



Managing atraumatic meniscal tears in middle-aged patients

What role does arthroscopic surgery have in the treatment of patients with atraumatic meniscal tears and osteoarthritis? The authors reviewed the literature to find out.

William Bassett, MD; Jeremy Korsh, MD; Kenneth G. Swan, MD

Rutgers Robert Wood Johnson Medical School, New Brunswick, NJ (Drs. Bassett, Korsh, and Swan); University Orthopedic Associates, New Brunswick, NJ (Dr. Swan)

wpb31@rwjms.rutgers.edu

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PRACTICE RECOMMENDATIONS

› *Start middle-aged patients with knee pain and a degenerative meniscal tear on a regimen of strengthening-based physical therapy.* **(A)**

› *Limit meniscectomy to patients who either have no preoperative osteoarthritis (OA) or early-stage OA, unless there is evidence of mechanical locking or intra-articular loose bodies.* **(A)**

Strength of recommendation (SOR)

- (A)** Good-quality patient-oriented evidence
- (B)** Inconsistent or limited-quality patient-oriented evidence
- (C)** Consensus, usual practice, opinion, disease-oriented evidence, case series

Meniscectomy is the most common orthopedic procedure performed in the United States with 700,000 meniscectomies performed every year.¹ More than half of these procedures are performed in patients ≥ 45 years of age,² giving rise to the question: Does arthroscopic surgery have a role in the treatment of patients who may have osteoarthritis (OA) and another knee condition, such as a symptomatic meniscal tear? Determining the answer is especially important when you consider that the number of true and incidental tears diagnosed on magnetic resonance imaging (MRI) has been on the rise³—a result of the routine use of MRIs to identify the cause of patients' chronic knee pain.

At a cost of roughly \$5,000 per procedure, some experts have suggested that at least a portion of the approximately \$4 billion annual direct medical costs associated with meniscectomy could be put to better use.^{4,5} This prompted us to wonder what the literature tells us about the management of degenerative meniscus tears in middle-aged patients with OA and whether these patients would benefit from nonoperative management with optimized physical and medical therapy as a first-line approach. Our findings follow.

But first, a word about the connection between OA and meniscal tears.

What we've learned about meniscal damage

Research has shown that over one-third of individuals > 50 years of age and three-quarters of people with knee OA have degenerative meniscal tears.⁶ In the past, the relative paucity of epidemiologic data on the prevalence of meniscal tears in the general population made it difficult to interpret the diagnostic information provided by MRI.

More recently, experts found that meniscal damage is especially prevalent among individuals with OA, and they began

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treating with arthroscopic partial meniscectomy (APM), as the meniscal damage was thought to be the anatomical foundation for the complaint of knee pain.⁷

However, researchers then began realizing that many patients with findings of a meniscal tear visualized on MRI reported no knee symptoms. In one study, adults in a large community-based sample found to have a meniscal tear on MRI were no more likely to have knee pain than subjects without a meniscal tear.⁶ Similarly, subjects with a meniscal tear and OA had no more severe pain than subjects with OA and no meniscal tear.⁶

In addition, the landmark Fairbank study from 1948⁸ and others since have shown that meniscectomy can lead to other problems. Removal of meniscal tissue decreases the contact stress area, which increases stress on the articular cartilage, and inevitably leads to degeneration of the involved joint.⁹ Researchers have shown that even partial meniscectomy produces late articular cartilage changes.¹⁰

Which interventions and when?

We conducted an in-depth literature review to determine which approaches were best for the treatment of OA and meniscal tears, and summarize our findings below, according to OA severity. (For details of how the literature review was conducted and an at-a-glance summary of the key findings, see the **TABLE**.^{4,5,11-17}) Of note: All of the studies reviewed here included patients with chronic knee pain and excluded patients with sudden onset pain from a single physical event.

The findings:

Early OA and meniscal tears

The first 2 studies we identified in the literature, both published by Herrlin et al,^{11,12} examined the efficacy of APM in middle-aged patients with early OA (\leq grade 1), according to the Ahlbäck classification.

■ **In the first Herrlin study**, a 6-month prospective randomized trial, 90 middle-aged patients with a medial meniscal tear (without traumatic history) were assigned to either APM followed by supervised exercise or 8 weeks of supervised exercise alone.¹¹

Exercise consisted of activities for improving muscle strength, endurance, and flexibility, as well as for balance and proprioception. The authors concluded that a combination of APM and supervised exercise did not lead to greater improvements in knee function compared with supervised exercise alone.¹¹

■ **In the second Herrlin study**, a prospective randomized study involving 96 middle-aged patients with an MRI-verified medial meniscal tear and radiographic OA, the authors concluded that arthroscopic surgery followed by exercise therapy was not superior to the same exercise therapy alone.¹² The results were gleaned from both patient-reported outcomes and radiographic assessment at 2 and 5 years. Both groups reported significant improvements at 5 years, but participants did not reach the level of fitness and quality of life of similarly-aged healthy controls.

Perhaps one of the most interesting aspects of this study was that approximately one-third of patients from the exercise-only group still had disabling knee symptoms after exercise therapy, but improved to the same level as the rest of the patients after crossing over and undergoing APM.¹² Part of the observed benefit of arthroscopy in these patients has the potential to be explained by the placebo effect, especially given that invasive procedures have a stronger placebo effect than do noninvasive ones, and due to the lack of blinding.¹⁸ Additionally, limitations of the above studies include small sample sizes, lack of a control group, and short-term follow-up.

■ **Next, a 2013 study by Yim et al** looked specifically at APM vs nonoperative treatment with strengthening exercises.¹³ A total of 102 patients with an average age of 53.8 years, a Kellgren-Lawrence Classification of Osteoarthritis of <2 , and an MRI-confirmed degenerative horizontal tear of the posterior horn of the medial meniscus were randomized to the 2 intervention groups. The 2 groups were highly comparable, giving the study high internal validity. These patients were then assessed at 3 months, one year, and at 2 years after treatment.

Although most patients at the outset of the study had intense knee pain with mechanical symptoms, both groups reported a

TABLE

The best approach to atraumatic meniscal tears: A summary of relevant studies*

Author (year)	Study type	Strength of evidence (level) [†]	No. of patients (mean age)	Follow-up period (months)	Conclusions
Early OA					
Herrlin et al ¹¹ (2007)	Multicenter, prospective RCT	Low (II)	90 (56 years)	6	In patients with moderate OA, APM and supervised exercise is not superior to supervised exercise alone.
Herrlin et al ¹² (2013)	Single-center, prospective RCT	Moderate (II)	96 (55 years)	60	In patients with mild OA, APM and exercise therapy was not superior to exercise therapy alone. However, 30% of the exercise group with persistent symptoms improved after APM.
Yim et al ¹³ (2013)	Single-center RCT	Moderate (II)	102 (54 years)	24	There were no significant differences between arthroscopic meniscectomy and nonoperative management with strengthening exercises in terms of relief in knee pain, improved knee function, or increased satisfaction in patients after 2 years of follow-up.
Sihvonen et al ⁴ (2013)	Multicenter, blinded, randomized, sham surgery-controlled trial	High (I)	146 (52 years)	12	In patients with none-to-doubtful OA, APM provides no significant benefit over sham surgery.
Kise et al ¹⁴ (2016)	Randomized, controlled, superiority trial	Moderate (II)	140 (50 years)	24	In patients with degenerative meniscal tears and no radiographic evidence of OA, there were no differences between APM and exercise therapy groups in patient-reported pain or functional outcomes.
Mild to moderate OA					
Moseley et al ⁵ (2002)	Single-center, double-blinded, randomized, sham surgery-controlled trial	High (I)	180 (52 years)	24	In patients with OA, APM or lavage provides no significant benefit over sham surgery.
Kirkley et al ¹⁵ (2008)	Single-center, evaluator-blinded RCT	Moderate (II)	178 (60 years)	24	In patients with mild-to-severe OA, APM plus optimized physical and medical therapy provided no additional benefit to optimized physical and medical therapy alone.
Katz et al ¹⁶ (2013)	Multicenter RCT	Low (II)	351 (58 years)	12	In patients with doubtful-to-moderate OA, APM plus PT provides no benefit over PT alone. However, 30% of patients in the PT group crossed over to surgery.
Bailey et al ¹⁷ (2015)	Prospective, questionnaire study	Low (II)	270 (51 years)	6	Arthroscopic meniscectomy benefits those with a BMI >30 kg/m ² , those without signs of OA, and those with early OA, but not those with moderate or advanced OA.

APM, arthroscopic partial meniscectomy; BMI, body mass index; OA, osteoarthritis; PT, physical therapy; RCT, randomized controlled trial.

*The search for relevant studies was conducted in PubMed, the Cochrane Library, DynaMed, Essential Evidence Plus, ScienceDirect, Scopus, and Web of Science. All levels of studies were considered for historical review, while only level I and II studies were included here. All studies included patients with degenerative meniscal tears except for Moseley et al and Katz et al, which included patients with symptomatic meniscal tears of unknown etiology. Acute, traumatic meniscal injuries were excluded. All studies showed significant improvements in knee pain and function scores over the follow-up period, regardless of treatment.

[†]Levels of evidence: (I) High-quality RCT; (II) Lesser quality RCT (eg, <80% follow-up, no blinding, or improper randomization).

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Many patients with MRI-verified meniscal tears have no symptoms, and many with OA and tears have no worse symptoms than those with OA alone.

decrease in experienced knee pain, improved function, and a high level of satisfaction with their prescribed treatment, with no significant difference in any of these values after 2 years of follow-up.¹³ A limitation of the study was that it used subjective questionnaires to assess pain, swelling, and activities of daily living (ADLs).

■ **A fourth study**, a 2013 multicenter, randomized, sham-controlled trial, looked at 146 patients ages 35 to 65 years who had knee symptoms consistent with a degenerative medial meniscus tear (confirmed by MRI and arthroscopic evaluation) and no knee arthritis.⁴ The subjects were assigned to either APM or sham surgery (skin incisions only). The results showed that APM was not superior to sham surgery with regard to outcomes assessed during a 12-month follow-up period.⁴

■ **Most recently** (2016), Kise et al¹⁴ published the results of a randomized controlled superiority trial conducted in Norway comparing 12 weeks of supervised exercise therapy with APM for patients with degenerative meniscus tears. Their study included 140 patients ages 36 to 60 years. Notably, most (96%), but not all, of their patients had no radiographic evidence of OA.

At the 2-year follow-up, there were no differences in patient-reported pain or functional outcomes, with all patients improving significantly from baseline. Muscle strength was also measured and found to be significantly greater at 3 and 12 months in the exercise group. Limitations of this study were a lack of patient blinding and a 19% crossover from the exercise to the APM group.

The findings:

Mild to moderate OA and meniscal tears

The authors of a 2002 double-blind, placebo-controlled trial randomly assigned 180 patients with degenerative meniscus tears and knee OA to either arthroscopic debridement, arthroscopic lavage, or placebo surgery consisting of superficial skin incisions without insertion of an arthroscope.⁵ Patients were eligible if they were ≤75 years of age and had not undergone arthroscopy of the knee within the previous 2 years. Arthritis was graded utilizing the Kellgren-Lawrence scale (0-4) and by calculating a

severity score (0-12) by adding the individual scores for each of the 3 compartments of the knee; patients were excluded if they had a severity grade ≥9. One-quarter of the participants had severe arthritis, with scores of 7 or 8. Outcomes were measured over a 24-month period. At no point did either of the intervention groups report less pain or better function than the sham-surgery group.⁵

■ **Additionally, in a single-center RCT** involving 178 patients with mild to severe OA, subjects were randomly assigned to surgical lavage and arthroscopic debridement together with optimized physical and medical therapy or to treatment with physical and medical therapy alone.¹⁵ Patients were excluded if they had “bucket handle” meniscal tears detected by physical exam or by MRI, previous arthroscopic surgery, previous major knee trauma, or steroid injections in the last 3 months. All participants were required to have Kellgren-Lawrence grade 2, 3, or 4 arthritis.

The researchers used 2 validated outcome measures to evaluate pain, symptoms, and functional ability and followed the patients for 2 years after the initiation of treatment. This study failed to show that arthroscopic surgery provided any additional benefit to optimized physical and medical therapy.¹⁵

■ **A 2013 multicenter, RCT** randomly assigned 351 patients ≥45 years with a meniscal tear and radiographic evidence of mild to moderate OA to either surgery and postoperative physical therapy or to a standardized physical therapy regimen.¹⁶ Patients were required to have at least one symptom that was consistent with a meniscal tear for approximately one month. About 30% of the patients who were assigned to physical therapy alone underwent surgery within 6 months. There were no significant differences between the 2 groups in the magnitude of improvement in functional status or pain at 6 or 12 months.

■ **Finally, a prospective Scottish study** consisting of 270 patients with everything from no signs of OA to advanced OA who underwent APM were sent preoperative and 6-month postop questionnaires evaluating ADLs, pain, symptoms, quality of life, and body mass index (BMI).¹⁷ Their OA was

graded via preop MRI or radiographs and confirmed by the operating surgeon. The investigators were unable to demonstrate any significant benefit associated with arthroscopic meniscectomy, and, therefore, could not recommend the procedure for patients with moderate to advanced OA.

However, in their analysis, 3 subgroup populations were found to benefit from APM: those with greater body habitus (BMI >30 kg/m²), those without signs of OA, and those with early OA. Limitations of this study included the lack of randomization, blinding, a control, and long-term follow up, and that the authors didn't use established OA grading criteria.¹⁷

The bottom line: Nonoperative treatment benefits most patients

Physical therapy is an appropriate first-line treatment for degenerative meniscus tears in middle-aged patients. In fact, a trial of nonoperative treatment is likely to benefit the majority of patients. In addition, avoiding surgery eliminates surgical complications and decreases overall health care costs.

Reserve APM for those patients without significant OA who fail to improve after physical therapy, who have mechanical symptoms, or who have intra-articular loose bodies.

In addition, exercise therapy is an effective treatment for patients with knee OA. It improves function and limits joint pain in both acute arthritic flares and more long-term, chronic situations. There is strong evidence that strengthening plays a critical role in reducing symptoms and improving muscle strength, physical ability, and quality of life.¹⁹ It has been suggested that physical exercise 3 times a week for 4 months could lead to >35% improvement of knee function.²⁰ In contrast, other studies reported that while 91% of patients 11.5 years after APM considered their knees "normal or almost normal," patients actually experienced a reduction in postoperative physical activity and quality of life.²¹

The most recent American Academy of Orthopaedic Surgeons (AAOS) guidelines²² do not recommend for or against arthroscopic partial meniscectomy in patients with knee

OA and a torn meniscus. In middle-aged patients, MRI abnormalities of the meniscus do not consistently correlate with symptoms. Many meniscus lesions are asymptomatic or not the primary source of pain in the setting of OA.³

■ Potential harms and considerations.

Deep venous thrombosis is the most frequently reported adverse event of arthroscopic surgery, with an approximate incidence of 4.13 per 1000 procedures, followed by less frequent complications such as infection, pulmonary embolism, and death.¹⁸

It is important to note that the degenerative meniscus tears that occur in middle age and that are associated with OA are not the same as acute, traumatic meniscus tears. All of the studies discussed here included patients with chronic knee pain and excluded patients with sudden onset pain from a single physical event. Many of the studies excluded patients with bucket-handle tears or severe mechanical symptoms (ie, locking). APM may be indicated for these meniscus tears regardless of age or OA status.

■ Making a sensible choice. Ultimately, physicians and their patients must use the best evidence available to make sensible clinical decisions. The ability to retain native meniscal tissue is of utmost importance to maintaining the longevity of their knee. According to previous studies, OA progression is more likely to occur after meniscectomy than after nonoperative treatment.²³ **JFP**

CORRESPONDENCE

William Bassett, MD, Department of Orthopedics, Rutgers-Robert Wood Johnson Medical School, 51 French St., PO Box 19, New Brunswick, NJ 08903; wpb31@rwjms.rutgers.edu.

References

- Cullen KA, Hall MJ, Golosinskiy A. Ambulatory surgery in the United States, 2006. *Natl Health Stat Rep.* 2009;11:1-25.
- Hall MJ, Lawrence L. Ambulatory surgery in the United States, 1996. Advance data from vital and health statistics of the Centers for Disease Control and Prevention/National Center for Health Statistics. No. 300. August 12, 1998. Available at: <https://cdc.gov/nchs/data/ad/ad300.pdf>. Accessed October 11, 2017.
- Englund M, Guermazi A, Gale D, et al. Incidental meniscal findings on knee MRI in middle-aged and elderly persons. *N Engl J Med.* 2008;359:1108-1115.
- Sihvonen R, Paavola M, Malmivaara A, et al. Arthroscopic partial meniscectomy versus sham surgery for a degenerative meniscal tear. *N Engl J Med.* 2013;369:2515-2524.
- Moseley JB, O'Malley KO, Petersen NJ, et al. A controlled trial of arthroscopic surgery for osteoarthritis of the knee. *N Engl J Med.* 2002;347:81-88.

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➤ Consider a trial of nonoperative treatment, as it is likely to benefit the majority of patients with degenerative meniscal tears.

6. Bhattacharyya T, Gale D, Dewire P, et al. The clinical importance of meniscal tears demonstrated by magnetic resonance imaging in osteoarthritis of the knee. *J Bone Joint Surg.* 2003;85:4-9.
7. Paxton ES, Stock MV, Brophy RH. Meniscal repair versus partial meniscectomy: a systematic review comparing reoperation rates and clinical outcomes. *Arthroscopy.* 2011;27:1275-1288.
8. Fairbank TJ. Knee joint changes after meniscectomy. *J Bone Joint Surg Br.* 1948;30B:664-670.
9. Amoczky SP, Warren RF. Microvasculature of the human meniscus. *Am J Sports Med.* 1982;10:90-95.
10. Morgan CD, Wojtys EM, Casscells CD, et al. Arthroscopic meniscal repair evaluated by second-look arthroscopy. *Am J Sports Med.* 1991;19:632-638.
11. Herrlin S, Hällander M, Wange P, et al. Arthroscopic or conservative treatment of degenerative medial meniscal tears: a prospective randomised trial. *Knee Surg Sports Traumatol Arthrosc.* 2007;15:393-401.
12. Herrlin SV, Wange PO, Lapidus G, et al. Is arthroscopic surgery beneficial in treating non-traumatic, degenerative medial meniscal tears? A five-year follow-up. *Knee Surg Sports Traumatol Arthrosc.* 2013;21:358-364.
13. Yim JH, Seon JK, Song EK, et al. A comparative study of meniscectomy and nonoperative treatment for degenerative horizontal tears of the medial meniscus. *Am J Sports Med.* 2013;41:1565-1570.
14. Kise NJ, Risberg MA, Stensrud S, et al. Exercise therapy versus arthroscopic partial meniscectomy for degenerative meniscal tear in middle aged patients: randomised controlled trial with two year follow-up. *BMJ.* 2016;354:i3740.
15. Kirkley A, Birmingham TB, Litchfield RB, et al. A randomized trial of arthroscopic surgery for osteoarthritis of the knee. *N Engl J Med.* 2008;359:1097-1107.
16. Katz JN, Brophy RH, Chaisson CE, et al. Surgery versus physical therapy for a meniscal tear and osteoarthritis. *N Engl J Med.* 2013;368:1675-1684.
17. Bailey O, Gronkowski K, Leach WJ. Effect of body mass index and osteoarthritis on outcomes following arthroscopic meniscectomy: A prospective nationwide study. *The Knee.* 2015;22:95-99.
18. Thorlund JB, Juhl CB, Roos EM, et al. Arthroscopic surgery for degenerative knee: systematic review and meta-analysis of benefits and harms. *BMJ.* 2015;350:h2747.
19. Pedersen BK, Saltin B. Evidence for prescribing exercise as therapy in chronic disease. *Scan J Med Sci Sports.* 2006;16(Suppl1):3-63.
20. Mangione KK, McCully K, Gloviak A, et al. The effects of high-intensity and low-intensity cycle ergometry in older adults with knee osteoarthritis. *J Gerontol A Biol Sci Med Sci.* 1999;54:M184-190.
21. Chatain F, Robinson AHN, Adeleine P, et al. The natural history of the knee following arthroscopic medial meniscectomy. *Knee Surg Sports Traumatol Arthrosc.* 2001;9:15-18.
22. American Academy of Orthopaedic Surgeons. Treatment of Osteoarthritis of the Knee. Evidence-based guideline. 2nd ed. May 18, 2013. Available at: <https://www.aaos.org/research/guidelines/TreatmentofOsteoarthritisoftheKneeGuideline.pdf>. Accessed October 11, 2017.
23. Lohmander LS, Thorlund JB, Roos EM. Routine knee arthroscopic surgery for the painful knee in middle-aged and old patients—time to abandon ship. *Acta Orthop.* 2016;87:2-4.