios, which represent the change in the odds of a diagnosis, based on the outcome of the test. For example, given a positive likelihood ratio of 2, if a test result is positive, the odds of the disease being present is doubled. A positive likelihood ratio >10 provides strong evidence that the disorder is present. A negative likelihood ratio <0.1 provides strong evidence that the disorder is not present. Scores between 0.5 and 2.0 are neutral. In Scholten's meta-analysis, likelihood ratios are given in ranges (no composite value given).

RECOMMENDATIONS FROM OTHERS

The American Academy of Orthopaedic Surgeons' clinical guideline on the evaluation and treatment of knee injuries lists the following findings as associated with a meniscal tear: delayed swelling of the knee, twisting injury, painful popping and catching, effusion, joint line tenderness, positive McMurray's test, and negative radiography.[6] The guideline fails to list the strength and type of supporting evidence for these associations.

The American College of Radiology's Appropriateness Criteria for Acute Trauma to the Knee states that decision rules for meniscal tears and other soft tissue injuries to the knee are being investigated, but it fails to mention specific evaluation strategies for meniscal tears.[7]

CLINICAL COMMENTARY

Meniscus injury likely with suggestive history, joint line tenderness, and an inability to squat because of pain

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I often suspect meniscal injuries as a cause of knee pain but am rarely certain based on physical examination alone. I look for a history of joint line pain, locking, or popping with movement. If the patient lacks joint line tenderness, a meniscal injury is unlikely. The McMurray test is usually negative. In the absence of another explanation for the patient's symptoms, a meniscus injury is high on my list in the presence of a suggestive history, joint line tenderness, and an inability to squat because of pain. When my suspicion is high I usually resort to an MRI.

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