AAOS
American Academy of Orthopaedic Surgeons

Acute Isolated Meniscal Pathology

Evidence-Based Clinical Practice Guideline

Adopted by:
The American Academy of Orthopaedic Surgeons Board of Directors
June 10, 2024

Endorsed by:

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Disclaimer

This clinical practice guideline (CPG) was developed by a physician volunteer clinical practice guideline development group based on a formal systematic review of the available scientific and clinical information and accepted approaches to treatment and/or diagnosis. This clinical practice guideline is not intended to be a fixed protocol, as some patients may require more or less treatment or different means of diagnosis. Clinical patients may not necessarily be the same as those found in a clinical trial. Patient care and treatment should always be based on a clinician's independent medical judgment, given the individual patient's specific clinical circumstances.

Disclosure Requirement

In accordance with AAOS policy, all individuals whose names appear as authors or contributors to the clinical practice guideline filed a disclosure statement as part of the submission process. All panel members provided full disclosure of potential conflicts of interest prior to voting on the recommendations contained within this clinical practice guideline.

Funding Source

This clinical practice guideline was funded exclusively by the American Academy of Orthopaedic Surgeons who received no funding from outside commercial sources to support the development of this document.

FDA Clearance

Some drugs or medical devices referenced or described in this clinical practice guideline may not have been cleared by the Food and Drug Administration (FDA) or may have been cleared for a specific use only. The FDA has stated that it is the responsibility of the physician to determine the FDA clearance status of each drug or device he or she wishes to use in clinical practice.

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SUMMARY OF RECOMMENDATIONS

Recommendations are formed when there is sufficient evidence by which to create a directional statement. This is defined as evidence from two or more high quality studies (i.e., a strong recommendation), two or more moderate quality studies (i.e., a moderate recommendation), or statements resulting in a strong or moderate strength following Evidence to Decision Framework upgrading and/or downgrading.

Physical Examination

Physical examination, including joint line tenderness, the McMurray test, and the Thesally test, can effectively diagnose acute meniscal tears and may yield more accurate results when combined.

Quality of Evidence: High

Strength of Recommendation: Moderate★★★☆ *(downgraded)*

Evidence from two or more "Moderate" quality studies with consistent findings, or evidence from a single "High" quality study for recommending for or against the intervention. Also requires no or only minor concerns addressed in the EtD framework.

Advanced Imaging

MRI is the preferred imaging modality to diagnose acute meniscal tears because of its high accuracy, while CT arthrography or ultrasound can be used, particularly when MRI is not available or is contraindicated.

Quality of Evidence: High

Strength of Recommendation: Strong ★★★★

Evidence from two or more "High" quality studies with consistent findings for recommending for or against the intervention. Also requires no reasons to downgrade from the EtD framework.

Joint Degeneration

When indicated in the treatment of acute meniscal tear, surgery should preserve as much functional meniscal tissue as possible to mitigate patient risk for osteoarthritis.

Quality of Evidence: Moderate

Strength of Recommendation: Moderate★★★☆

Evidence from two or more "Moderate" quality studies with consistent findings, or evidence from a single "High" quality study for recommending for or against the intervention. Also requires no or only minor concerns addressed in the EtD framework.

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SUMMARY OF OPTIONS

Options are formed when there is little or no evidence on a topic. This is defined as low quality evidence or a single moderate quality study (i.e., a limited strength option), no evidence or only conflicting evidence (i.e., a consensus option), or statements resulting in a limited or consensus strength following Evidence to Decision Framework upgrading and/or downgrading.

Surgical Intervention After Non-Operative Treatment

Patients with acute meniscal tear who have failed conservative treatment may have better outcomes from surgical intervention within 6 months of injury.

Quality of Evidence: Low

Strength of Option: Limited ★★☆☆

Evidence from two or more "Low" quality studies with consistent findings or evidence from a single "Moderate" quality study recommending for or against the intervention. Also, higher strength evidence can be downgraded to limited due to major concerns addressed in the EtD Framework.

Meniscus Repair

Meniscus repair can improve patient outcomes compared to partial meniscectomy in acute isolated meniscal tears with healing potential.

Quality of Evidence: Low

Strength of Option: Limited ★★☆☆

Evidence from two or more "Low" quality studies with consistent findings or evidence from a single "Moderate" quality study recommending for or against the intervention. Also, higher strength evidence can be downgraded to limited due to major concerns addressed in the EtD Framework.

Biological Enhancement

Bone Marrow Venting or Platelet Rich Plasma can be considered in patients with acute isolated meniscal tears undergoing surgical repair to improve outcomes.

Quality of Evidence: Moderate

Strength of Option: Limited ★★☆☆ (*downgraded)*

Evidence from two or more "Low" quality studies with consistent findings or evidence from a single "Moderate" quality study recommending for or against the intervention. Also, higher strength evidence can be downgraded to limited due to major concerns addressed in the EtD Framework.

Indications for Acute Surgical Intervention

1. In the absence of sufficient evidence, it is the opinion of the workgroup that patients with a displaced or displacing acute meniscal tear, particularly those restricting knee range of motion, can benefit from acute surgical intervention.

2. In the absence of sufficient evidence, it is the opinion of the workgroup that patients with a symptomatic acute meniscal tear who could benefit from a repair should be considered for early surgical intervention.

Quality of Evidence: Very Low
Strength of Option: Consensus ★☆☆☆
Evidence from one "Low" quality study. Also, higher strength evidence can be downgraded to consensus due to major concerns addressed in the EtD Framework. In the absence of sufficient evidence, the guideline work group is making a recommendation based on their clinical opinion.

Physical Therapy

In the absence of sufficient evidence, it is the opinion of the workgroup that physical therapy/rehabilitation may benefit patients with an acute isolated meniscal tear undergoing non-operative treatment or recovering from meniscal surgery.

Quality of Evidence: Very Low
Strength of Option: Consensus ★☆☆☆
Evidence from one "Low" quality study. Also, higher strength evidence can be downgraded to consensus due to major concerns addressed in the EtD Framework. In the absence of sufficient evidence, the guideline work group is making a recommendation based on their clinical opinion.

Surgical Repair Technique

It is the opinion of the workgroup that, when performing repair of acute isolated meniscal tears, surgeons may favor the inside out technique to reduce the risk of repair failure in certain tear patterns or all inside techniques to reduce the risk of other complications.

Quality of Evidence: Very Low
Strength of Option: Consensus ★☆☆☆
There is no supporting evidence, or limited level evidence was downgraded due to major concerns addressed in the EtD framework. In the absence of sufficient evidence, the guideline work group is making a recommendation based on their clinical opinion.

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INTRODUCTION

OVERVIEW

This clinical practice guideline is based on a systematic review of published studies examining the management of acute meniscal tears. It provides recommendations that will help practitioners to integrate the current evidence and clinical practice, and it highlights gaps in the literature in need of future research. This guideline is intended to be used by appropriately trained physicians and clinicians who manage the treatment of acute meniscal tears. It also serves as an information resource for developers and applied users of clinical practice guidelines.

GOALS AND RATIONALE

The purpose of this clinical practice guideline is to evaluate the current best evidence associated with treatment. Evidence-based medicine (EBM) standards advocate for use of empirical evidence by physicians in their clinical decision making. To assist with access to the large resources of information, a systematic review of the literature in publication between 1965 and August 2, 2023 was conducted. It highlights where there is good evidence, where evidence is lacking, and what topics future research will need to target in order to help facilitate evidence-based decision making in the treatment of patients with acute meniscal tears. AAOS staff methodologists assisted the physician/clinician work group in evaluating the existing literature so that they could formulate the following recommendations based on a rigorous systematic process. Musculoskeletal care is provided in many different settings and by a variety of providers. We created this guideline as an educational tool to guide qualified physicians and clinicians in making treatment decisions that improve the quality and efficacy of care. This guideline should not be construed as including all possible methods of care or excluding acceptable interventions similarly directed at obtaining favorable outcomes. The final decision to use a specific procedure must be made after assessing all concerns presented by the patient and consideration of locality-specific resources.

INTENDED USERS

This guideline is intended to be used by orthopaedic surgeons and other healthcare providers managing patients with acute meniscal tears. It serves as an information resource for medical practitioners. In general, individual practicing physicians and clinicians do not have the resources required to complete a project of comparable scope and duration involving the evaluation of an extensive literature base. In April 2019, the AAOS adopted the use of the GRADE Evidence-to-Decision Framework into its clinical practice guideline development methodology. This Framework enables work group members to incorporate additional factors into the strength of each recommendation and move away from the rigidity of previous AAOS recommendation language stems. The AAOS intends for this guideline to assist treatment providers not only in making shared clinical decisions with their patients, but also in describing to patients and their loved ones why a selected intervention represents the best available course of treatment. This guideline is not intended for use as a benefits determination document. It does not cover allocation of resources, business and ethical considerations, and other factors needed to determine the material value of orthopaedic care. Users of this guideline may also want to consider the appropriate use criteria (AUC) related to the treatment of acute meniscal tears.

PATIENT POPULATION

This guideline is intended for use with individuals who are suspected of or have been diagnosed by a trained healthcare provider with an acute isolated meniscal tear. This is not intended for use with patients who have concomitant ligamentous pathology such as anterior cruciate ligament tears or for patients with suspected chronic or degenerative meniscal tears.

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SCOPE

The scope of this guideline includes the diagnosis and management of patients with isolated acute meniscal injury. It does not provide guidelines for chronic or degenerative meniscus tears, re-tears, meniscal root tears or meniscal injuries that occur with concomitant knee injuries such as ACL tears, intra-articular fractures or chondral/osteochondral pathology.

ETIOLOGY

Acute meniscal tears often result from an injury with rotation and flexion of the knee or direct impact although the severity of injury can vary widely and may not be a distinct, identifiable event. They can occur through a variety of mechanisms such as sports or with activities of daily living.

INCIDENCE AND PREVALENCE

Acute meniscal pathology can afflict patients of all ages with a predominance in the young active population.[1,2] The incidence of meniscus tears in the general population of the United States treated with partial meniscectomy has been reported as 0.61 per 1000 person-years and has been shown to be much higher in active-duty US military service members at 8.27 (95% CI = 8.22, 8.32) per 1000 person-years.[3] Meniscus tears have been reported to occur at a rate of 0.51 per 10,000 athlete exposures (AEs) in high school athletes.[4] Another study reported the rate of meniscal injuries in high school and collegiate athletes as 0.53 per 10,000 AEs for female athletes and 0.68 per 10,000 AEs for male athletes.[5] Meniscal tears are reported to affect 12% of the adult population.[6]

BURDEN OF DISEASE

The true burden of disease from isolated, acute meniscus tears is difficult to measure given the challenges with determining chronicity of meniscal pathology. From 2004 to 2012, the rate of meniscus repair increased by 37% from 1.6 to 2.2 cases per surgeon in the American Board of Orthopaedic Surgery Database, however, these results are not strictly limited to acute meniscus tears.[7] A study of insurance claims reported a 14% increase in the incidence of partial meniscectomy and 100% increase in the incidence of meniscal repair between 2005 and 2011.[2]

Meniscal pathology has been shown to be a significant risk factor for the development of progressive joint degeneration and the development of arthritis. In a longitudinal study in knees without surgery, meniscal pathology was associated with a 3.0-7.9 increased odds of having developed radiographic osteoarthritis at 30 month follow-up.[8].

EMOTIONAL AND PHYSICAL IMPACT

Meniscal injury can have significant physical and emotional impact on patients leading to time off from work or time out of sports. Return to play after meniscus surgery has been reported from 65%-100% at 4-7 months post-surgery and can vary based on type of sport.[9] Increasing year-round sport participation and early specialization especially among youth athletes may lead to increased injury risk and increased rate of meniscal pathology. Although there is not specific data for acute meniscus pathology, time off from work has been reported at approximately 55 days for meniscus repair and 37 days for partial meniscectomy.[10]

POTENTIAL BENEFITS, HARM, AND CONTRAINDICATIONS

Individuals with acute meniscus tears of the knee often complain of swelling, pain, decreased range of motion, limited function or inability to return to sport. The goal of treatment is to provide relief from pain, improvement in function, and return to sports and other activities. Meniscal injury and deficiency have been associated with the development of knee osteoarthritis so treatment focuses on preserving as much healthy meniscus as possible by only resecting injured or unstable meniscal tissue and repairing when possible.[8] Contraindications vary by the type and location of meniscal injury and surgical procedure. Treatment of acute meniscal pathology is associated with a high

rate of improvement in function and return to sports or other activities. Surgery is associated with risks including infection, thromboembolism (DVT/PE), nerve damage, persistent or recurrent pain or swelling, and re-tear of the meniscus especially in the setting of meniscus repair.

METHODS

The methods used to perform this systematic review were employed to minimize bias and enhance transparency in the selection, appraisal, and analysis of the available evidence. These processes are vital to the development of reliable, transparent, and accurate clinical recommendations. To view the full AAOS clinical practice guideline methodology please visit https://www.aaos.org/quality/research-resources/methodology/ .

This clinical practice guideline evaluates the management of acute meniscal tear patient outcomes. The AAOS approach incorporates practicing physicians (clinical experts) and methodologists who are free of potential conflicts of interest relevant to the topic under study, as recommended by clinical practice guideline development experts.[1]

This clinical practice guideline was prepared by the AAOS Acute Meniscal Pathology Guideline physician development group (clinical experts) with the assistance of the AAOS Clinical Quality and Value (CQV) Department (methodologists). To develop this clinical practice guideline, the clinical practice guideline development group held an introductory meeting on October 30, 2022 to establish the scope of the clinical practice guideline. As the physician experts, the clinical practice guideline development group defined the scope of the clinical practice guideline by creating PICO Questions (i.e. population, intervention, comparison, and outcome) that directed the literature search. The AAOS Medical Librarian created and executed the search (see Appendix I for search strategy).

LITERATURE SEARCHES

The systematic review begins with a comprehensive search of the literature. Articles considered were published prior to the start date of the search in a minimum of three electronic databases; PubMed, EMBASE, and the Cochrane Central Register of Controlled Trials. The medical librarian conducts the search using key terms determined from the guideline development group's PICO questions.

A CQV methodologist will review/include only primary literature but will supplement the electronic search with a manual search of the bibliographies of secondary literature sources, such as systematic reviews, as available. The methodologist will then evaluate all recalled articles for possible inclusion based on the study selection criteria and will summarize the evidence for the guideline work group who assist with reconciling possible errors and omissions.

A study attrition diagram is provided in the appendix of each document that details the numbers of identified abstracts, recalled and selected studies, and excluded studies that were evaluated in the CPG. The search strategies used to identify the abstracts is also included in the appendix of each CPG document.

DEFINING THE QUALITY OF EVIDENCE

The quality of evidence for a recommendation is determined by the quality and quantity of included literature for the statement. Statements with evidence from two or more "High" quality studies are considered to have "High Quality Evidence". Statements with evidence from two or more "Moderate" quality studies, or evidence from a single "High" quality study are considered to have "Moderate Quality Evidence". Statements with evidence from two or more "Low" quality studies or evidence from

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a single “Moderate” quality study are considered to have “Low Quality Evidence”. Statements with evidence from one “Low” quality study or no supporting evidence are considered to have “Very Low Quality Evidence” or “Consensus” respectively.

DEFINING THE STRENGTH OF RECOMMENDATION

Judging the quality of evidence is only a steppingstone towards arriving at the strength of a CPG recommendation. The strength of recommendation also takes into account the quality, quantity, and the trade-off between the benefits and harms of a treatment, the magnitude of a treatment’s effect, and whether data exists on critical outcomes.

Strength of recommendation expresses the degree of confidence one can have in a recommendation. As such, the strength expresses how possible it is that a recommendation will be overturned by future evidence. It is very difficult for future evidence to overturn a recommendation that is based on many high quality randomized controlled trials that show a large effect. It is much more likely that future evidence will overturn recommendations derived from a few small retrospective comparative studies. Consequently, recommendations based on the former kind of evidence are given a “strong” strength of recommendation and statements based on the latter kind of evidence are presented as “Options” to the practicing clinician, rather than a directional recommendation, with either a “limited” strength or, in the event of no supporting or only conflicting evidence, a “consensus” strength. For any “consensus” strength option, the decision to include a statement in the CPG is at the discretion of the guideline development group.

VOTING ON THE RECOMMENDATIONS

The recommendations and their strength were voted on by the guideline development group members during the final meeting. If disagreement between the guideline development group occurred, there was further discussion to see whether the disagreement(s) could be resolved. Recommendations were approved and adopted in instances where a simple majority (60%) of the guideline development group voted to approve; however, the guideline development group had consensus (100% approval) when voting on every recommendation for this guideline. Any recommendation strength upgrade or downgrade based on the Evidence-to-Decision Framework requires a super majority (75%) approval of the work group.

UNDERSTANDING THE QUALITY OF EVIDENCE AND STRENGTH OF STATEMENT

Table I. Strength and Quality Descriptions

Statement Strength	Evidence Quality	Statement Description	Strength Visual
Strong	High*	Evidence from two or more "High" quality studies with consistent findings recommending for or against the intervention. Or Rec is upgraded using the EtD framework.	
Moderate	Moderate*	Evidence from two or more "Moderate" quality studies with consistent findings or evidence from a single "High" quality study recommending for or against the intervention. Or Rec is upgraded or downgraded using the EtD framework.	
Limited	Low*	Evidence from two or more "Low" quality studies with consistent findings or evidence from a single "Moderate" quality study recommending for or against the intervention. Or Rec is downgraded using the EtD framework.	
Consensus*	Very Low, or Consensus*	Evidence from one "Low" quality study, no supporting evidence, or Rec is downgraded using the EtD framework. In the absence of sufficient evidence, the guideline work group is making a statement based on their clinical opinion.	

*Unless statement was upgraded or downgraded in strength, using the EtD Framework.

Table II. Interpreting the Strength of a Recommendation or Option

Strength of Statement	Patient Counseling (Time)	Decision Aids	Impact of Future Research
Strong	Least	Least Important, unless the evidence supports no difference between two alternative interventions	Not likely to change
Moderate	Less	Less Important	Less likely to change
Limited	More	Important	Change possible/anticipated
Consensus	Most	Most Important	Impact unknown

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REVIEW PERIOD

Following the final meeting, the CPG draft undergoes a 3-week review period for additional input from external content experts. Written comments are provided on the structured review form. All reviewers are required to disclose their conflicts of interest.

Specialty societies relevant to the topic are solicited for nominations of individual reviewers approximately six weeks before the final meeting. The review period is announced as it approaches, and others interested are able to volunteer to review the draft. The chairs of the guideline work group review the draft of the guideline prior to dissemination.

Some specialty societies (both orthopaedic and non-orthopaedic) ask their evidence-based practice (EBP) committee to provide review of the guideline. The organization is responsible for coordinating the distribution of our materials and consolidating their comments onto one form. The chair of the external EBP committees provides disclosure of their conflicts of interest (COI) and manages the potential conflicts of their members.

Again, the AAOS asks for comments to be assembled into a single response form by the specialty society and for the individual submitting the review to provide disclosure of potentially conflicting interests. The review stage gives external stakeholders an opportunity to provide evidence-based direction for modifications that they believe have been overlooked. Since the draft is subject to revisions until its approval by the AAOS Board of Directors as the final step in the guideline development process, confidentiality of all working drafts is essential.

The CPG is also provided to members of the AAOS Board of Directors (BOD), members of the Research and Quality Council (RQC), members of the Board of Councilors (BOC), and members of the Board of Specialty Societies (BOS) and members of the Committee on Evidence-Based Quality and Value (EBQV) for review and comment. The CPG is automatically forwarded to the AAOS BOD, RQC, and EBQV so that they may review it and provide comment prior to being asked to approve the document. Based on these bodies, over 200 commentators have the opportunity to provide input into each CPG.

The chairs of the guideline work group, the manager of the AAOS CQV unit, and the Director of AAOS CQV draft the initial responses to comments that address methodology. These responses are then reviewed by the chair and co-chair, who respond to questions concerning clinical practice and techniques. All comments received and the initial drafts of the responses are also reviewed by all members of the guideline development group. All proposed changes to recommendation language as a result of the review period are based on the evidence. Final revisions are summarized in a report that is provided alongside the guideline document throughout the remainder of the approval processes and final publication.

The AAOS believes in the importance of demonstrating responsiveness to input received during the review process and welcomes the critiques of external specialty societies. Following final approval of the guideline, all individual responses are posted on our website http://www.aaos.org/quality with a point-by-point reply to each non-editorial comment. Reviewers who wish to remain anonymous notify the AAOS to have their names de-identified; their comments, our responses, and their COI disclosures are still posted.

THE AAOS CPG APPROVAL PROCESS

This final clinical practice guideline draft must be approved by the AAOS Committee on Evidence Based Quality and Value, and subsequently the AAOS Research and Quality Council, and the AAOS Board of Directors. These decision-making bodies are described in the AMP CPG eAppendix. Their charge is to approve or reject its publication by majority vote.

REVISION PLANS

This clinical practice guideline represents a cross-sectional view of current treatment and may become outdated as new evidence becomes available. This clinical practice guideline will be revised in accordance with new evidence, changing practice, rapidly emerging treatment options, and new technology. This clinical practice guideline will be updated or withdrawn in five years.

CPG DISSEMINATION PLANS

The primary purpose of the present document is to provide interested readers with full documentation of the best available evidence for various procedures associated with the topic of this review. Publication of most clinical practice guidelines is announced by an Academy press release, articles authored by the clinical practice guideline development group and published in the Journal of the American Academy of Orthopaedic Surgeons, and articles published in AAOS *Now*. Most clinical practice guidelines are also distributed at the AAOS Annual Meeting in the Resource Center. he final guideline recommendations and their supporting rationales will be hosted on www.OrthoGuidelines.org. Selected clinical practice guidelines are disseminated by webinar, the AAOS Learning Management System (LMS), Media Briefings, and by distributing them at relevant Continuing Medical Education (CME) courses and at the AAOS Resource Center.

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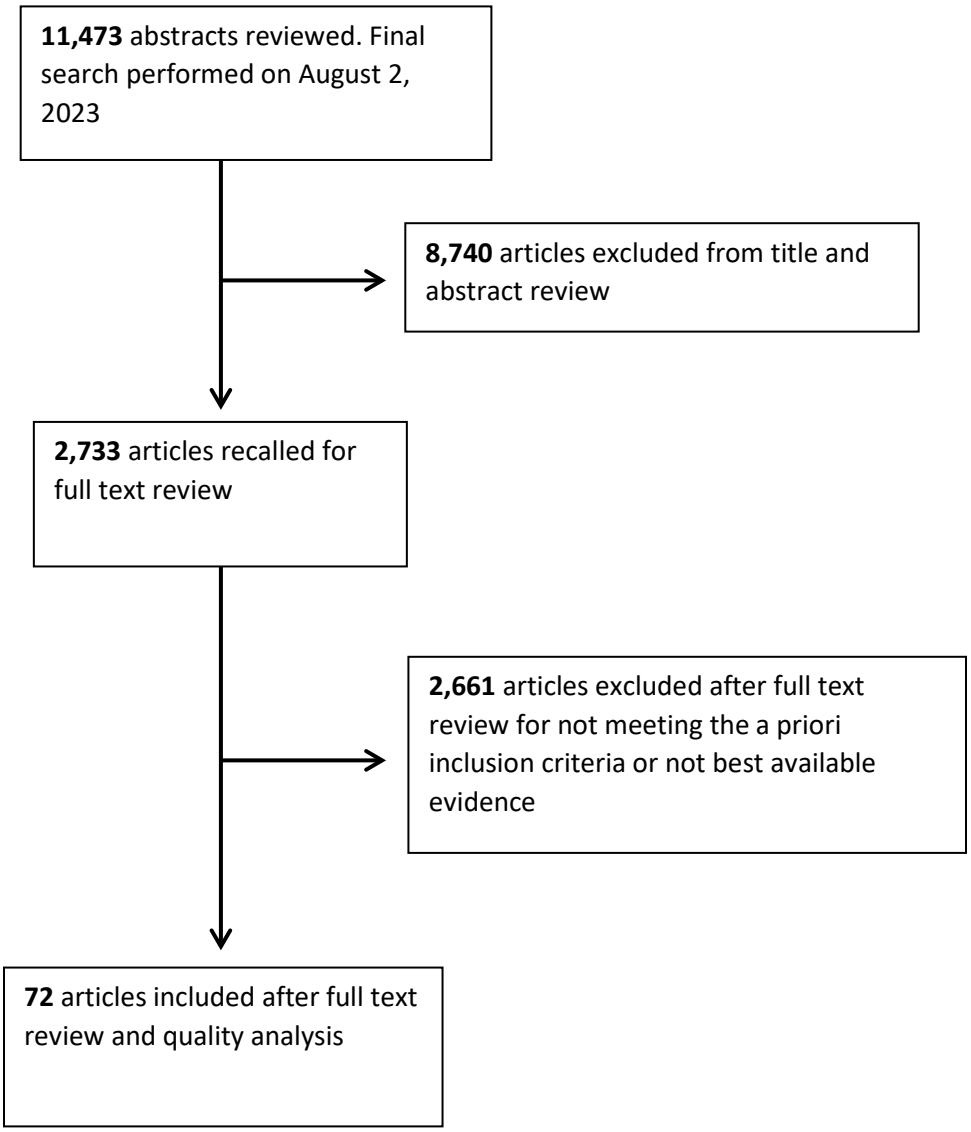
Study Attrition Flowchart



RECOMMENDATIONS

Recommendations are formed when there is sufficient evidence by which to create a directional statement. This is defined as evidence from two or more high quality studies (i.e. a strong recommendation), two or more moderate quality studies (i.e. a moderate recommendation), or statements resulting in a strong or moderate strength following Evidence to Decision Framework upgrading and/or downgrading.

Physical Examination

Physical examination, including joint line tenderness, the McMurray test, and the Thesally test, can effectively diagnose acute meniscal tears and may yield more accurate results when combined.

Quality of Evidence: High

Strength of Recommendation: Moderate ★★★☆ *(downgraded)*

Evidence from two or more "Moderate" quality studies with consistent findings, or evidence from a single "High" quality study for recommending for or against the intervention. Also requires no or only minor concerns addressed in the EtD framework.

Rationale

Due to the relatively low number of high-quality studies and the inconsistent findings between the studies, the strength of the recommendation has been downgraded one level to moderate.

There were four high quality (Goossens, 2015; Porter, 2021; Shantanu, 2021; Syal, 2015) and eight moderate quality (Dhillon, 1985; Imran, 2019; Konan, 2009; Madhusudhan, 2008; Muellner, 1997; Mohan, 2007; Orlando Junior, 2015; Yaseen, 2019) studies that assessed the effectiveness of physical examination in the diagnosis of meniscus tears.

Physical examination is important in the assessment of patients with suspected meniscal injury. Various tests have been described including joint line tenderness, presence of effusion, range of motion, and meniscal provocative maneuvers such as the McMurray, Apley and Thessaly tests.

Goossens et al. studied the Thessaly test alone or when combined with the McMurray test and found similar sensitivity and specificity for the Thessaly test when performed in isolation (64% and 53%, respectively) and when the Thessaly and McMurray tests were performed together (53% and 62%, respectively). Syal et. al. compared a combination of tests including joint line tenderness, McMurray's and Apley's tests, with arthroscopic findings to evaluate for isolated meniscal injury and demonstrated a sensitivity and specificity of 75% and 94% respectively for medial meniscus tears and 38% and 100% respectively for lateral meniscus tears. Porter et. al. compared clinical assessment (joint-line tenderness, McMurray's, and presence of effusion) and showed that clinical assessment was more accurate than MRI for diagnosing lateral meniscus tears ($P<0.001$) and similar to MRI for diagnosing medial meniscus tears ($P=0.12$), with arthroscopy being used as the reference standard.

The original publication of the Thessaly test by Karachalios et. al. showed a diagnostic accuracy of 94% and 96% respectively for the diagnosis of medial and lateral meniscus tears, which was higher than joint line tenderness,

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the McMurray test and the Apley test. This study was not included in the articles used to determine the recommendation as it did not meet clinical practice guideline inclusion criteria.

Benefits/Harms of Implementation

Physical examination will assist clinicians with assessing for the presence of meniscus tears and other knee injuries. There are no known risks from a comprehensive physical examination.

Outcome Importance

The four high quality and eight moderate quality studies demonstrate the importance of physical examination in the diagnosis of meniscus tears, although there is variability in the diagnostic accuracy of individual tests.

Cost Effectiveness/Resource Utilization

A comprehensive physical exam is a low-cost method for assessing patients for meniscus tears.

Acceptability

Physical examination should have high acceptability as it is routinely performed.

Feasibility

Physical examination is a feasible and expected component to evaluating patients for meniscal injury.

Future Research

Future research could determine the most useful and accurate examination maneuver or combination of examination maneuvers for diagnosing patients with meniscal injury.

Additional References

1. Karachalios, T. Diagnostic accuracy of a new clinical test (the Thessaly test) for early detection of meniscal tears. J Bone Joint Surg Am. 2005;87(5):955-62. PMID: 15866956.

Advanced Imaging

MRI is the preferred imaging modality to diagnose acute meniscal tears because of its high accuracy, while CT arthrography or ultrasound can be used, particularly when MRI is not available or is contraindicated.

Quality of Evidence: High

Strength of Recommendation: Strong ★★★★

Evidence from two or more "High" quality studies with consistent findings for recommending for or against the intervention. Also requires no reasons to downgrade from the EtD framework.

Rationale

Nineteen high quality (Ahmadi, 2022; Alizadeh, 2013; DeSmet, 1994; Grevitt, 1992; Grevitt, 1993; Junik, 1986; Lohman, 1991; Murray, 1990; Nazem, 2006; Nederveen, 1989; Porter, 2021; Rand, 1999; Raunest, 1991; Reicher, 1987; Rubin, 1994; Shantanu, 2021; Shetty, 2008; Syal, 2015; Wareluk, 2012) and twenty-two moderate quality (Abd Elkhalek, 2019; Abdon, 1989; Araki, 1992; Dhillon, 1985; Elshimy, 2021; Evancho, 1990; Gokalp, 2012; Habib, 2023; Mackenzie, 1995; Madhusudhan, 2008; Matava, 1999; McNally, 2002; Muellner, 1997; Nalaini, 2022; Nemec, 2008; Orlando Junior, 2015; Reicher, 1986; Roper, 1986; Schafer, 2006; Tahmasebi, 2005; Vande Berg, 2000; Van Heuzen, 1988) studies evaluated advanced imaging modalities as diagnostic tests for acute meniscal tears. A meta-analysis was performed using findings of acute meniscal pathology on an MRI compared to arthroscopic findings demonstrated acceptable sensitive and specificity of an MRI in the identification of acute meniscal pathology (sensitivity 0.93[0.71,0.99] and specificity 0.83 [0.45, 0.97])[13 High, Alizadeh, Grevitt, Shetty, De Smet, Nazem, Nederveen, Raunest, Reicher, Shantanu, Syal, Porter, Rand, Rubin; 17 Mod, Habib, Mackenzie, Matava, Nemec, Abd Elkhalek, Elshimy, Madhusudhan, McNally, Muellner, Tahmasebi, van Heuzen, Araki, Orlando Junior, Reicher, Evancho, Gokalp, Nailani, Schafer]. Similar findings were observed in both medial and lateral meniscal pathology with lateral meniscus having a higher specificity (0.94 [0.86,0.97] versus 0.78[0.66, 0.86]) and medial meniscus having a higher sensitivity (0.94[0.89, 0.97] versus 0.80 [0.70, 0.87]).

For patients in which an MRI is contra-indicated including, but not limited to, those with cardiac implants (ie pacemaker), spinal implants, some dental implants, infusions pumps, or cochlear implants, ultrasound [4 High, Ahmadi, Alizadeh, Shetty, Wareluk; 1 Mod, Elshimy] and computed tomography/SPECT [4 High, Junik, Grevit, Lohmann, Murray; 2 Mod. Tahmasebi, Vande Berg], or arthrography [3 Mod, van Heuzen, Abdon, Dhilllon] are acceptable options with added risk for an infection when an arthrogram is performed or radiation exposure.

Benefits/Harms of Implementation

Advantages of MRI to identify acute meniscal pathology is high accuracy compared with ultrasound and computed tomography and avoiding any radiation or intervention (arthrogram). Ultrasound also presented with limited harm with added benefit when applicable.

Computed tomography or a SPECT can afford potential harmful effects of radiation to the patient. Particular harm should be considered in those of childbearing age due to detrimental effects of radiation during pregnancy.

Despite the value of arthrography, there is added risk with injection, which include infection and pain as well as intolerance (ie allergic reaction) to contrast that should be noted.

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View data summaries via the CPG eAppendix 2

Outcome Importance

Value to identify acute meniscal pathology will aid in accurate and appropriate treatment.

Cost Effectiveness/Resource Utilization

Recent cost and accessibility of MRI has allowed for reasonable cost associated with this advanced modality compared to other forms of advanced imaging. More cost-effective treatment including ultrasound and CT scan are acceptable options.

Acceptability

MRI and other forms of advanced imaging are readily available and accessible to most modern medical communities. Ultrasound and CT scan may be more accessible in rural or underserved areas and are acceptable options.

Feasibility

Advanced imaging modalities are feasible, however, arthrography may be out of favor with routine assessment of acute meniscal pathology due to its invasiveness.

Future Research

Abundant high-quality studies are available on this topic. Future research may focus on value based imaging modalities and minimizing risks.

When indicated in the treatment of acute meniscal tear, surgery should preserve as much functional meniscal tissue as possible to mitigate patient risk for osteoarthritis.

Quality of Evidence: Moderate

Strength of Recommendation: Moderate 

Evidence from two or more "Moderate" quality studies with consistent findings, or evidence from a single "High" quality study for recommending for or against the intervention. Also requires no or only minor concerns addressed in the EtD framework.

Rationale

One high quality (Hede, 1986) and eleven low quality (Andersson-Molina, 2002; Cohen, 2012; Englund, 2003; Englund, 2004; Englund, 2009; Hulet, 2001; Rockborn, 1995; Roos, 1998; Roos, 2008; Stein, 2010,;Zhang, 2018) articles evaluating joint degeneration after meniscal tear were reviewed. Several studies indicate that meniscal tear is associated with a greater risk of degenerative changes in joint tissues indicative of knee osteoarthritis compared to uninjured knees/intact menisci (Englund, 2009). Additionally, meniscectomy is associated with a greater prevalence of degenerative changes compared to conservative treatment/no meniscectomy (Cohen, 2012; Englund, 2003; Roos, 1998; Hulet, 2001). While partial meniscectomy is associated with a lesser prevalence of degenerative changes compared to total (Andersson-Molina, 2002; Englund, 2004) and subtotal (Rockborn, 1995) meniscectomy, partial meniscectomy also results in a higher prevalence of degenerative changes compared to meniscal repair (Stein, 2010).

The primary limitation of this body of evidence is that the majority of studies were retrospective in nature. Surgical decision making should be based on the clinical scenario (e.g. the extent, type and location of the initial meniscal trauma), thus there are ethical implications that limit the ability to conduct randomized clinical trials in meniscus patients. Therefore, while there is a preponderance of evidence indicating that meniscal tears in general and surgical removal of a larger amount of meniscal tissue are associated with a greater risk of joint degeneration, the supporting evidence is inherently limited by the nature of the investigations. Additionally, these studies generally did not distinguish the potential influences of the location, type, or extent of the meniscal injury on clinical and radiographic outcomes, thus generalizability of the findings to specific meniscal cases is limited.

Benefits/Harms of Implementation

The primary risk of meniscal preservation, specifically meniscus repair, is the higher rate of subsequent surgery as compared to meniscal debridement or meniscectomy, as well as the added cost of and rehabilitation/recovery following the procedure. However, the long-term value of meniscal preservation to delay or prevent advancement of chondral degeneration should be considered.

Outcome Importance

Meniscal preservation has the potential to delay or prevent joint degeneration which minimizes resulting long term disability.

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View data summaries via the CPG eAppendix 2

Cost Effectiveness/Resource Utilization

Meniscal repair techniques, use of implants and additional operative time is expected with meniscal preservation techniques, particularly for meniscus repair. There is some evidence that this approach is cost effective over time (Deviandri, 2023).

Acceptability

Meniscus preservation techniques including meniscus repair are readily accepted and accessible.

Feasibility

There are no concerns regarding the feasibility of meniscal preservation techniques for acute meniscal pathology.

Future Research

The optimal indications and techniques for meniscal preservation techniques, specifically meniscal repair, deserve further investigation, particularly in regards to which types of tears are particularly amenable to repair. Longer term follow-up including assessment of joint degeneration with imaging as well as clinical outcomes and subsequent surgery such as knee arthroplasty is needed.

Additional References:

1. Deviandri, R., Daulay, M. C., Iskandar, D., Kautsar, A. P., Lubis, A. M. T., & Postma, M. J. (2023). Health-economic evaluation of meniscus tear treatments: a systematic review. Knee surgery, sports traumatology, arthroscopy : official journal of the ESSKA, 31(9), 3582–3593. https://doi.org/10.1007/s00167-022-07278-8

OPTIONS

Low quality evidence, no evidence, or conflicting supporting evidence have resulted in the following statements for patient interventions to be listed as options for the specified condition. Future research may eventually cause these statements to be upgraded to strong or moderate recommendations for treatment.

Surgical Intervention After Non-Operative Treatment

Patients with acute meniscal tear who have failed conservative treatment may have better outcomes from surgical intervention within 6 months of injury.

Quality of Evidence: Low

Strength of Option: Limited 

Description: Evidence from one or more "Low" quality studies with consistent findings or evidence from a single "Moderate" quality study recommending for or against the intervention. Also, higher strength evidence can be downgraded to limited due to major concerns addressed in the EtD Framework.

Rationale

Two low quality studies (Marder, 1994; Stone, 1988) evaluated the timing of surgical intervention in the management of acute meniscal tears. Appreciating the historical nature of the cited articles, these studies clearly demonstrated a significantly greater ability for patients to return to their prior athletic level with intermittent to no pain when surgical intervention was performed prior to 6 months. An increased percentage of patients had persistent pain or inability to return to prior activity when surgical intervention was performed after 6 months. Additionally, younger patients without radiographic evidence of osteoarthritis have an increased likelihood of resolution of pain and return to athletics following surgical intervention when performed prior to 6 months from onset. For patients who are returning to a level of activity that does not involve increased load such as jumping, landing, and/or pivoting, non-operative initial management is recommended. However, when initial non-surgical management fails to improve symptoms and function adequately, surgical intervention should be performed prior to 6 months.

Benefits/Harms of Implementation

In addition to the general risks for anesthesia and surgical intervention, the ability to comply with activity limitations and duration of rehabilitation following surgical intervention should be considered when determining if operative or non-operative treatment is pursued. Emphasis should also be placed on patient education in order to facilitate rehabilitation compliance. Delayed surgical treatment of acute symptomatic meniscal injury beyond six months has decreased function, increased pain, and increased chondromalacia and post traumatic arthritis.

Outcome Importance

Addressing meniscal pathology in a timely fashion may result in improved outcomes.

Cost Effectiveness/Resource Utilization

There is no association with cost effectiveness.

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Acceptability
Meniscus surgery is an acceptable treatment for acute isolated symptomatic meniscal injury and may be warranted without a trial of non-operative treatment in some circumstances.

Feasibility
Surgical treatment of acute meniscal pathology is feasible and performed regularly within 6 months of injury.

Future Research
High quality studies to prospectively follow acute meniscal injuries are required to determine if and when early operative intervention is indicated.

Meniscus repair can improve patient outcomes compared to partial meniscectomy in acute isolated meniscal tears with healing potential.

Quality of Evidence: Low

Strength of Option: Limited 

Description: Evidence from one or more "Low" quality studies with consistent findings or evidence from a single "Moderate" quality study recommending for or against the intervention. Also, higher strength evidence can be downgraded to limited due to major concerns addressed in the EtD Framework.

Rationale

Six low quality studies (Gan, 2020; Lu, 2020; Mao, 2022; Sochacki, 2020; Stein, 2010; Zhou, 2019) evaluating meniscal repair and meniscectomy were reviewed. One study (Gan) demonstrated improved postoperative patient reported outcome scores in patients with complex tears who underwent repair versus partial meniscectomy. Another (Stein) showed improved results in repair versus partial meniscectomy in regard to osteoarthritis progression and sports activity recovery. When comparing meniscectomy and meniscus repair in a large national insurance database (Sochacki), repairs were found to have lower reoperation rates with higher rates of both complications and total cost.

The primary limitation of this body of evidence is that the majority of studies were retrospective in nature. Surgical decision making should be based on the clinical scenario (e.g. the extent, type and location of the initial meniscal trauma), thus there are ethical implications that limit the ability to conduct randomized clinical trials in meniscus patients. Therefore, while there is a preponderance of evidence indicating that meniscal tears in general and surgical removal of a larger amount of meniscal tissue are associated with a greater risk of joint degeneration, the supporting evidence is inherently limited by the nature of the investigations. Additionally, these studies generally did not distinguish the potential influences of the location, type, or extent of the meniscal injury on clinical and radiographic outcomes, thus generalizability of the findings to specific meniscal cases is limited.

Benefits/Harms of Implementation

There is evidence to suggest that repair of some tears has benefit in regard to decreased reoperation rates and improved outcomes while meniscectomy may have lower costs and complications, but a higher rate of osteoarthritis progression.

Outcome Importance

Mitigating degenerative change in the knee is one of the most important outcomes in the treatment of acute meniscal tears. The potential benefit of meniscal repair over meniscectomy in this area may outweigh disadvantages in terms of cost, complications, and short-term outcomes. Identifying tears more amenable to repair versus meniscectomy, such as peripheral longitudinal tears, can help to guide treatment.

Cost Effectiveness/Resource Utilization

While there is evidence that meniscal repair is cost effective (Deviandri, 2023), determining the optimal tears for repair versus partial meniscectomy may lead to lower costs and decreased complications.

Acceptability

Both treatments are widely acceptable with means to easily perform either.

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Feasibility

Both are feasible and should be used according to the appropriate tear pattern.

Future Research

Larger studies with patients stratified by age, activity level, and tear type comparing meniscal repair versus partial meniscectomy are needed.

Additional References:

1. Deviandri, R., Daulay, M. C., Iskandar, D., Kautsar, A. P., Lubis, A. M. T., & Postma, M. J. (2023). Health-economic evaluation of meniscus tear treatments: a systematic review. Knee surgery, sports traumatology, arthroscopy : official journal of the ESSKA, 31(9), 3582–3593. https://doi.org/10.1007/s00167-022-07278-8

Bone Marrow Venting or Platelet Rich Plasma can be considered in patients with acute isolated meniscal tears undergoing surgical repair to improve outcomes.

Quality of Evidence: Moderate

Strength of Option: Limited ★★☆☆ (*downgraded*)

Description: Evidence from one or more "Low" quality studies with consistent findings or evidence from a single "Moderate" quality study recommending for or against the intervention. Also, higher strength evidence can be downgraded to limited due to major concerns addressed in the EtD Framework.

Rationale

The biological enhancement recommendation was downgraded for inconsistency of populations, as some studies only included discoid menisci patients.

One high level study (Kaminski, 2019) supports the use of bone marrow venting to improve outcomes of acute meniscal tears treated with surgical repair. The prospective randomized study showed definite benefits in terms of healing and patient reported outcomes with no change in complications, but it was a small cohort of vertical peripheral meniscal tears at a single study site. The use of PRP has been shown to improve outcomes of surgically repaired acute meniscal tears in one high (Liu, 2019) and three low level studies (Dai, 2019; Everhart, 2019; Pujol, 2015). One high level study showed a slight improvement in patient reported outcomes with the use of PRP, but it was a small cohort of acute tears of discoid menisci with very short-term follow. Another low-level study looking at the use of PRP to augment surgical repair of acute tears in discoid menisci showed no difference in clinical outcomes. One low level study was a retrospective review of a large single surgeon cohort which showed the use of PRP decreased the re-tear rate in the treatment of isolated acute meniscal tears but not tears repaired in conjunction with ACL reconstruction. Another low-level study showed slightly better clinical outcomes with the use of PRP in the repair of acute horizontal meniscus tears.

Benefits/Harms of Implementation

There is some evidence to suggest augmenting repairs of acute meniscal tears can improve healing and clinical outcomes. Bone marrow venting has little risk or cost. PRP has little risk but can have increased associated costs to the patient and health care system.

Outcome Importance

Improving the healing rate of meniscal repairs can improve symptoms and reduce rates of subsequent surgery in the short term and potentially reduce the rates of post-traumatic osteoarthritis in the long term.

Cost Effectiveness/Resource Utilization

Bone marrow venting has negligible cost whereas PRP often adds $500-$1000 or more to the cost of the procedure.

Acceptability

Bone marrow venting is very widely accessible as it can be performed by a variety of widely available surgical tools. PRP requires access to and paying for a system to prepare the sample.

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Feasibility

Bone marrow venting is very feasible and should be considered in isolated surgical repair of acute meniscal tears. PRP can be considered depending on availability and cost considerations.

Future Research

Larger cohorts from multiple sites are needed to better understand the efficacy and generalizability of biological augmentation for surgical repair of acute meniscal tears. Studies to compare the efficacy and cost effectiveness of bone marrow venting and PRP would also be helpful.

Indications for Acute Surgical Intervention

1. In the absence of sufficient evidence, it is the opinion of the workgroup that patients with a displaced or displacing acute meniscal tear, particularly those restricting knee range of motion, can benefit from acute surgical intervention.

2. In the absence of sufficient evidence, it is the opinion of the workgroup that patients with a symptomatic acute meniscal tear who could benefit from a repair should be considered for early surgical intervention.

Quality of Evidence: Very Low
Strength of Option: Consensus ★☆☆☆

Description: Evidence there is no supporting evidence, or limited level evidence was downgraded due to major concerns addressed in the EtD framework. In the absence of reliable evidence, the guideline work group is making a recommendation based on their clinical opinion.

Rationale

One low quality study (Marder, 1994) was included, comparing surgical treatment of meniscal tears with nonoperative treatment. There is a paucity of research comparing outcomes from operative and nonoperative treatment of isolated acute meniscal tears. Patients with an isolated meniscal tear that suddenly limits active knee movement, either intermittently or constantly, may benefit from early surgical intervention. Patients active with sports that require loading, pivoting, and/or landing may benefit from early surgical treatment of an acute isolated meniscal injury. The viability to repair torn meniscal tissue may be diminished when surgical intervention is delayed. Nondisplaced tears unlikely to be repairable should be treated initially with physical therapy and undergo surgical management if symptoms persist. Additional future research is needed to compare the short and long-term functional outcomes and return to activity in patients undergoing operative and non-operative treatment of acute isolated meniscal injuries. There is a preponderance of literature of meniscal tears with concomitant injuries. The biological milieu of the knee and following cruciate ligament injuries varies from those with an isolated meniscal injury; therefore, future research is needed in isolated meniscal tears.

Benefits/Harms of Implementation

There is general risk when patients undergo surgery and anesthesia for orthopedic conditions, which may include, but are not limited to death, neurovascular injury, infection, thromboembolic events, and postoperative sequelae such as joint stiffness or degeneration. Nondisplaced tears unlikely to be repairable have little downside if delayed surgical treatment is necessary after initial nonoperative management. However, in the case of displaced meniscal tears blocking knee motion or meniscal tears likely to be repairable, there are potential downsides of delaying surgical intervention.

Outcome Importance

In addition to the general risks for anesthesia and surgical intervention, the ability to comply with activity limitations and duration of rehabilitation following surgical intervention should be considered when determining if operative or non-operative treatment is pursued. Since MRI evaluation is less accurate than direct arthroscopic visualization to determine meniscal tear type, location and tissue viability, which guide the decision to repair or resect, treatment plans may change during surgery and modify postoperative rehabilitation and recovery.

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Cost Effectiveness/Resource Utilization

Non-operative management with skilled physical therapy or directed rehabilitation at home can be an effective treatment for acute non-displaced meniscus tears. However, patients who fail conservative management may still require surgical intervention, which delays but does not decrease medical cost. Insufficient rehabilitation or delay in surgical management when indicated can delay recovery and return to work and increase the risk of less optimal outcomes.

Acceptability

Patients returning to pivoting or landing activities may benefit from early surgical intervention for a quicker return to play or work, even in the absence of limited knee motion. Even patients without "symptomatic" knees, as defined above, who receive salaries from athletics could benefit from surgical intervention for a quicker and more reliable return to play. However, the short-term benefit of quicker recovery after resection compared to repair has to be weighed against the risk of more rapid joint degeneration over time, which can reduce performance and durability.

Feasibility

No obvious barriers to identify.

Future Research

Topics to be addressed with future research include:

Which meniscal tear, i.e., location, type and length of tear, would normally need and therefore benefit from surgery vs initial nonoperative management?

How long should high-level verses lower-level athletes trial nonoperative treatment before undergoing surgical intervention?

How do variables such as age, body mass index, and type and level of activity influence optimal treatment and outcomes from acute isolated meniscal tears?

Additional References

1. Cook C.E. et al. (2021). Does Surgery for Cruciate Ligament and Meniscus Injury Increase the Risk of Comorbidities at 2 Years in the Military System? *The Journal of Knee Surgery*.
2. van der Graaff SJA, Eijgenraam SM, Meuffels DE et al. (2022). Arthroscopic partial meniscectomy versus physical therapy for traumatic meniscal tears in a young study population: a randomised controlled trial. *Br J Sports Med*(56), 870-876.

Physical Therapy

In the absence of sufficient evidence, it is the opinion of the workgroup that physical therapy/rehabilitation may benefit patients with an acute isolated meniscal tear undergoing non-operative treatment or recovering from meniscal surgery.

Quality of Evidence: Very Low
Strength of Option: Consensus ★☆☆☆

Description: Evidence there is no supporting evidence, or limited level evidence was downgraded due to major concerns addressed in the EtD framework. In the absence of reliable evidence, the guideline work group is making a recommendation based on their clinical opinion.

Rationale

One low quality study (Katsuri, 2020) was included. While this investigation demonstrated that physical therapy/rehabilitation (i.e. conservative management) improved pain, range of motion, and functional ability in patients with meniscal tears, generalizability and application of the findings is limited due to a lack of information regarding the parameters of the rehabilitation scheme and the appropriateness of the statistical approach. In the absence of additional evidence, it is the opinion of the workgroup that physical therapy/rehabilitation may be beneficial to patients who present with an acute non-displaced isolated meniscal tear not amenable to repair when implemented as a non-operative treatment option as well as for those recovering from meniscal surgery. Complications developing or increasing, such as pain or tear size, are not noted with a trial of rehabilitation following atraumatic or traumatic mechanisms of injury.

Benefits & Harms:

No additional harm noted for a trial of conservative rehabilitation.

Cost Effectiveness/Resource Utilization:

Nonoperative rehabilitation that treats the symptoms of an acute meniscal tear provides cost-saving by avoiding surgical intervention. However, patients who fail rehabilitation and then undergo surgery obviously incur the cost of pre-surgical rehabilitation in addition to the surgical intervention.

Acceptability:

Physical therapy, including Mulligan techniques, is widely available at reasonable cost. There is little risk or downside to physical therapy.

Feasibility:

Physical therapy is widely available at reasonable cost. Mulligan technique is a mode of intervention within manual physical therapy with no additional cost.

Future Research:

Topics to be addressed with future research include:

The benefit of a home exercise program compared to a supervised program?

If and when patients return to high-level (dynamic, pivoting) or moderate-level (running, cycling) sports (was not objectively measured)

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Randomized controlled trial on long-term, i.e., greater than 3 months, outcomes of physical therapy for acute meniscal tears to measure return to sports and activity and rates of subsequent surgery.

Surgical Repair Technique

It is the opinion of the workgroup that, when performing repair of acute isolated meniscal tears, surgeons may favor the inside out technique to reduce the risk of repair failure in certain tear patterns or all inside techniques to reduce the risk of other complications.

Quality of Evidence: Very Low
Strength of Option: Consensus ★☆☆☆

Description: Evidence there is no supporting evidence, or limited level evidence was downgraded due to major concerns addressed in the EtD framework. In the absence of reliable evidence, the guideline work group is making a recommendation based on their clinical opinion.

Rationale

The most recent meta-analysis and systematic review (Schweizer C/Nepple) on all inside versus inside out repair showed no significant difference in pooled failure rates between all inside versus inside out repair. Another low-level study (Borque) demonstrated a higher rate of failure of medial meniscus tears treated with the all inside technique versus inside out technique, but this may be limited by the study population and tear morphology. Biomechanical studies (Rosso) have demonstrated similar responses to cyclic loading with all inside versus inside out repairs.

Benefits & Harms:

All inside meniscal repair has the potential to decrease operative time as well as morbidity by avoiding additional incisions and dissection. All inside devices do not eliminate the risk for neurovascular injury however and present a risk for iatrogenic cartilage injury and can break or malfunction. Inside out repair has risks of iatrogenic nerve injury and additional surgical dissection.

Outcome Importance:

The relative risk of complications and retear likely depends on tear and patient specific variables. Determining the ideal indication for various repair techniques could optimize outcomes.

Cost Effectiveness/Resource Utilization:

Cost of increased OR time with an inside out repair versus increased cost of all inside implants should be weighed.

Acceptability:

Both techniques are accepted treatment modalities for meniscal repair with the inside out repair being the historical gold standard.

Feasibility:

Both techniques are widely available for use.

Future Research:

Future research should investigate how tear and patient specific variables relate to the impact of meniscal repair technique on outcomes, complications, and cost in the treatment of acute meniscal tears.

View background material via the CPG eAppendix 1
View data summaries via the CPG eAppendix 2

Additional References:

1. Schweizer C, Hanreich C, Tscholl PM, Blatter S, Windhager R, Waldstein W. Meniscal Repair Outcome in 3829 Patients With a Minimum Follow-up From 2 Years Up to 5 Years: A Meta-analysis on the Overall Failure Rate and Factors Influencing Failure. Am J Sports Med. 2023 Apr 6:3635465231158385. doi: 10.1177/03635465231158385. Epub ahead of print. PMID: 37022676
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APPENDICES

Appendix I: References (*Introduction and Recommendation Included Literature*)

Introduction References

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8. Englund M, Guermazi A, Roemer FW, Aliabadi P, Yang M, Lewis CE, Torner J, Nevitt MC, Sack B, Felson DT. Meniscal tear in knees without surgery and the development of radiographic osteoarthritis among middle-aged and elderly persons: The Multicenter Osteoarthritis Study. Arthritis Rheum. 2009 Mar;60(3):831-9. doi: 10.1002/art.24383. PMID: 19248082; PMCID: PMC2758243.
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View background material via the CPG eAppendix 1
View data summaries via the CPG eAppendix 2

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