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Arthroscopic Debridement of the Knee: An Evidence Update

Evidence Development and Standards Branch, Health Quality Ontario

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Abstract

Background

Patients with knee pain as a result of osteoarthritis or degenerative meniscal injury may seek treatment through arthroscopic surgery. How effective arthroscopic debridement with or without meniscectomy is for relieving pain and improving patients' functional outcomes is uncertain.

Objectives

To conduct an evidence update of an evidence-based analysis (EBA) conducted in 2005 to determine if arthroscopic debridement for osteoarthritis of the knee or for meniscal injury from degenerative causes improve patient outcomes.

Data Sources

A literature search was performed using Ovid MEDLINE, MEDLINE In-Process and Other Non-Indexed Citations, Embase, and all EBM databases, for studies published from January 1, 2005, to February 4, 2014.

Review Methods

A systematic review of the literature was conducted, limited to randomized controlled trials (RCTs) that examined the effectiveness of arthroscopic debridement with or without meniscectomy. Quality assessment of the body of literature was conducted using Grading of Recommendations Assessment, Development, and Evaluation (GRADE).

Results

A total of 8 RCTs were identified, 2 from the original EBA plus 6 that were published since that time. The studies included patients with a range of indications for treatment and severity of osteoarthritis. Moderate-quality evidence showed no statistically significant difference in pain or functional status between patients who received arthroscopic treatment versus placebo (e.g., sham surgery). Low-quality evidence showed no statistically significant difference in pain or functional status between patients who received arthroscopic treatment versus usual care (e.g., physical therapy).

Limitations

Heterogeneity across the study populations, interventions, and reported measures limited the ability to calculate a summary effect estimate; however, all studies demonstrated consistency in their findings.

Conclusions

The evidence does not show the superiority of arthroscopic debridement with or without meniscectomy in patients with osteoarthritis of the knee or with meniscal injury from degenerative causes.

Plain Language Summary

The soft tissues of the knee joint can wear away and cause pain, limiting quality of life and the ability of patients to participate in day-to-day activities. Arthroscopic debridement is a surgical treatment that extracts any loose material that may be in the knee joint and can smooth the surfaces inside the knee.

This report is an evidence update of the evidence-based analysis (EBA) conducted in 2005 to determine if arthroscopic debridement improves patient outcomes in patients with osteoarthritis of the knee or meniscal injury from degenerative causes.

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List of Abbreviations

EBA	Evidence-based analysis
GRADE	Grading of Recommendations Assessment, Development, and Evaluation
KOOS	Knee Injury and Osteoarthritis Outcome Score
OA	Osteoarthritis
OHTAC	Ontario Health Technology Advisory Committee
RCT	Randomized controlled trial
WOMAC	Western Ontario and McMaster Universities Osteoarthritis Index

Background

Objective of Analysis

To examine whether arthroscopic debridement for osteoarthritis of the knee or for meniscal injury from degenerative causes improves patient outcomes.

Clinical Need and Target Population

Soft tissues that cushion the bone and allow for ease of movement within the knee joint can become degraded. The relationship between degradation and osteoarthritis is unclear. What is known is that signs of osteoarthritis can be accompanied by pain and can reduce patients' engagement in everyday and recreational activities. (1) There are several treatments for patients with osteoarthritis of the knee; one is debridement with arthroscopic surgery. (1) Arthroscopic debridement involves insertion of a fibreoptic scope into the knee through a small incision and typically includes the removal of loose bodies or osteophytes in the knee, partial meniscectomy, chondroplasty, synovectomy, adhesiolysis, or joint insufflation. (2)

In 2005, Health Quality Ontario (formerly the Medical Advisory Secretariat) conducted an evidence-based analysis (EBA) to examine the effectiveness of lavage and debridement as treatment for osteoarthritis of the knee. (3) This report examined a total of 8 studies in its analysis on debridement, 2 randomized controlled trials (RCTs) and 6 observational studies. The findings from this report ultimately informed the following Ontario Health Technology Advisory Committee (OHTAC) recommendation for debridement:

> "Arthroscopic debridement of the knee has thus far only been found to be effective for medial compartmental osteoarthritis. All other indications should be reviewed with a view to reducing arthroscopic debridement as an effective therapy." (3)

In 2013 Health Quality Ontario convened an expert advisory panel to develop best practice recommendations for knee arthroscopy. (4) The Expert Advisory Panel on Episode of Care for Patients Undergoing Arthroscopic Knee Surgery advised Health Quality Ontario that there has been a body of literature published on the topic of knee arthroscopy debridement with or without meniscectomy since the time of the original OHTAC recommendation in 2005 that could indicate a need to revisit the original OHTAC recommendation. In response, Health Quality Ontario conducted this EBA update to reflect the evolving context and new body of the published literature in the area of arthroscopic debridement. Furthermore, the expert advisory panel advised that arthroscopic debridement could be provided to patients who experience the same symptoms of pain and disrupted participation in activities because of degraded soft tissues but who do not meet the criteria for a diagnosis of osteoarthritis. This finding indicates a need to expand the original question's inclusion criteria.

Evidence Update

Research Question

What is the effectiveness of arthroscopic debridement with or without meniscectomy for patients with osteoarthritis (OA) of the knee or with meniscal injury from degenerative causes?

Research Methods

Literature Search Strategy

A literature search was performed on February 4, 2014, using Ovid MEDLINE, MEDLINE In-Process and Other Non-Indexed Citations, Embase, and all EBM Databases, for studies published from January 1, 2005, to February 4, 2014. (Appendix 1 provides details of the search strategies.) Abstracts were reviewed by a single reviewer and, for those studies meeting the eligibility criteria, full-text articles were obtained. Reference lists were also examined for any additional relevant studies not identified through the search.

Inclusion Criteria

- English-language full-text publications
- published between January 1, 2005, and February 4, 2014
- randomized controlled trials (RCTs), systematic reviews, and meta-analyses
- knee OA or degenerative causes of meniscal injury
- arthroscopic debridement of the knee with or without arthroscopic meniscectomy
- studies that compare the intervention to placebo (e.g., washout or sham surgery) or usual care (e.g., physical therapy)

Exclusion Criteria

- meniscal injury from an acute injury or trauma
- inflammatory OA, joint tuberculosis, septic joints, psoriatic joints, synovitis, chondropathy of the knee, and gonarthrosis
- rheumatoid arthritis
- studies where outcomes of interest cannot be abstracted

Outcomes of Interest

- pain
- functional status

Expert Advisory Panel

In December 2013, an Expert Advisory Panel on Episode of Care for Patients Undergoing Arthroscopic Knee Surgery was struck. Members of the expert advisory panel included physicians, personnel from the Ministry of Health and Long-Term Care, health care administrators, and allied health professionals.

The expert advisory panel was to provide advice on primary patient groupings; to review the evidence, guidance, and publications related to defined patient populations; to identify and prioritize interventions for review; and to advise on the development of a care pathway model. Panel members were to provide advice on the scope of the project, the methods used, and the findings. However, the statements, conclusions, and views expressed in this report do not necessarily represent the views of the panel members.

Statistical Analysis

A *P* value of less than 0.05 was considered statistically significant unless otherwise stated. Pooling of trial data in meta-analyses was considered where possible, and conducted in Review Manager 5.2. (5) Where pooling of data was determined to be inappropriate, results were summarized descriptively. Relative risks for binary outcomes and mean differences for continuous outcomes were calculated if the data were available and were not reported in the studies.

Quality of Evidence

The quality of the body of evidence for each outcome was examined according to the Grading of Recommendations Assessment, Development, and Evaluation (GRADE) Working Group criteria. (6) The overall quality was determined to be high, moderate, low, or very low using a step-wise, structural methodology.

Study design was the first consideration; the starting assumption was that RCTs are high quality, whereas observational studies are low quality. Five additional factors—risk of bias, inconsistency, indirectness, imprecision, and publication bias—were then taken into account. Limitations in these areas resulted in downgrading the quality of evidence. Finally, 3 main factors that can raise the quality of evidence were considered: large magnitude of effect, dose-response gradient, and accounting for all residual confounding factors. (6) For additional detailed information, please refer to the latest series of GRADE articles. (6)

As stated by the GRADE Working Group, the final quality score can be interpreted using the following definitions:

High	High confidence in the effect estimate—the true effect lies close to the estimate of the effect
Moderate	Moderate confidence in the effect estimate—the true effect is likely to be close to the estimate of the effect, but may be substantially different
Low	Low confidence in the effect estimate—the true effect may be substantially different from the estimate of the effect
Very Low	Very low confidence in the effect estimate—the true effect is likely to be substantially different from the estimate of effect

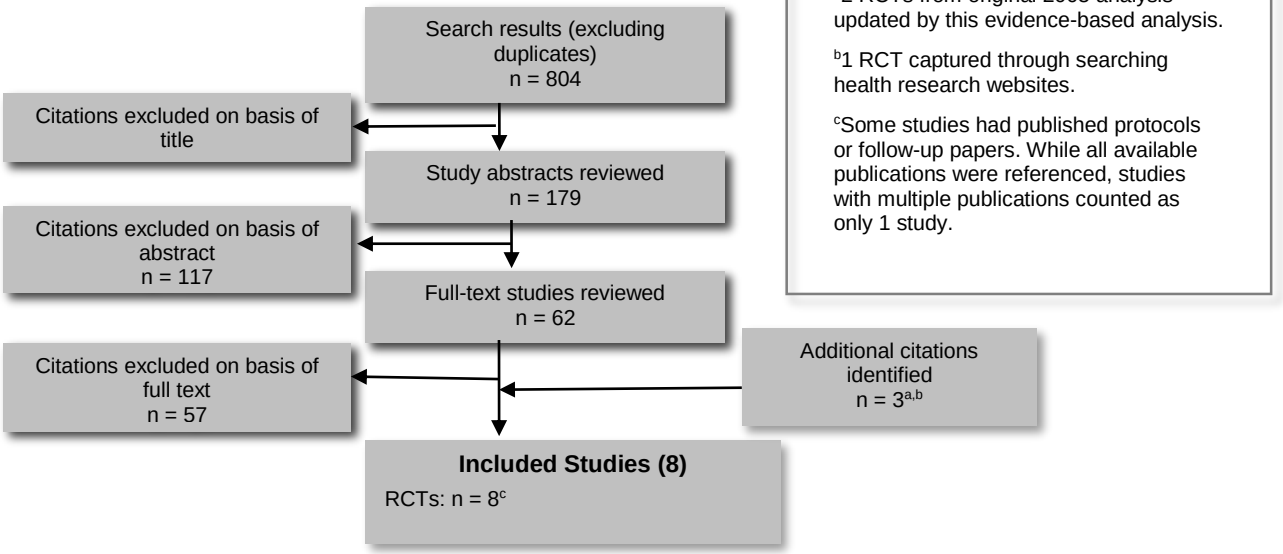
Results of Evidence-Based Analysis

The database search yielded 804 citations published between January 1, 2005, and February 4, 2014 (with duplicates removed). Articles were excluded on the basis of information in the title and abstract. The full texts of potentially relevant articles were obtained for further assessment. Figure 1 shows when and for what reason citations were excluded from the analysis.

The original EBA conducted in 2005 (3) included 2 RCTs, and the literature search identified an additional 5 RCTs. The reference lists of the included studies and health research websites were hand-searched to identify other relevant studies, and 1 additional citation was included, for a total of 8 RCTs.

Figure 1: Citation Flow Chart

Abbreviation: RCT, randomized controlled trial.



Systematic Reviews and Meta-Analyses

Six systematic reviews that examined arthroscopic surgery for the population of interest were captured in the literature search. None of these reviews met all of the inclusion and exclusion criteria of this review. Examination of their reference lists identified no additional individual studies for inclusion. The systematic reviews are summarized in Appendix 2, Table A1.

Summary of Included Studies

A total of 8 RCTs met the inclusion criteria. Two of the RCTs (7, 8) were from the original EBA; (3) 6 others had been published since 2005. (9-14) Published protocols and follow-up papers were referenced; (15, 16) however, where multiple publications existed they were counted as only 1 study.

All studies administered the treatments by a single provider or used standard protocols. However, there was heterogeneity present among the studies' patient populations, how they administered the interventions, their definition of usual care, and the length of their follow-up periods (Tables 1 and 2).

Patient Characteristics

Studies differed in several potentially clinically relevant patient characteristics. Age, sex, and duration of symptoms before study participation are described in Table 1. Detailed population inclusion and exclusion criteria of the individual studies are available in Appendix 2, Table A2. Table 2 summarizes the variations between studies for indication for arthroscopic treatment (degenerative tear without OA or OA with no meniscal tear, with a meniscal tear, and with mechanical symptoms) and disease severity (mild to severe OA).

Six studies reported no significant differences between study groups at baseline measures (8-11, 13, 14); 2 studies did not calculate statistical significance, but visual inspection of the baseline characteristics tables identified no sizeable differences between groups. (7, 12)

Study Design

Studies included in this analysis were all RCTs; however, they were divided in their design of comparator groups. Three studies compared the effectiveness of knee arthroscopy with that of a placebo or sham surgery, (7, 8, 13) and 5 compared knee arthroscopy to usual care, which happened to be some form of physical therapy in all 5 studies. (9-12, 14) Given that interpretation and potential generalization of results between these 2 designs varies considerably, findings in this report were subgrouped on the basis of the type of study design (placebo or usual care).

Table 1: Randomized Controlled Trials Identified Through Literature Search

Author, Year	Country, N Study Sites	Population[a]	Sample size (Intervention/ Control)	Mean Age, Years	% Male	Intervention	Control	Follow-Up Period
Studies with placebo surgery controls								
Hubbard, 1996 (7)	United Kingdom, 1 site	• Single medial femoral condyle degenerative lesion Grade 3 or 4 on the Outbridge classification • Symptomatic for > 1 year	40/36	45.3–59.0	71%	**Debridement** - 3 L of saline run through the knee after loose cartilage was resected - No abrasion or drilling of condyle	**Washout** 3 L of saline run through the knee	5 years
Moseley et al, 2002 (8)	United States, 1 site	• OA as per the ACR definition • Ongoing pain for > 6 months	59/60[b]	52.0–53.6	95%	**Debridement** - 10 L of fluid for lavage - Rough cartilage was shaved, loose debris removed, and meniscus trimmed and smoothed - No abrasion or microfracture	**Simulated debridement** 3 incisions were made and surgeon requested tools while manipulating the knee	2 years
Sihvonen et al, 2013 (13, 16)	Finland, 5 sites	• Medial meniscus injury • Persistent pain > 3 months • *Excluded* patients with OA according to ACR or Kellgren-Lawrence Grade ≥ 2	70/76	52	61%	**Partial meniscectomy** No debridement, abrasion, or microfracture	**Simulated partial meniscectomy** Arthroscopy was conducted as part of confirmation for inclusion but no meniscectomy	1 year
Studies with usual care controls								
Herrlin et al, 2013 (9) 2007 (15)	Sweden, 1 site	• Medial meniscal tear • Daily pain within last 2–6 months • *Excluded* patients with OA Grade > 1 on Ahlbäcks classification	47/49	54–56	60%	**Debridement with partial meniscectomy or resection followed by supervised exercise** Same protocol as control group	**Supervised exercise** 2 times per week for 8 weeks plus home program 2 times per week	5 years
Katz et al, 2013 (10)	United States, 7 sites	• OA with Kellgren-Lawrence Grade 1, 2, or 3 • Symptoms > 1 year not managed with medications, activity limitations, or physical therapy	174/177	57.8–59.0	45%	**Partial meniscectomy** Loose fragments of cartilage and bone were removed **Followed by physical therapy** Same protocol as control group	**Physical therapy** 1 to 2 times per week with physiotherapist plus exercise at home for 6 weeks, or as required	1 year

Author, Year	Country, N Study Sites	Population[a]	Sample size (Intervention/ Control)	Mean Age, Years	% Male	Intervention	Control	Follow-Up Period
Kirkley et al, 2008 (11)	Canada, 1 site	OA with Kellgren-Lawrence Grade 2, 3, or 4	94/94	58.6–60.6	37%	**Arthroscopic treatment** - 1 L of saline plus at least one of: synovectomy, debridement, excision of degenerative tears in meniscus, or chondral flaps - No abrasion or microfracture **Followed by physical therapy and medical therapy** Same protocol as control group	**Physical therapy and medical therapy** 1 hour per week for 12 weeks with physiotherapist plus 2 times per day individualized exercises, continuing with home exercises for duration of study	2 years
Østerås et al, 2012 (12)	Norway, 2 sites	• Degenerative meniscal tear • Pain for > 3 months • *Excluded* Kellgren-Lawrence Grade 3 or 4	8/9	49.7	76.4%	**Partial meniscectomy** No details provided, unclear if patients received exercise therapy	**Medical exercise therapy** 3 times per week monitored by a therapist	3 months
Yim et al, 2013 (14)	Korea, 1 site	• Horizontal tear of posterior horn of medial meniscus • Pain > 1 month affecting activities of daily living not managed with primary efforts • *Excluded* Kellgren-Lawrence Grade ≥ 2	54/54	54.9–57.6	26%	**Meniscectomy** - With limited debridement - Co-interventions such as analgesics or NSAIDs **Followed by home exercise program** Unsupervised	**Physical therapy and medical therapy** - 2 weeks of analgesics, NSAIDs, or muscle relaxants - 3 times per week for 3 weeks of physiotherapy followed by home exercise for 8 weeks	2 years

Abbreviations: ACR, American College of Rheumatoology; NSAID, nonsteroidal anti-inflammatory drug; OA, osteoarthritis.
[a]More detailed description of inclusion and exclusion criteria in Appendix 2, Table A2.
[b]Moseley et al (8) study also included a third study arm of patients who received lavage only with 10 L of fluid.

Table 2: Matrix of Disease Characteristics Considered

Author, Year	Characteristics Considered[a]					
	Indication				Disease Severity	
	Non-OA Degenerative Meniscal Injury	OA With no Large Meniscal Injury	Meniscal Injury (e.g. "Bucket Handles")	Mechanical Symptoms (e.g. Locking)	Mild–Moderate (e.g. Kellgren-Lawrence Score ≤ 2)	Moderate–Severe (e.g. Kellgren-Lawrence Score ≥ 3)
Studies with placebo surgery controls						
Hubbard, 1996 (7)	✓	✓	✓			✓
Moseley et al, 2002 (8)			✓		✓	✓
Sihvonen et al, 2013 (13, 16)	✓			✓	✓	
Studies with usual care controls						
Herrlin et al, 2013 (9) 2007 (15)			✓		✓	
Katz et al, 2013 (10)			✓	✓[b]	✓	✓
Kirkley et al, 2008 (11)		✓		✓	✓	✓
Østerås et al, 2012 (12)	✓		✓		✓	
Yim et al, 2013 (14)			✓		✓	

Abbreviation: OA, osteoarthritis
[a]More details on inclusion and exclusion criteria in Appendix 2, Table A2.
[b]Included patients with episodic locking and catching but excluded patients with a chronically locked knee and stated that such patients are clear candidates for arthroscopic partial meniscectomy.

Results for the Outcome of Pain

All 8 studies reported pain as an outcome measure; however, measurement instruments used were inconsistent. They included patient-specific, disease-specific, and global health–related scales. Table 3 briefly describes various instruments used in the studies. Table 4 summarizes the results for end of follow-up periods for each study; results for all periods are summarized in Appendix 2, Table A3.

Meta-analysis was considered but was determined to be inappropriate given the heterogeneity of study populations, interventions, and reported measures. The expert advisory panel advised a priori that there is no criterion standard measure of pain for the purposes of this EBA.

Table 3: Pain Measurement Instruments Used in Randomized Controlled Trials

Measurement Instrument	Description[a]
AIMS2: pain subscale	Measurement of arthritis pain, not limited to knee pain, composed of 4 items. Reported on a 0–100 scale where higher scores indicate more severe pain.
ASES: pain subscale	Questionnaire for patients with osteoarthritis to assess self-efficacy. Subscale score ranges from 10 to 100 where higher scores indicate greater self-efficacy.
KOOS: pain subscale	Measurement tool specific to knee function. Pain is 1 of the 5 subscales with scores ranging from 0 to 100 where higher scores indicate no knee-related pain.
KSPS	12-item measurement tool the authors created for the study. Scores range from 0 to 100. Higher scores indicate more severe pain.
Proportion of patients who are pain free	Rate of patients determined to be pain free versus total patients in each study arm. No description was provided about how pain-free status was evaluated.
SF-36: pain subscale	Self-reported measure of pain on basis of 2 items with a score ranging from 0 to 100. Higher scores indicate less pain.
VAS	Single question completed by patients on a continuous 10-cm line or discrete scores ranging from 0 to 10; higher scores indicate more severe pain. One study (13, 16) used an 11-point scale accounting for 0 as an option.
WOMAC: pain subscale	Questionnaire to assess condition in patients with osteoarthritis of hip or knee. Pain is 1 of 3 subscales examined in the WOMAC index and is evaluated on basis of 5 items. WOMAC is available in 2 formats: 4-point Likert (pain scores range from 0 to 20) and 100-mm VAS (pain scores range from 0 to 500). Higher scores indicate more severe pain.

Abbreviations: AIMS2, Arthritis Impact Measurement Scale; ASES, Arthritis Self-Efficacy Scale; KOOS, Knee Injury and Osteoarthritis Outcome Score; KSPS, knee-specific pain scale; SF-36, Short Form 36 health survey; VAS, visual analogue scale; WOMAC, Western Ontario and McMaster Universities Osteoarthritis Index.
[a]Descriptions are based on information provided in the included studies.

Table 4: Results for the Outcome of Pain for Knee Arthroscopy for End of Follow-up Periods

Author, Year	Pain Measure	N (Intervention/ Control)	Follow-Up	Intervention Group	Control Group	Between-Study Group Differences
Studies with placebo surgery controls						
Moseley et al, 2002 (8)	Knee-Specific Pain Scale Score	53/55	2 years	Mean 51.4 ± SD 23.2	Mean 51.6 ± SD 23.7	Mean 0.2 (95% CI −8.8 to 9.2); *P* = 0.96
	AIMS2: pain subscale	53/55	2 years	Mean 54.0 ± SD 23.3	Mean 52.5 ± SD 25.1	Mean −1.5 (95% CI −10.8 to 7.7); *P* = 0.75
	SF-36: pain subscale	52/55	2 years	Mean 45.0 ± SD 23.0	Mean 42.3 ± SD 24.2	Mean −2.7 (95% CI −11.8 to 6.4); *P* = 0.56
Sihvonen et al, 2013 (13, 16)	11-point VAS: after exercise	70/76	12 months	Mean absolute change from baseline 3.1 (95% CI 2.5–3.8)	Mean absolute change from baseline 3.3 (95% CI 2.8–3.8)	Mean −0.1 (95% CI −0.9 to 0.7)
	11-point VAS: at rest	70/76	12 months	Mean absolute change from baseline 2.5 (95% CI 1.8–3.2)	Mean absolute change from baseline 2.5 (95% CI 1.8–3.1)	Mean 0.0 (95% CI −0.9 to 1.0)
Studies with usual care controls						
Herrlin et al, 2013 (9) 2007 (15)	10-point VAS: movement	45/47	60 months	Mean 0 (IQR 0–3)	Mean 0 (IQR 0–2)	*P* > 0.05
	10-point VAS: rest	45/47	60 months	Mean 0 (IQR 0–1)	Mean 0 (IQR 0–0)	*P* > 0.05
	KOOS pain subscale	45/47	60 months	NR	NR	*P* > 0.05
Katz et al, 2013 (10)	KOOS pain score	161/169	12 months	Mean absolute change from baseline 26.8 (95% CI 23.7–30.0)	Mean absolute change from baseline 27.3 (95% CI 24.1–30.4)	Mean −0.4 (95% CI −4.8 to 4.0)
Kirkley et al, 2008 (11)	WOMAC: pain subscale	88/80	24 months	Mean 168 ± SD 134	Mean 185 ± SD 132	*P* = 0.14
	ASES: pain subscale	88/80	24 months	Mean 68.8 ± SD 18.5	Mean 63.8 ± SD 18.5	*P* = 0.23
Østerås et al, 2012 (12)	10-cm VAS	8/9	3 months	Mean change from baseline−1.5 ± SD 0.8	Mean change from baseline −1.1 ± SD 0.6	*Adjusted for baseline values* Mean −0.5 (95% CI −1.2 to 0.2)
Yim et al, 2013 (14)	10-point VAS	50/52	2 years	Mean 1.8 (range 1–5)	Mean 1.7 (range 1–4)	*P* = 0.675

Abbreviation: AIMS2, Arthritis Impact Measurement Scale; ASES, Arthritis Self-Efficacy Scale; CI, confidence interval; IQR, interquartile range; KOOS, Knee Injury and Osteoarthritis Outcome Score; NR, not reported; SD, standard deviation; SF-36, Short Form 36 health survey; VAS, visual analogue scale; WOMAC, Western Ontario and McMaster Universities Osteoarthritis Index.
[a]Measurement tools are briefly described in Table 3.

Studies with placebo surgery controls

The 2 studies included found no statistically significant greater reduction in pain at the end of follow-up among patients who received arthroscopy than among patients in the placebo groups. (8, 13) The Moseley et al (8) study did identify a statistically significantly greater reduction in pain at 2 weeks among patients who received *sham surgery* (Appendix 2, Table A3).

A post-hoc subgroup analysis was conducted by 1 study. When findings were limited to patients who experienced a sudden onset of symptoms, again, no significant difference between treatment groups was found. (13)

One study had serious quality limitations and was excluded from the body of evidence for this assessment. (7) The author was the surgeon and assessor and was not blinded to study group assignments,

all of which are important potential sources of bias. (7) This study also reported on the outcome of pain using the proportion of patients who were deemed pain free. (7) However, the study did not describe how pain-free status was determined or whether a validated measure was used. This study did state that debridement reduced pain substantially compared with the control group at the end of the study; however, this claim was not quantified by statistical analyses. (7) The reported proportion of patients who were deemed pain free was 59% in the intervention group versus 12% in the control group. (7)

In conclusion moderate-quality evidence shows no significant difference in pain among patients who received arthroscopic debridement with or without meniscectomy versus placebo (sham surgery). Details of the GRADE quality assessment are available in Appendix 3, Table A6.

Studies with Usual Care Controls

All 5 included studies provided some form of physical therapy as their usual care ("Control" in Table 1). All 5 studies found no statistically significant differences between study groups at any point. One study analyzed subgroups on the basis of severity of disease according to Kellgren-Lawrence score and of mechanical symptoms of locking or catching. These subgroup analyses found no significant differences among patients regardless of subgroup or treatment provided. (11) Results presented in the table above are based on per-protocol analyses accounting for patients who completed the respective studies. Two of these studies used both per-protocol and intention-to-treat analyses. Researchers indicated that method did not change their conclusions. (10, 11)

In addition to the measure reported above, Østerås et al (12) also measured the Knee Injury and Osteoarthritis Outcome Score (KOOS); however only the aggregate score was reported, and results for pain couldn't be abstracted. The primary author was contacted and was unable to provide the subscale results. (Personal communication, Ø Håvard, 2014) The authors reported no significant difference between groups by end of study for the aggregate KOOS measure. (12)

In conclusion, low-quality evidence indicated no significant difference in pain among patients who received arthroscopic debridement with or without meniscectomy compared with usual care (physical therapy). Details of the GRADE quality assessment are available in Appendix 3, Table A6.

Results for the Outcome of Functional Status

All included 8 studies reported functional status as an outcome measure, yet instruments used for measurement were inconsistent; they included patient-specific, disease-specific, and global health–related scales. The various instruments applied in the studies are briefly described in Table 5. Table 6 summarizes the results at the end of follow-up periods for each study; results for all periods are summarized in Appendix 2, Table A4.

Meta-analysis was considered but was determined to be inappropriate given the heterogeneity of study populations, interventions, and reported measures. The expert advisory panel advised a priori that there is no criterion standard measure of functional status for the purposes of this evidence-based analysis.

Table 5: Functional Status Measurement Instruments Used in Randomized Controlled Trials

Measurement Instrument	Description[a]
5D Score	Generic health-related quality-of-life measure of 15 items measured with a 5-point Likert-type scale. Scores can range from 0 to 1; higher scores indicate fewer problems.
AIMS2: walking-bending subscale	Self-reported measure of physical function, comprising 5 items. Reported on a 0–100 scale where higher scores indicate more limited function.
ASES	Questionnaire for patients with osteoarthritis to assess self-efficacy. Comprising 20 questions across 3 subscales (pain, function, and other symptoms), each with scores ranging from 10 to 100 where higher scores indicate greater self-efficacy.
KOOS	Measure specific to knee function comprising 5 separate subscales (pain, other symptoms, activities of daily living, sport/recreation, and quality of life). Scores in each subsection range from 0 to 100 where higher scores indicate no knee-related problems.
Lysholm Knee Score	Questionnaire to evaluate knee function and symptoms during activity among patients with anterior cruciate ligament or meniscal injury. Based on 8 domains, scores range from 0 to 100 with higher scores indicating better outcomes. Hubbard (7) modified the questionnaire by removing the subsection on instability, making the maximum score 70.
MACTAR	Patient-specific questionnaire with scores ranging from 0 to 500 with higher scores indicating greater disability.
Physical Functioning Scale	Objective measure of the time in seconds for patients to walk 30 meters and climb up and down a flight of stairs with longer times indicating worse function developed by the study authors (8) for the purposes of their study as a means of an objective measure of function.
SF-36: Physical function subscale	Self-reported measure of function based on 10 items with scores ranging from 0 to 100; higher scores indicate better function.
Tegner Activity Scale	Questionnaire about patient-reported activity comprising questions related to both activities of daily living and sport. Each question score ranges from 0 to 10 where higher scores indicate more involvement with an activity.
WOMAC	Questionnaire to assess osteoarthritis of hip or knee. WOMAC is composed of 3 subscales (pain, stiffness, and function) and is available in 2 formats: 4-point Likert (scores range from 0 to 96) and 100-mm VAS (scores range from 0 to 2,400), where a higher score indicates more severe condition.
WOMET	Tool to evaluate health-related quality-of-life among patients with meniscal injury. 16 items are evaluated on a 100-mm VAS. Total scores range from 0 to 1,600 where higher scores indicate better function.

Abbreviations: AIMS2, Arthritis Impact Measurement Scale; ASES, Arthritis Self-Efficacy Scale; KOOS, Knee Injury and Osteoarthritis Outcome Score; MACTAR, McMaster–Toronto Arthritis Patient Preference Disability Questionnaire; SF-36, Short Form 36 health survey; VAS, visual analogue scale; WOMAC, Western Ontario and McMaster Universities Osteoarthritis Index; WOMET, Western Ontario Meniscal Evaluation Tool.

[a]Based on information provided in the included studies.

Table 6: Results for the Outcome of Functional Status for Knee Arthroscopy at End of Follow-up Period

Author, Year	Pain Measure[a]	N (Intervention/ Control)	Follow-Up	Intervention Group	Control Group	Between-Study Group Differences
Studies with placebo surgery controls						
Moseley et al, 2002 (8)	Physical Functioning Scale	52/54	2 years	Mean 52.6 ± SD 16.4	Mean 47.7 ± SD 12.0	Mean −4.9 (95% CI −11.0 to 1.2); *P* = 0.11
	AIMS2: walking-bending subscale	53/55	2 years	Mean 56.4 ± SD 29.4	Mean 53.8 ± SD 27.5	Mean −2.6 (95% CI −13.4 to 8.2); *P* = 0.64
	SF-36: physical function subscale	44/44	2 years	Mean 47.9 ± SD 26.6	Mean 49.0 ± SD 27.2	Mean 1.1 (95% CI −9.3 to 11.5); *P* = 0.83
Sihvonen et al, 2013 (13, 16)	Lysholm knee score	70/76	12 months	Mean absolute change from baseline 21.7 (95% CI 17.6–25.8)	Mean absolute change from baseline 23.3 (95% CI 19.5–27.2)	Mean −1.6 (95% CI −7.2 to 4.0)
	WOMET score	70/76	12 months	Mean absolute change from baseline 24.6 (95% CI 19.7–29.4)	Mean absolute change from baseline 27.1 (95% CI 22.4–31.8)	Mean −2.5 (95% CI −9.2 to 4.1)
	15D score	70/76	12 months	Mean absolute change from baseline 0.03 (95% CI 0.02–0.04)	Mean absolute change from baseline 0.03 (95% CI 0.01–0.04)	Mean 0.01 (95% CI 0.01–0.02)
Studies with usual care controls						
Herrlin et al, 2013 (9) 2007 (15)	KOOS: activities of daily living subscale	45/47	60 months	NR	NR	*P* > 0.05
	KOOS: sport/recreation subscale	45/47	60 months	NR	NR	*P* > 0.05
	Lysholm Knee Score	45/47	60 months	Mean 89 (IQR 80–100)	Mean 95 (IQR 85–100)	*P* > 0.05
	Tegner Activity Scale	45/47	60 months	Mean 3 (IQR 2–4)	Mean 3 (IQR 2–4)	*P* > 0.05
Katz et al, 2013 (10)	WOMAC: physical function subscale	161/169	12 months	Mean absolute change from baseline 23.5 (95% CI 20.5–26.5)	Mean absolute change from baseline 22.8 (95% CI 19.8–25.8)	Mean 0.7 (95% CI −3.5 to 4.9)
	SF-36: physical activity	161/169	12 months	Mean absolute change from baseline 25.0 (95% CI 20.9 to 29.1)	Mean absolute change from baseline 28.1 (95% CI 24.0 to 32.1)	Mean −3.0 (95% CI −8.8 to 2.7)
Kirkley et al, 2008 (11)	WOMAC: physical function subscale	88/80	24 months	Mean 612 ± SD 448	Mean 623 ± SD 439	*P* = 0.26
	SF-36: physical activity subscale	88/80	24 months	Mean 37.0 ± SD 11.4	Mean 37.2 ± SD 10.6	*P* = 0.93
	ASES: functional status subscale	88/80	24 months	Mean 83.5 ± SD 17.0	Mean 80.19 ± SD 18.4	*P* = 0.20
	MACTAR	88/80	24 months	Mean 238 ± SD 146	Mean 244 ± SD 133	*P* = 0.58
Yim et al, 2013 (14)	Lysholm Knee Score	50/52	2 years	Mean 83.2 (range 52–100)	Mean 84.3 (range 58–100)	*P* = 0.237

Abbreviations: AIMS2, Arthritis Impact Measurement Scale; ASES, arthritis self-efficacy scale; CI, confidence interval; IQR, interquartile range; KOOS, Knee Injury and Osteoarthritis Outcome Score; MACTAR, McMaster–Toronto Arthritis Patient Preference Disability Questionnaire; NR, not reported; SD, standard deviation; SF-36, Short Form 36 health survey; WOMAC, Western Ontario and McMaster Universities Osteoarthritis Index; WOMET, Western Ontario Meniscal Evaluation Tool.

[a]Measurement tools are briefly described in Table 5.

Studies with placebo surgery controls

The 2 studies included found no statistically significant greater improvement in functional status at the end of follow-up among patients who received knee arthroscopy than among patients in the placebo groups. (8, 13) The Moseley et al (8) study did identify a statistically significant greater improvement in functional status at 2 weeks among patients who received *sham surgery* (Appendix 2, Table A3).

A post-hoc subgroup analysis was conducted by 1 study. When findings were limited to patients who experienced a sudden onset of symptoms, again, no significant difference between treatment groups was found. (13)

One study had serious quality limitations and was excluded from the body of evidence for this assessment. (7) The author was the surgeon and assessor and was not blinded to study group assignments, all of which are important potential sources of bias. (7) This study also reported on the outcome of functional status measured with a modified version of the Lysholm knee score that had not been validated. (7) This study did not quantify results with statistical analyses and produced a range of means from the modified Lysholm knee score of 33–58 for the intervention group and 35–59 for the control group. (7)

In conclusion, moderate-quality evidence shows no significant difference in functional status among patients who received arthroscopic debridement with or without meniscectomy versus placebo (sham surgery). Details of the GRADE quality assessment are available in Appendix 3, Table A6.

Studies with usual care controls

All 5 included studies provided some form of physical therapy as their usual care ("Control" in Table 1). Four studies found no statistically significant differences between study groups for any measure reported by the end of the study's follow-up periods. (9-11, 14) Yim et al (14) did identify a statistically significantly greater improvement on the Lysholm knee score at 3 months among patients who received arthroscopy compared with patients who received usual care. As well, 1 study analyzed subgroups on the basis of severity of disease according to Kellgren-Lawrence score and of mechanical symptoms of locking or catching. These subgroup analyses found no significant differences among patients regardless of subgroup or treatment provided. (11) Results presented in the table above are based on per-protocol analyses accounting for patients who completed the respective studies. Two of these studies used both per-protocol and intention-to-treat analyses. Researchers indicated that the method did not change their conclusions. (9, 11)

In addition to the measures reported above, 1 study found that, while there were no significant differences between groups, all patients indicated a statistically significant ($P < 0.001$) reduction in activity from pre-injury levels, as measured by the Tegner activity score, at 6 months. (15) As well, 1 study reported a significant difference ($P = 0.001$) in the proportion of patients who achieved at least an 8-point improvement on the Western Ontario and McMaster Universities Osteoarthritis Index (WOMAC) measure between study groups, with 67% of arthroscopy patients and 44% of the control group achieving this threshold at 6 months. (10) However, any difference in improvement from baseline WOMAC scores between groups was not statistically significant, even though in both groups the mean WOMAC scores improved by more than 8 points. (10) As well, Østerås et al (12) measured the KOOS score; however only the aggregate score was reported and results for functional status couldn't be abstracted. The primary author was contacted and was unable to provide the subscale results. (Personal communication, Ø Håvard, 2014) The authors reported no significant difference between groups by end of study for the aggregate KOOS measure. (12)

In conclusion, low-quality evidence indicated no significant difference for functional status in patients who received arthroscopic debridement with or without meniscectomy compared with usual care (physical therapy). Details of the GRADE quality assessment are available in Appendix 3, Table A6.

Limitations and Considerations

Limitations of the studies included in this analysis included biases due to inadequate blinding, incomplete accounting of all patients randomized to a study, heterogeneity of the populations and interventions, and the absence of a criterion standard for the outcomes of interest.

Cross-Over Between Study Groups

An important limitation of the included studies in which a comparator group received usual care (physical therapy) was that patients could not be blinded to their treatment allocation. What complicates the findings further is potential for cross-over to the treatment to which participants were not originally randomized (e.g., arthroscopy). Cross-over rates among these studies ranged from 0% to 30% (patients who crossed over from usual care to surgery), and from 0% to 6% (patients randomized to the intervention arms who refused surgery and received usual care). (9-12, 14)

In 3 studies patients crossed over from usual care to arthroscopy after randomization. In the Herrlin et al (9) study, 13 (26%) patients crossed over from the control group to receive arthroscopy at an average of 6.5 months after randomization. In the Katz et al (10) study, 51 (30%) patients in the control arm crossed over to receive arthroscopic surgery by 6 months after randomization and an additional 8 (5%) between 6 to 12 months. Last, in the Yim et al (14) study, 1 (18%) patient randomized to the control group elected to have the surgery and was withdrawn from the study as a result.

Herrlin et al (9) conducted a retrospective examination of data collected on the patients that had crossed over to receive arthroscopy, and these patients had statistically significant worse outcomes than others in the control group at 2 months after randomization, before their surgery. (9) These patients who crossed over to receive arthroscopy did not differ from all other study participants by the end of the study. (9) The study did not, however, conduct an equivalent post-hoc analysis of patients in the intervention group, so it is difficult to tell if the observation that a subgroup of patients happen to experience worse outcomes is a result of ineffectiveness of usual care or if the phenomenon would be observed in any similar group of patients regardless of treatment received.

One study provided a boundary for stopping the trial if superiority or inferiority was shown; (11) however, no study met any measure that might prompt allowing the observed cross-overs among patients who received usual care. (9-12, 14) The fact that patients crossed over to receive surgery could be an observed patient, or provider, bias toward the effectiveness of surgery rather than an indication of ineffectiveness of the control group, a phenomenon that has been previously discussed elsewhere. (17) Limitations because of the cross-over effect (Table A7) were accounted for in the GRADE quality assessment.

Refusal to Participate

The included studies reported rates of refusal to participate between 11% and 73.6%. However, there is no indication that patients who refused to participate are different than those who did. Only 1of the studies reported on patients who refused to participate; those who refused were similar in age, sex, and body mass index to study participants. (13)

Re-operations

The expert advisory panel advised that a measure of effectiveness for arthroscopic debridement with or without meniscectomy is the potential to delay or eliminate a total knee replacement. However, re-operation is a surrogate measure for ongoing pain and for poor functional status. No study reported on re-operation as an outcome. Subsequent operations were indirectly reported in several studies through the reporting of adverse events, reasons for loss to follow-up or withdrawal from a study, and cross-over of patients from usual care to arthroscopic surgery.

One study that used a placebo surgery control reported that 1 (1.4%) patient from the intervention group received a total knee replacement at 10 months post randomization. (13) This study also found that 1 (1.4%) patient in the intervention group and 4 (5.3%) patients from the control group received additional arthroscopic treatment, not a statistically significant difference between groups. (13) In addition, 1 study that used a usual care control reported that 5 (3%) patients randomized to the arthroscopy group and 3 (2%) from the control group received total knee replacements and dropped out of the study as a result. (10)

Conclusions

Studies that compared arthroscopy to a placebo control

- Moderate-quality evidence shows no significant difference in pain or functional status among patients with osteoarthritis of the knee or degenerative causes of meniscal injury who received arthroscopic debridement with or without meniscectomy compared with placebo (sham surgery).

Studies that compared arthroscopy to a usual-care control

- Low-quality evidence shows no significant difference in pain or functional status among patients with osteoarthritis of the knee or degenerative causes of meniscal injury who received arthroscopic debridement with or without meniscectomy compared with usual care (physical therapy).

Acknowledgements

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Orthopaedic and Reconstructive Surgery		
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Leslie Gauthier	Hamilton Health Sciences	Director, Perioperative Services
Winnie Doyle	St Joseph's Healthcare, Hamilton	VP President Patient Services, Chief Nursing Executive

Appendices

Appendix 1: Literature Search Strategies

Search date: February 4, 2014
Databases searched: Ovid MEDLINE, MEDLINE In-Process and Other Non-Indexed Citations, Embase, All EBM Databases (see below)
Limits: 1995-current; English
Filters: systematic reviews, meta-analyses, health technology assessments and RCTs

Databases: EBM Reviews – Cochrane Database of Systematic Reviews <2005 to December 2013>, EBM Reviews – ACP Journal Club <1991 to January 2014>, EBM Reviews – Database of Abstracts of Reviews of Effects <4th Quarter 2013>, EBM Reviews – Cochrane Central Register of Controlled Trials <December 2013>, EBM Reviews – Cochrane Methodology Register <3rd Quarter 2012>, EBM Reviews – Health Technology Assessment <1st Quarter 2014>, EBM Reviews – NHS Economic Evaluation Database <1st Quarter 2014>, Embase <1980 to 2014 Week 05>, Ovid MEDLINE® <1946 to January Week 4 2014>, Ovid MEDLINE® In-Process & Other Non-Indexed Citations <February 03, 2014>

Search Strategy:

#	Searches	Results
1	exp Osteoarthritis, Knee/ use mesz,acp,cctr,coch,clcmr,dare,clhta,cleed	11075
2	exp knee osteoarthritis/ use emez	16582
3	arthritis/ or osteoarthritis/	153312
4	exp Knee/	51979
5	exp Knee Joint/ use mesz,acp,cctr,coch,clcmr,dare,clhta,cleed	43151
6	exp Knee Injuries/ use mesz,acp,cctr,coch,clcmr,dare,clhta,cleed	15761
7	exp knee injury/ use emez	21986
8	exp knee meniscus/ use emez	5228
9	3 and (4 or 5 or 6 or 7 or 8)	14304
10	exp knee meniscus rupture/ use emez	3474
11	((osteoarthrit* or osteoarthro* or oa or degenerative or tear or injur*) adj3 (knee* or menisc* or semilunar cartilage or superior tibiofibular* or femorotibia*)).ti,ab.	38496
12	or/1-2,9-11	61166
13	exp Arthroscopy/	37349
14	exp knee arthroscopy/ use emez	4444
15	exp arthroscopic debridement/ use emez	416
16	exp Debridement/	36671
17	exp Curettage/	16239
18	(28nglish2828py* or debride* or curettage*).ti,ab.	97624
19	or/13-18	132191
20	12 and 19	7475
21	exp Menisci, Tibial/su [Surgery]	4035
22	exp Menisci, Tibial/in [Injuries]	3042
23	exp meniscal surgery/ use emez	2308
24	or/20-23	13487

25	(Meta Analysis or Controlled Clinical Trial).pt.	214105
26	Meta-Analysis/ use mesz,acp,cctr,coch,clcmr,dare,clhta,cleed or exp Technology Assessment, Biomedical/ use mesz,acp,cctr,coch,clcmr,dare,clhta,cleed	52834
27	Meta Analysis/ use emez or Biomedical Technology Assessment/ use emez	91903
28	(meta analy* or metaanaly* or pooled analysis or (systematic* adj2 review*) or published studies or published literature or medline or embase or data synthesis or data extraction or 29nglish29 or ((health technolog* or biomedical technolog*) adj2 assess*)).ti,ab.	397128
29	exp Randomized Controlled Trial/	726701
30	exp Random Allocation/ use mesz,acp,cctr,coch,clcmr,dare,clhta,cleed or exp Double-Blind Method/ use mesz,acp,cctr,coch,clcmr,dare,clhta,cleed or exp Control Groups/ use mesz,acp,cctr,coch,clcmr,dare,clhta,cleed or exp Placebos/ use mesz,acp,cctr,coch,clcmr,dare,clhta,cleed	338551
31	exp Randomization/ use emez or exp RANDOM SAMPLE/ use emez or Double Blind Procedure/ use emez or exp Triple Blind Procedure/ use emez or exp Control Group/ use emez or exp PLACEBO/ use emez	420313
32	(random* or RCT or placebo* or sham* or (control* adj2 clinical trial*)).ti,ab.	2230045
33	or/25-32	3037891
34	24 and 33	1456
35	limit 34 to 29nglish language [Limit not valid in CDSR,ACP Journal Club,DARE,CCTR,CLCMR; records were retained]	1338
36	limit 35 to yr=”1995 –Current” [Limit not valid in DARE; records were retained]	1203
37	remove duplicates from 36	804

Appendix 2: Summary of Studies

Table A1: Summary of Systematic Reviews

Author, Year	Objective	Search Parameters	N Included Studies	Conclusion	AMSTAR (out of 11)[a]
Laupattarakasem et al, 2008 (18)	To estimate effectiveness of arthroscopic debridement on knee osteoarthritis	Search dates: To 2006 Databases: Cochrane Central Register of Controlled Trials, MEDLINE, CINAHL, EMBASE, and Web of Science Language and study design limits: English language; controlled clinical trial	3	Good-quality evidence indicates arthroscopic debridement has no benefit for indiscriminate osteoarthritis from mechanical or inflammatory causes	10
McLeod et al, 2012 (19)	To assess effect of arthroscopic partial meniscectomy on quadriceps strength	Search dates: To September 2010 Databases: Web of Science, MEDLINE, Derwent Innovations Index, Journal Citation Reports, and BIOSIS Previews Language and study design limits: English language	4	Inter-limb deficits in isokinetic quadriceps strength: deficits sometimes persist for years after arthroscopic partial meniscectomy	8
Petty and Lubowitz, 2011 (20)	To assess long-term results from arthroscopic partial meniscectomy	Search dates: To February 2009 Databases: PubMed Language and study design limits: English language	5	Clinical symptoms of osteoarthritis of the knee are not observed up to 16 years after knee arthroscopic partial meniscectomy	7
Salata et al, 2010 (21)	To review clinical literature on meniscectomy	Search dates: Stated as 1970 to present; paper was published in 2010 Databases: Ovid and PubMed Language and study design limits: English language; ≥ 5-year follow-up for retrospective cohort studies	26	Body of literature is heterogeneous with predominantly lower-quality study designs. Future studies should include patient factors not adequately assessed thus far, such as sex and smoking status	6
Siparskey et al, 2007 (22)	To identify indications for arthroscopic treatment for osteoarthritis of the knee	Search dates: To May 2006 Databases: Medline, EMBASE, and Cochrane Language and study design limits: English language	18	Arthroscopic debridement could have some utility, but should not be used routinely for patients with osteoarthritis of the knee	6
Spahn et al, 2013 (23)	To assess effect of arthroscopic debridement in knee osteoarthritis	Search dates: Not stated Databases: PubMed, Cochrane, and EMBASE Language and study design limits: English or German language	30	Arthroscopic debridement is effective for middle-term (3- to 5-year) treatment of knee osteoarthritis resulting in good outcomes for approximately 60% of patients	6

Abbreviations: AMSTAR, Assessment of Multiple Systematic Reviews; CINAHL, EBSCO Cumulative Index to Nursing & Allied Health Literature.

[a]AMSTAR quality assessment details provided in Appendix 3, Table A5.

Table A2: Inclusion and Exclusion Criteria for Randomized Controlled Trials Included in Analysis

Author, Year	Recruitment Period	Inclusion Criteria	Exclusion Criteria
Placebo surgery control group			
Hubbard, 1996 (7)	1985–1989	Degeneration of the articular cartilage of the knee Symptoms > 1 year No previous surgery of the knee No laxity or deformity of the knee Single medial femoral condyle degenerative lesion Grade 3 or 4 on the Outbridge classification Subchondral sclerosis Grades 1–3 were accepted No other intra-articular pathology Normal plain radiograph Modified Lysholm score < 38/70 Full range of motion Patients with operation on contra-lateral knee Generalized ligamentous laxity in other joints if equal laxity was present in both knees and no ligamentous damage was found at arthroscopy All patients had tenderness of medial joint line or medial femoral condyle, and all had an effusion and full range of motion No patient had obvious deformity	Loss of joint space on radiograph Previous operation or steroid injection for any reason
Moseley et al, 2002 (8)	1995–1998	≤ 75 years OA of the knee assessed on radiograph per the ACR criteria At least moderate knee pain (≥ 4 on 10-point VAS) despite medical treatment for at least 6 months No previous arthroscopy during previous 2 years (included patients with large meniscal “bucket-handle” tears)	Severity score of ≥ 9 (of 12 on basis of summation of 3 compartments with scores up to 4 each using Kellgren-Lawrence) Severe deformity Serious medical problems
Sihvonen et al, 2013 (13, 16)	2007–2012	35–65 years Persistent pain > 3 months on medial joint line Pain provoked by palpation or compression of joint line (positive McMurray sign) MRI showing signals characteristics of medial meniscus Degenerative injury to medial meniscus confirmed at arthroscopy	Trauma-induced onset of symptoms Locked knee Previous surgical procedure on knee OA of the knee (assessed per the ACR criteria) Radiologic OA of the knee (Kellgren-Lawrence Grade > 1) Acute fracture of affected extremity (1 year) Decreased range of motion Instability of the knee MRI showed pathology other than degenerative requiring arthroscopy Arthroscopic examination reveals pathology other than degenerative injury requiring intervention other than arthroscopic partial meniscectomy
Usual care (physical therapy) control group			
Herrlin et al, 2013 (9) 2007 (15)	2003–2005	45–64 years Daily pain within the last 2–6 months Clinical signs: medial meniscal tear without trauma Medial meniscal tear on MRI Swedish language	Traumatic meniscal injury Knee OA Grade > 1 on Ahlbäcks classification Neurologic and rheumatic inflammatory diseases Loose bodies, ligament injuries, osteochondral defects, and tumors on MRI Earlier knee surgery, prosthetic replacements of hip or knee, and fractures of lower extremities within previous year Contraindication to physical training
Katz et al, 2013 (10)	2008–2011	> 45 years Symptoms for at least 1 month while being managed with ≥ 1medication, activity limitations, physical therapy Symptoms of meniscal tear include at least 1 of the following: clicking; catching;	Chronically locked knee Symptomatic from another source (patellofemoral syndrome, ligament tear, other) Psychological issues that preclude participation Kellgren-Lawrence Grade 4

		popping; giving way; pain with pivot, activity, or torque; pain that is episodic; pain that is acute and localized to one joint line History of locking, episodic swelling, change in quality or pattern of pain, availability of x-ray (6 months) and MRI (1 year) Evidence on MRI of osteophyte formation, cartilage fissure or tear, cartilage loss, or plain radiographic evidence of osteophyte or joint space narrowing (Kellgren-Lawrence Grades 1–3) Evidence on MRI of meniscal tear (extends to surface of meniscus)	Contraindications to MRI Radiographic evidence of chondrocalcinosis and acute symptomatic pseudogout Inflammatory disease Injection with viscosupplementation in past 4 weeks Prior surgery on same knee Pregnancy or possible pregnancy Candidate for bilateral arthroscopic partial meniscectomy Claim filed for worker's compensation Unable or unwilling to participate with physical therapy
Kirkley et al, 2008 (11)	1999–2007	18–60 years Idiopathic or secondary OA with Kellgren-Lawrence Grade 2–4 2 subgroups were specified a priori: less severe disease (Kellgren-Lawrence Grade ≤ 2), and mechanical symptoms of catching or locking	Large meniscal tears ("bucket handles") from physical exam or MRI Inflammatory or postinfectious arthritis Previous arthroscopic treatment for knee OA > 5 degrees of varus or valgus deformity Previous major knee trauma Kellgren-Lawrence Grade 4 OA in 2 compartments (medial or lateral compartments of tibiofemoral joint or patellofemoral compartment) Intra-articular corticosteroid injection within previous 3 months Major neurologic deficit Serious medical illness (life expectancy < 2 years or high intraoperative risk) Pregnancy Patients who were deemed unlikely to comply with follow-up
Østerås et al, 2012 (12)	1-year period (not specified)	Knee pain for > 3 months 35–60 years old Eligible for arthroscopic partial meniscectomy MRI showing degenerative meniscal tear	ACL rupture requiring acute trauma surgery OA Kellgren-Lawrence Grades 3–4 Hemarthroses Acute cases of locking knee and symptomatic pain in contrary extremities Other musculoskeletal comorbidities severely affecting lower extremity muscle function
Yim et al, 2013 (14)	2007–2009	Horizontal tear of the posterior horn of the medial meniscus on MRI Nontraumatic knee pain Daily knee pain on the medial side with mechanical symptoms affecting daily living activities despite management at primary clinical during previous 1 month	History of definite trauma Previous knee surgery Ligament deficiency Systematic arthritis Osteonecrosis Marked degenerative change with Kellgren-Lawrence Grade ≥ 2

Abbreviations: ACL, anterior cruciate ligament; ACR, American College of Rheumatology; OA, osteoarthritis; MRI, magnetic resonance imaging; VAS, visual analogue scale.

Table A3: Results for the Outcome of Pain for Knee Arthroscopy at All Time Periods

Author, Year	Pain Measure[a]	N (Intervention/ Control)	Follow-Up	Intervention Group	Control Group	Between–Study Group Differences
Studies with placebo surgery controls						
Hubbard, 1996 (7)	Patients who are pain-free	40/36	1 year	80%	14%	*P* = 0.05
		40/36	5 years	59%	12%	NR
Moseley et al, 2002 (8)	Knee-Specific Pain Scale Score	59/59	2 weeks	Mean 54.6 ± SD 18.5	Mean 45.9 ± SD 20.5	Mean −8.6 (95% CI −15.8 to −1.5); *P* = 0.02[b]
		59/57	6 weeks	Mean 49.3 ± SD 23.0	Mean 45.7 ± SD 21.7	Mean −3.6 (95% CI −11.9 to 4.6); *P* = 0.38
		58/56	3 months	Mean 49.3 ± SD 22.0	Mean 48.8 ± SD 21.5	Mean −0.5 (95% CI −8.6 to 7.5); *P* = 0.89
		56/57	6 months	Mean 50.0 ± SD 21.0	Mean 47.6 ± SD 20.7	Mean −2.3 (95% CI −10.1 to 5.4); *P* = 0.55
		50/53	1 year	Mean 51.7 ± SD 22.4	Mean 48.9 ± SD 21.9	Mean −2.9 (95% CI −11.5 to 5.8); *P* = 0.51
		51/52	18 months	Mean 50.7 ± SD 25.3	Mean 52.4 ± SD 22.4	Mean 1.7 (95% CI −7.7 to 11.0); *P* = 0.73
		53/55	2 years	Mean 51.4 ± SD 23.2	Mean 51.6 ± SD 23.7	Mean 0.2 (95% CI −8.8 to 9.2); *P* = 0.96
	AIMS2 pain score	58/59	2 weeks	Mean 53.2 ± SD 21.7	Mean 47.9 ± SD 23.9	Mean −5.2 (95% CI −13.6 to 3.1); *P* = 0.22
		59/57	6 weeks	Mean 49.9 ± SD 23.3	Mean 50.8 ± SD 23.2	Mean 0.9 (95% CI −7.7 to 9.4); *P* = 0.84
		58/56	3 months	Mean 49.9 ± SD 21.7	Mean 50.1 ± SD 21.3	Mean 0.3 (95% CI −7.7 to 8.2); *P* = 0.95
		55/57	6 months	Mean 52.0 ± SD 20.8	Mean 50.0 ± SD 20.7	Mean −2.0 (95% CI −9.8 to 5.7); *P* = 0.60
		51/54	1 year	Mean 53.3 ± SD 25.4	Mean 53.6 ± SD 22.1	Mean 0.3 (95% CI −8.9 to 9.5); *P* = 0.95
		51/52	18 months	Mean 50.7 ± SD 24.4	Mean 55.6 ± SD 23.6	Mean 4.9 (95% CI −4.5 to 14.3); *P* = 0.30
		53/55	2 years	Mean 54.0 ± SD 23.3	Mean 52.5 ± SD 25.1	Mean −1.5 (95% CI −10.8 to 7.7); *P* = 0.75
	SF-36 pain subscale	59/59	2 weeks	Mean 38.3 ± SD 19.8	Mean 53.6 ± SD 24.1	Mean 15.3 (95% CI 7.3 to 23.3); *P* < 0.001[b]
		59/56	6 weeks	Mean 46.6 ± SD 21.0	Mean 49.8 ± SD 23.3	Mean 3.2 (95% CI −5.0 to 11.3); *P* = 0.44
		58/56	3 months	Mean 46.8 ± SD 21.9	Mean 46.9 ± SD 24.9	Mean 0.1 (95% CI −8.6 to 8.8); *P* = 0.98
		55/57	6 months	Mean 45.1 ± SD 20.6	Mean 46.3 ± SD 26.4	Mean 1.2 (95% CI −7.7 to 10.0); *P* = 0.80
		51/54	1 year	Mean 44.5 ± SD 24.3	Mean 43.6 ± SD 24.8	Mean −1.0 (95% CI −10.5 to 8.5); *P* = 0.84
		51/52	18 months	Mean 46.8 ± SD 22.8	Mean 40.8 ± SD 24.9	Mean −6.1 (95% CI −15.4 to 3.3); *P* = 0.20
		52/55	2 years	Mean 45.0 ± SD 23.0	Mean 42.3 ± SD 24.2	Mean −2.7 (95% CI −11.8 to 6.4); *P* = 0.56
Sihvonen et al, 2013 (13, 16)	11-point VAS: *after exercise*	70/76	12 months	Mean absolute change from baseline 3.1 (95% CI 2.5 to 3.8)	Mean absolute change from baseline 3.3 (95% CI 2.8 to 3.8)	Mean −0.1 (95% CI −0.9 to 0.7)
	11-point VAS: *at rest*	70/76	12 months	Mean absolute change from baseline 2.5 (95% CI 1.8 to 3.2)	Mean absolute change from baseline 2.5 (95% CI 1.8 to3.1)	Mean 0.0 (95% CI −0.9 to 1.0)
Studies with usual care controls						
		47/49	8 weeks	Mean 1 (IQR 0–3)	Mean 1 (IQR 0–3)	*P* > 0.05

Author, Year	Pain Measure[a]	N (Intervention/ Control)	Follow-Up	Intervention Group	Control Group	Between–Study Group Differences
Herrlin et al, 2013 (9) 2007 (15)	10-point VAS: movement	47/43	6 months	Mean 1 (IQR 1–3)	Mean 1 (IQR 1–4)	*P* > 0.05
		46/46	24 months	Mean 0 (IQR 0–2)	Mean 0 (IQR 0–1)	*P* > 0.05
		45/47	60 months	Mean 0 (IQR 0–3)	Mean 0 (IQR 0–2)	*P* > 0.05
	10-point VAS: at rest	47/49	8 weeks	Mean 0 (IQR 0–1)	Mean 0 (IQR 0–2)	*P* > 0.05
		47/43	6 months	Mean 1 (IQR 0–2)	Mean 0 (IQR 0–2)	*P* > 0.05
		46/46	24 months	Mean 0 (IQR 0–1)	Mean 0 (IQR 0–1)	*P* > 0.05
		45/47	60 months	Mean 0 (IQR 0–1)	Mean 0 (IQR 0–0)	*P* > 0.05
	KOOS: pain subscale	47/49	8 weeks	Mean 89 (IQR 72–94)	Mean 86 (IQR 75–94)	*P* = 0.90
		47/43	6 months	Mean 89 (IQR 75–97)	Mean 86 (IQR 72–94)	*P* = 0.42
		46/46	24 months	NR	NR	*P* > 0.05
		45/47	60 months	NR	NR	*P* > 0.05
Katz et al, 2013 (10)	KOOS: pain subscale	161/169	6 months	Mean absolute change from baseline 24.2 (95% CI 21.3 to 21.7)	Mean absolute change from baseline 21.3 (95% CI 18.4 to 24.2)	Mean 2.9 (95% CI −1.2 to 7.0)
		161/169	12 months	Mean absolute change from baseline 26.8 (95% CI 23.7 to 30.0)	Mean absolute change from baseline 27.3 (95% CI 24.1 to 30.4)	Mean −0.4 (95% CI−4.8 to 4.0)
Kirkley et al, 2008 (11)	WOMAC: pain subscale Mean ± SD	90/80	3 months	Mean 141 ± SD 109	Mean 172 ± SD 124	NR
		90/73	6 months	Mean 143 ± SD 113	Mean 155 ± SD 118	NR
		80/77	12 months	Mean 155 ± SD 125	Mean 147 ± SD 116	NR
		78/70	18 months	Mean 179 ± SD 140	Mean 158 ± SD 115	NR
		88/80	24 months	Mean 168 ± SD 134	Mean 185 ± SD 132	*P* = 0.14
	ASES: pain subscale Mean ± SD	90/80	3 months	Mean 73.9 ± SD 15.8	Mean 68.6 ± SD 17.0	NR
		90/73	6 months	Mean 71.5 ± SD 16.9	Mean 67.9 ± SD 17.0	NR
		80/77	12 months	Mean 70.5 ± SD 20.0	Mean 69.5 ± SD 16.8	NR
		78/70	18 months	Mean 69.8 ± SD 18.9	Mean 66.6 ± SD 19.0	NR
		88/80	24 months	Mean 68.8 ± SD 18.5	Mean 63.8 ± SD 18.5	*P* = 0.23
Østerås et al, 2012 (12)	10-cm VAS	8/9	3 months	Mean change from baseline −1.5 ± SD 0.8	Mean change from baseline −1.1 ± SD 0.6	Adjusted for baseline values Mean −0.5 (95% CI −1.2 to 0.2)
Yim et al, 2013 (14)	10-point VAS	50/52	3 months	Mean 2.4 (NR)	Mean 2.7 (NR)	NR
		50/52	6 months	Mean 1.5 (NR)	Mean 2.1 (NR)	NR
		50/52	1 year	Mean 1.7 (NR)	Mean 1.8 (NR)	NR
		50/52	2 years	Mean 1.8 (range 1–5)	Mean 1.7 (range 1–4)	*P* = 0.675

Abbreviations: AIMS2, Arthritis Impact Measurement Scale; ASES, Arthritis Self-Efficacy Scale; CI, confidence interval; IQR, interquartile range; KOOS, Knee Injury and Osteoarthritis Outcome Score; NR, not reported; SD, standard deviation; SF-36, Short Form 36 health survey; VAS, visual analogue scale; WOMAC, Western Ontario and McMaster Universities Osteoarthritis Index.
[a]Measurement tools are briefly described in Table 3.
[b]Statistically significant difference between groups.

Table A4: Results for the Outcome of Functional Status for Knee Arthroscopy at All Time Points

Author, Year	Pain Measure[a]	N (Intervention/ Control)	Follow-up	Intervention Group	Control Group	Between–Study Group Differences
Studies with placebo surgery controls						
Hubbard, 1996 (7)	Modified Lysholm Knee Score[a]	40/36	1 year	Range of means: 33–61	Range of means: 35–63	NR
		40/36	5 years	Range of means: 33–58	Range of means: 35–59	NR
Moseley et al, 2002 (8)	Physical Functioning Scale	59/59	2 weeks	Mean 56.0 ± SD 21.8	Mean 48.3 ± SD 13.4	Mean −7.7 (95% CI −14.3 to −1.1); *P* = 0.02[b]
		59/57	6 weeks	Mean 51.7 ± SD 24.7	Mean 45.9 ± SD 12.0	Mean −5.8 (95% CI −13.1 to 1.4); *P* = 0.11
		58/56	3 months	Mean 49.5 ± SD 17.4	Mean 47.3 ± SD 16.0	Mean −2.2 (95% CI −8.5 to 4.1); *P* = 0.49
		55/57	6 months	Mean 49.8 ± SD 17.4	Mean 47.0 ± SD 13.0	Mean −2.8 (95% CI −8.7 to 3.1); *P* = 0.34
		50/54	1 year	Mean 52.5 ± SD 20.3	Mean 45.6 ± SD 10.2	Mean −6.9 (95% CI −13.3 to −0.4); *P* = 0.04
		51/52	18 months	Mean 52.8 ± SD 20.9	Mean 48.5 ± SD 12.4	Mean −4.3 (95% CI −11.5 to 2.8); *P* = 0.23
		52/54	2 years	Mean 52.6 ± SD 16.4	Mean 47.7 ± SD 12.0	Mean −4.9 (95% CI −11.0 to 1.2); *P* = 0.11
	AIMS2: walking-bending subscale	58/59	2 weeks	Mean 61.7 ± SD 26.3	Mean 47.9 ± SD 27.9	Mean −13.8 (95% CI −23.7 to −3.9); *P* = 0.007[b]
		59/57	6 weeks	Mean 49.9 ± SD 30.8	Mean 47.3 ± SD 22.3	Mean −2.6 (95% CI −12.5 to 7.3); *P* = 0.60
		58/56	3 months	Mean 53.5 ± SD 28.6	Mean 49.9 ± SD 21.6	Mean −3.6 (95% CI −13.0 to 5.8); *P* = 0.45
		55/57	6 months	Mean 52.5 ± SD 28.7	Mean 49.1 ± SD 25.8	Mean −3.4 (95% CI −13.6 to 6.8); *P* = 0.51
		51/54	1 year	Mean 56.4 ± SD 28.4	Mean 49.4 ± SD 25.5	Mean −7.0 (95% CI −17.4 to 3.4); *P* = 0.19
		51/52	18 months	Mean 53.1 ± SD 29.3	Mean 55.6 ± SD 26.6	Mean 2.4 (95% CI −8.5 to 13.4); *P* = 0.66
		53/55	2 years	Mean 56.4 ± SD 29.4	Mean 53.8 ± SD 27.5	Mean −2.6 (95% CI −13.4 to 8.2); *P* = 0.64
	SF-36: physical function subscale	57/59	2 weeks	Mean 46.9 ± SD 23.9	Mean 50.1 ± SD 23.4	Mean 3.1 (95% CI −5.5 to 11.8); *P* = 0.47
		58/56	6 weeks	Mean 49.2 ± SD 26.5	Mean 51.0 ± SD 24.2	Mean 1.8 (95% CI −7.6 to 11.2); *P* = 0.71
		56/54	3 months	Mean 49.6 ± SD 24.2	Mean 52.4 ± SD 23.5	Mean 2.8 (95% CI −6.0 to 11.7); *P* = 0.53
		54/54	6 months	Mean 51.1 ± SD 25.9	Mean 48.4 ± SD 25.9	Mean −2.6 (95% CI −12.3 to 7.1); *P* = 0.60
		47/49	1 year	Mean 47.3 ± SD 27.1	Mean 49.3 ± SD 24.5	Mean 2.0 (95% CI −8.0 to 12.1); *P* = 0.69
		44/46	18 months	Mean 50.9 ± SD 26.1	Mean 49.1 ± SD 25.0	Mean −1.7 (95% CI −11.7 to 8.3); *P* = 0.73
		44/44	2 years	Mean 47.9 ± SD 26.6	Mean 49.0 ± SD 27.2	Mean 1.1 (95% CI −9.3 to 11.5); *P* = 0.83
Sihvonen et al, 2013 (13, 16)	Lysholm Knee Score	70/76	12 months	Mean absolute change from baseline 21.7 (95% CI 17.6 to 25.8)	Mean absolute change from baseline 23.3 (95% CI 19.5 to 27.2)	Mean −1.6 (95% CI −7.2 to 4.0)
	WOMET score	70/76	12 months	Mean absolute change from baseline 24.6 (95% CI 19.7 to 29.4)	Mean absolute change from baseline 27.1 (95% CI 22.4 to 31.8)	Mean −2.5 (95% CI −9.2 to 4.1)

Author, Year	Pain Measure[a]	N (Intervention/ Control)	Follow-up	Intervention Group	Control Group	Between–Study Group Differences
	15D score	70/76	12 months	Mean absolute change from baseline 0.03 (95% CI 0.02 to 0.04)	Mean absolute change from baseline 0.03 (95% CI 0.01 to 0.04)	Mean 0.01 (95% CI 0.01 to 0.02)
Studies with placebo surgery controls						
Herrlin et al, 2013 (9) 2007 (15)	KOOS: activities of daily living subscale	47/49	8 weeks	Mean 93 (IQR 85–97)	Mean 96 (IQR 78–99)	*P* = 0.53
		47/43	6 months	Mean 84 (IQR 81–100)	Mean 96 (IQR 76–99)	*P* = 0.56
		46/46	24 months	NR	NR	*P* > 0.05
		45/47	60 months	NR	NR	*P* > 0.05
	KOOS: sport/recreation subscale	47/49	8 weeks	Mean 70 (35–85)	Mean 70 (50–90)	*P* = 0.12
		47/43	6 months	Mean 70 (30–90)	Mean 65 (35–85)	*P* = 0.80
		46/46	24 months	NR	NR	*P* > 0.05
		45/47	60 months	NR	NR	*P* > 0.05
	Lysholm Knee Score	47/49	8 weeks	Mean 88 (IQR 79–93)	Mean 90 (IQR 78–95)	*P* > 0.05
		47/43	6 months	Mean 84 (IQR 70–94)	Mean 85 (IQR 71–94)	*P* > 0.05
		46/46	24 months	Mean 93.5 (IQR 73–100)	Mean 90 (IQR 83–100)	*P* > 0.05
		45/47	60 months	Mean 89 (IQR 80–100)	Mean 95 (IQR 85–100)	*P* > 0.05
	Tegner Activity Scale	47/49	8 weeks	Mean 3 (IQR 3–4)	Mean 3 (IQR 3–4)	*P* > 0.05
		47/43	6 months	Mean 3 (IQR 2–4)	Mean 3 (IQR 2–4)	*P* > 0.05
		46/46	24 months	Mean 3 (IQR 3–4)	Mean 4 (IQR 3–4)	*P* > 0.05
		45/47	60 months	Mean 3 (IQR 2–4)	Mean 3 (IQR 2–4)	*P* > 0.05
Katz et al, 2013 (10)	WOMAC: physical function subscale	161/169	6 months	Mean absolute change from baseline 20.9 (95% CI17.9 to 23.9)	Mean absolute change from baseline 18.5 (95% CI 15.6 to 21.5)	2.4 (95% CI −1.8 to 6.5)
		161/169	12 months	Mean absolute change from baseline 23.5 (95% CI 20.5 to 26.5)	Mean absolute change from baseline 22.8 (95% CI 19.8 to 25.8)	0.7 (95% CI −3.5 to 4.9)
	SF-36: physical activity subscale	161/169	6 months	Mean absolute change from baseline 24.2 (95% CI 20.3 to 28.0)	Mean absolute change from baseline 23.1 (95% CI 19.2 to 27.0)	1.1 (95% CI −4.4 to 6.6)
		161/169	12 months	Mean absolute change from baseline 25.0 (95% CI 20.9 to 29.1)	Mean absolute change from baseline 28.1 (95% CI 24.0 to 32.1)	−3.0 (95% CI −8.8 to 2.7)
Kirkley et al, 2008 (11)	WOMAC: physical function subscale	90/80	3 months	Mean 522 ± SD 341	Mean 568 ± SD 369	NR
		90/73	6 months	Mean 551 ± SD 382	Mean 520 ± SD 368	NR
		80/77	12 months	Mean 570 ± SD 417	Mean 513 ± SD 370	NR
		78/70	18 months	Mean 578 ± SD 427	Mean 537 ± SD 385	NR
		88/80	24 months	Mean 612 ± SD 448	Mean 623 ± SD 439	*P* = 0.26
	SF-36: physical activity subscale	90/80	3 months	Mean 38.7 ± SD 9.0	Mean 37.7 ± SD 10.2	NR
		90/73	6 months	Mean 38.7 ± SD 9.3	Mean 38.1 ± SD 10.2	NR
		80/77	12 months	Mean 38.3 ± SD 10.7	Mean 37.7 ± SD 10.0	NR
		78/70	18 months	Mean 37.7 ± SD 11.9	Mean 38.4 ± SD 10.4	NR
		88/80	24 months	Mean 37.0 ± SD 11.4	Mean 37.2 ± SD 10.6	*P* = 0.93

Author, Year	Pain Measure[a]	N (Intervention/ Control)	Follow-up	Intervention Group	Control Group	Between–Study Group Differences
	ASES: functional status subscale	90/80	3 months	Mean 80.7 ± SD 18.2	Mean 81.9 ± SD 19.6	NR
		90/73	6 months	Mean 83.8 ± SD 14.7	Mean 83.2 ± SD 16.1	NR
		80/77	12 months	Mean 81.4 ± SD 19.1	Mean 84.4 ± SD 15.8	NR
		78/70	18 months	Mean 82.0 ± SD 18.5	Mean 83.2 ± SD 18.5	NR
		88/80	24 months	Mean 83.5 ± SD 17.0	Mean 80.19 ± SD 18.4	*P* = 0.20
	MACTAR	90/80	3 months	Mean 257 ± SD 108	Mean 249 ± SD 109	NR
		90/73	6 months	Mean 234 ± SD 118	Mean 246 ± SD 115	NR
		80/77	12 months	Mean 232 ± SD 128	Mean 225 ± SD 117	NR
		78/70	18 months	Mean 251 ± SD 141	Mean 221 ± SD 115	NR
		88/80	24 months	Mean 238 ± SD 146	Mean 244 ± SD 133	*P* = 0.58
Yim et al, 2013 (14)	Lysholm Knee Score	50/52	3 months	Mean 85.2 (NR)	Mean 80.4 (NR)	*P* = 0.031[b]
		50/52	6 months	Mean 84.1 (NR)	Mean 82.3 (NR)	NR
		50/52	1 year	Mean 83.5 (NR)	Mean 84.1 (NR)	NR
		50/52	2 years	Mean 83.2 (range 52–100)	Mean 84.3 (range 58–100)	*P* = 0.237

Abbreviations: AIMS2, Arthritis Impact Measurement Scale; ASES, Arthritis Self-Efficacy Subscale; CI, confidence interval; IQR, interquartile range; KOOS, Knee Injury and Osteoarthritis Outcome Score; MACTAR, McMaster–Toronto Arthritis Patient Preference Disability Questionnaire; NR, not reported; SD, standard deviation; SF-36, Short Form 36 health survey; WOMAC, Western Ontario and McMaster Universities Osteoarthritis Index; WOMET, Western Ontario Meniscal Evaluation Tool.

[a]Measurement tools are briefly described in Table 5.

[b]Statistically significant difference between groups.

Appendix 3: Evidence Quality Assessment

Table A5: AMSTAR Score of Identified Systematic Reviews

Author, Year	AMSTAR Score[a]	(1) Provided Study Design	(2) Duplicate Study Selection	(3) Broad Literature Search	(4) Considered Status of Publication	(5) Listed Excluded Studies	(6) Provided Characteristics of Studies	(7) Assessed Scientific Quality	(8) Considered Quality in Report	(9) Methods to Combine Appropriate	(10) Assessed Publication Bias	(11) Stated Conflict of Interest
Laupattarakasem et al, 2009 (18)	10	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	No	Yes
McLeod et al, 2012 (19)	8	Yes	No	Yes	Yes	No	Yes	Yes	Yes	Yes	Yes	No
Petty and Lubowitz, 2011 (20)	7	Yes	No	Yes	Yes	No	Yes	Yes	Yes	Yes	No	No
Salata et al, 2010 (21)	6	Yes	No	Yes	Yes	No	Yes	Yes	No	N/A	No	Yes
Siparskey et al, 2007 (22)	6	Yes	Yes	Yes	No	No	No	Yes	Yes	N/A	No	Yes
Spahn et al, 2013 (23)	6	Yes	Yes	Yes	Yes	No	Yes	Yes	No	No	No	No

Abbreviations: AMSTAR, Assessment of Multiple Systematic Reviews; N/A, not applicable.

[a]Maximum possible score is 11. Details of AMSTAR score are described in Shea et al. (24)

Table A6: GRADE Evidence Profile for Arthroscopic Debridement With or Without Meniscectomy

Type of Studies No. (Design)	Risk of Bias[a]	Inconsistency	Indirectness	Imprecision	Publication Bias	Upgrade Considerations	Quality
Outcome: Pain							
Studies with placebo controls 2 (RCTs)	No serious limitations	No serious limitations	No serious limitations	Serious limitations (−1)[b]	Undetected	None	⊕⊕⊕ Moderate
Studies with usual care controls 5 (RCTs)	Very serious limitations (−2)	No serious limitations	No serious limitations[c]	No serious limitations[d]	Undetected	None	⊕⊕ Low
Outcome: Function							
Studies with placebo controls 2 (RCTs)	No serious limitations	No serious limitations	No serious limitations	Serious limitations (−1)[b]	Undetected	None	⊕⊕⊕ Moderate
Studies with usual care controls 4 (RCTs)	Very serious limitations (−2)	No serious limitations	No serious limitations[c]	No serious limitations[d]	Undetected	None	⊕⊕ Low

Abbreviations: GRADE, Grading of Recommendations Assessment, Development, and Evaluation; RCT, randomized controlled trial.

[a]Risk of bias assessment details provided in Table A7.

[b]Confidence intervals of outcomes reported in 1 of the studies included minimally important differences, possibly because study was underpowered according to the study's own power calculations. (8)

[c]While reported outcomes varied, they were largely validated measures for the outcomes of interest.

[d]Two of the 5 studies that reported pain and 3 of the 4 that reported function did not meet their own sample size for appropriate power to determine status outcomes. However, the combined studies surpass the generally accepted minimal optimal information size for continuous outcomes. Where data were available, minimal clinically important differences appear to be outside the narrow confidence intervals around the effect estimate of individual measures.

Table A7: Risk of Bias Among Randomized Controlled Trials for Arthroscopic Debridement

Author, Year	Allocation Concealment	Blinding	Complete Accounting of Patients and Outcome Events	Selective Reporting Bias	Other Limitations
Studies with placebo surgery controls					
Moseley et al, 2002 (8)	No limitations	No limitations	No limitations[a]	No limitations	No limitations
Sihvonen et al, 2013 (13, 16)	No limitations	No limitations	No limitations	No limitations	No limitations
Studies with usual care controls					
Herrlin et al, 2013 (9) 2007 (15)	Limitations[b]	Serious limitations[c]	Limitations[d]	No limitations	No limitations
Katz et al, 2013 (10)	No limitations	Limitations[e]	No limitations	No limitations	No limitations
Kirkley et al, 2008 (11)	No limitations	Limitations[e]	No limitations	No limitations	No limitations
Østerås et al, 2012 (12)	No limitations	Serious limitations[f]	No limitations	No limitations	No limitations
Yim et al, 2013 (14)	No limitations	Limitations[e]	Limitations[d]	No limitations	No limitations

[a]Some loss to follow-up, but it was limited and balanced between both study arms.
[b]Allocation method was not described.
[c]Patients could not be blinded to study group, and no blinding of assessor was reported.
[d]Intention-to-treat analyses accounting for patients lost to follow-up or cross-over study arms were not conducted.
[e]Assessor was blinded to study group; however, patients could not be blinded and outcomes were subjective.
[f]Neither assessors nor patients were blinded to study group, and study author, who was the surgeon providing treatment, conducted assessments.

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