



■ KNEE

Arthroscopic meniscal surgery

A NATIONAL SOCIETY TREATMENT GUIDELINE AND CONSENSUS STATEMENT

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Aims

The aim of the British Association for Surgery of the Knee (BASK) Meniscal Consensus Project was to develop an evidence-based treatment guideline for patients with meniscal lesions of the knee.

Materials and Methods

A formal consensus process was undertaken applying nominal group, Delphi, and appropriateness methods. Consensus was first reached on the terminology relating to the definition, investigation, and classification of meniscal lesions. A series of simulated clinical scenarios was then created and the appropriateness of arthroscopic meniscal surgery or nonoperative treatment in each scenario was rated by the group. The process was informed throughout by the latest published, and previously unpublished, clinical and epidemiological evidence. Scenarios were then grouped together based upon the similarity of clinical features and ratings to form the guideline for treatment. Feedback on the draft guideline was sought from the entire membership of BASK before final revisions and approval by the consensus group.

Results

A total of 45 simulated clinical scenarios were refined to five common clinical presentations and six corresponding treatment recommendations. The final guideline stratifies patients based upon a new, standardized classification of symptoms, signs, radiological findings, duration of symptoms, and previous treatment.

Conclusion

The 2018 BASK Arthroscopic Meniscal Surgery Treatment Guidance will facilitate the consistent identification and treatment of patients with meniscal lesions. It is hoped that this guidance will be adopted nationally by surgeons and help inform healthcare commissioning guidance. Validation in clinical practice is now required and several areas of uncertainty in relation to treatment should be a priority for future high-quality prospective studies.

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Meniscal pathology is common and the prevalence is associated with increasing age and the development of osteoarthritis (OA).¹ Meniscal lesions are associated with a wide variety of symptoms and signs and may, for example, be asymptomatic or an incidental finding in patients with knee pain due to OA.¹⁻⁴ When a meniscal lesion is thought to be the cause of symptoms, surgery to excise or repair the unstable tissue may be recommended.

Recently, a series of clinical trials has been published evaluating the effectiveness of excising a meniscal tear by arthroscopic partial meniscectomy.⁵⁻¹⁰ Although these studies have made an important contribution to the literature, the

generalizability of the findings has been controversial due to the broad and inconsistently defined inclusion criteria applied to such a heterogeneous group of patients.¹¹⁻¹⁷ Given the persistent areas of uncertainty, and concerns about rare adverse events that may be associated with arthroscopic partial meniscectomy, there is a clear need for agreement on how to investigate, describe, stratify, and manage patients with meniscal lesions.

The aim of this study was to develop a national surgical consensus on how to describe and manage patients with meniscal pathology consistently, including agreement on the combination of clinical features that determine which patients are

*See page 659 for a full list of the BASK Meniscal Working Group's members.

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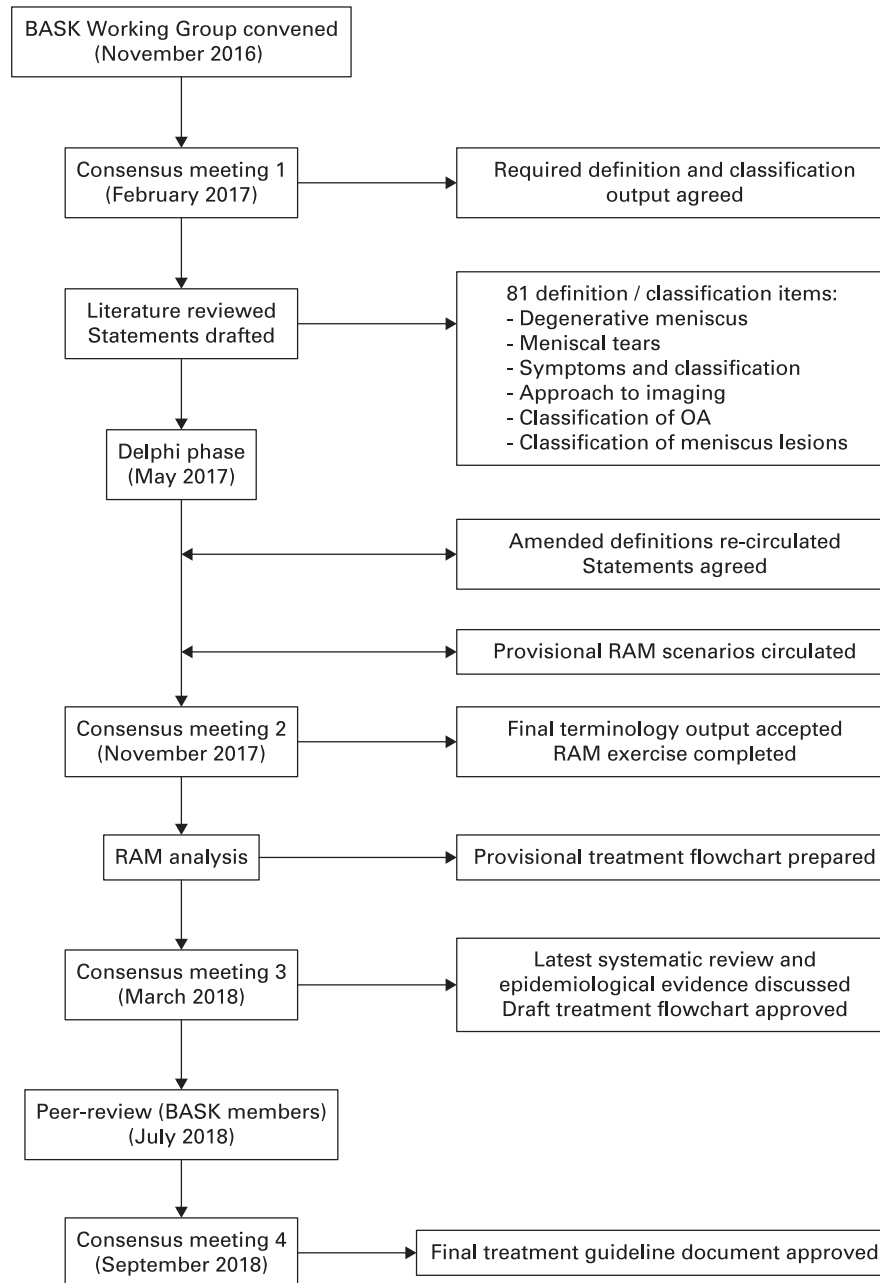


Fig. 1

Flowchart of the consensus process. BASK, the British Association for Surgery of the Knee; OA, osteoarthritis; RAM, RAND/UCLA Appropriateness Method.

candidates for surgical treatment and which are candidates for non-surgical treatment options.

Materials and Methods

In November 2016, 25 experts were invited to participate in the British Association for Surgery of the Knee (BASK) Meniscal Working Group by its research committee and study steering committee. These experts were surgeons and were selected due to a combination of: 1) their interests and publication history; 2) their clinical specialism; and 3) peer-recognition and

recommendations. In addition to the steering committee, 21 of the invited surgeons agreed to participate (as listed in the acknowledgements). A summary of the consensus process is shown in Figure 1.

Terminology exercise. The scope of the process and the classification and terminology relevant to patients with a meniscal lesion was defined by the Working Group in the initial phase, and this has recently been published.¹⁸ Prior to the first meeting, the literature on arthroscopic meniscectomy was provided to the group electronically, and the meeting was conducted using

nominal group techniques.¹⁹ Iterative questionnaires were then circulated to the group, following a Delphi type methodology,¹⁸ and statements were agreed. The definitions, approach to imaging investigations, and classification of meniscal lesions and OA, which were agreed in this phase, are summarized on the second page of the full guideline document (Supplementary Fig. ab).

Surgical ‘appropriateness’ exercise. Surgical appropriateness rating exercises are well established and have been used previously to deliver recommendations for a wide range of medical and surgical treatments.²⁰⁻²⁴ In this study, we applied the validated RAND/UCLA Appropriateness Method (RAM).²⁵ RAM was first developed in the 1980s and designed for the estimation of the over- or under-use of medical or surgical interventions by applying a consensus-based technique.²⁵ RAM provides the opportunity to use controlled interaction between experts in order to derive knowledge and recommendations for treatment. The process is informed by the existing evidence, including clinical effectiveness data, but not reliant on such data where none is currently available. The anonymous rating process aims to limit the impact from experts otherwise showing “unwillingness to abandon publicly held beliefs” or the pressure to conform.²⁶

Following the conclusion of the Delphi rounds, population and patient selection factors were defined and agreed, as published.¹⁸ Based on these findings, mutually exclusive clinical scenarios were prepared from combinations of factors to make up a range of simulated ‘patients’ for the panel to evaluate. The scenarios were created from a combination of: 1) severity of meniscal symptoms and signs (locked knee, meniscal predominant, possibly meniscal, arthritic, mixed arthritic, and meniscal); 2) severity of OA (early or no OA, mild or moderate OA, advanced OA); and 3) meniscal findings on MRI (target, possible target, no target).¹⁸ A total of 45 scenarios were voted on by members of the group during the RAM exercise, the first round of which was conducted anonymously between meetings (Fig. 1).

An introduction and standardized history of a patient was presented for the purposes of the voting and members of the group were then asked: “Do you think meniscal surgery is appropriate in this patient? (To what extent do you believe arthroscopic meniscal surgery would benefit symptoms and quality of life AND outweigh the risks of surgery / benefit of an alternative, more appropriate, treatment option.)” A rating for each clinical scenario was requested on a scale from 1 (inappropriate) to 9 (appropriate). In accordance with published standards, the degree of agreement between participants was measured by evaluating the median and spread of rating.^{25,27,28} A median rating ≥ 7 without disagreement was defined *a priori* as appropriate and a median rating ≤ 3 without disagreement was defined as inappropriate. Disagreement was defined as more than one-third of votes ≤ 3 with a median ≥ 7 , or more than one-third of votes ≥ 7 with a median ≤ 3 . Uncertainty was recorded for median scores between 4 and 6.

Participants were also invited to make recommendations for treatment, in a modified ‘necessity’ rating exercise.²⁵ For a procedure such as arthroscopic meniscectomy, the risk of the procedure may be considered so low that it could be rated

‘appropriate’ even when the clinical value is uncertain, and this exercise aimed to overcome this limitation.²⁵ Four options were provided: 1) “urgent” arthroscopic meniscal surgery, where the expected benefit is not small and it would be considered ‘improper’ not to offer the treatment; 2) “routine” arthroscopic meniscal surgery (i.e. appropriate but not urgent); 3) “non-surgical treatment and re-assess”, where the benefit from meniscal surgery is uncertain; and 4) “no arthroscopy”, where no benefit is anticipated, or harms exceed anticipated benefits. Agreement on this recommendation item was defined at $> 50\%$ (majority threshold).

Following the first round of RAM voting, the group met to discuss the results (Fig. 1). At this meeting, each participant was provided with a document showing their own rating and the summary ratings from the other participants.²⁵ The results were discussed, focusing on areas of disagreement or uncertainty. Scenarios with disagreement were clarified and all relevant evidence was discussed in this context. Each participant then re-rated every scenario, so that each participant had rated every scenario twice. The intention of two rounds of voting is to distinguish true clinical disagreement (‘real’ disagreement) from fatigue or misunderstanding (‘artefactual’ disagreement).²⁵

On completion of the RAM exercise, 11 scenarios (24%) were rated appropriate for arthroscopic meniscal surgery, 24 scenarios (53%) were rated inappropriate, and ten scenarios (22%) were uncertain. Treatment recommendations exceeded the 50% majority classification threshold in 43 scenarios (96%). The remaining two were discussed by the steering group and recommendations were made based upon the spread of votes and other ratings. Of the 11 appropriate cases, five (45%) were rated eligible for urgent surgery and six (55%) for routine surgery. Of the 24 inappropriate cases, 17 (71%) were rated for no arthroscopy and seven (29%) were rated for re-assessment after further nonoperative treatment. All ten uncertain cases (100%) were rated for re-assessment after further nonoperative treatment.

Preparing the treatment guideline. The output from the RAM exercise was used to prepare a management guideline for patients with meniscal lesions confirmed on imaging. The RAM scenarios were grouped by the steering committee based on the clinical features and ratings to create a smaller number of representative presentations and treatment recommendations. These were used as the basis of a draft flowchart-style guideline for treatment, which was circulated to the group for electronic feedback. Based on this feedback, amendments were made prior to discussion again at a meeting in March 2018, when the guideline was discussed in detail, taking into account an update on the latest evidence including a previously unpublished systematic review of evidence from a clinical trial stratified by the important patient factors, and a new analysis of the risks of arthroscopic surgery of the knee using national epidemiological data.^{29,30} Changes agreed at this meeting were made to the guideline and this was then presented at the annual BASK congress in March 2018 in order to introduce the guideline with a request for feedback from the membership of BASK.

Peer-review, feedback, and final approval. Following production of the draft guideline, it was subjected to peer review. First,

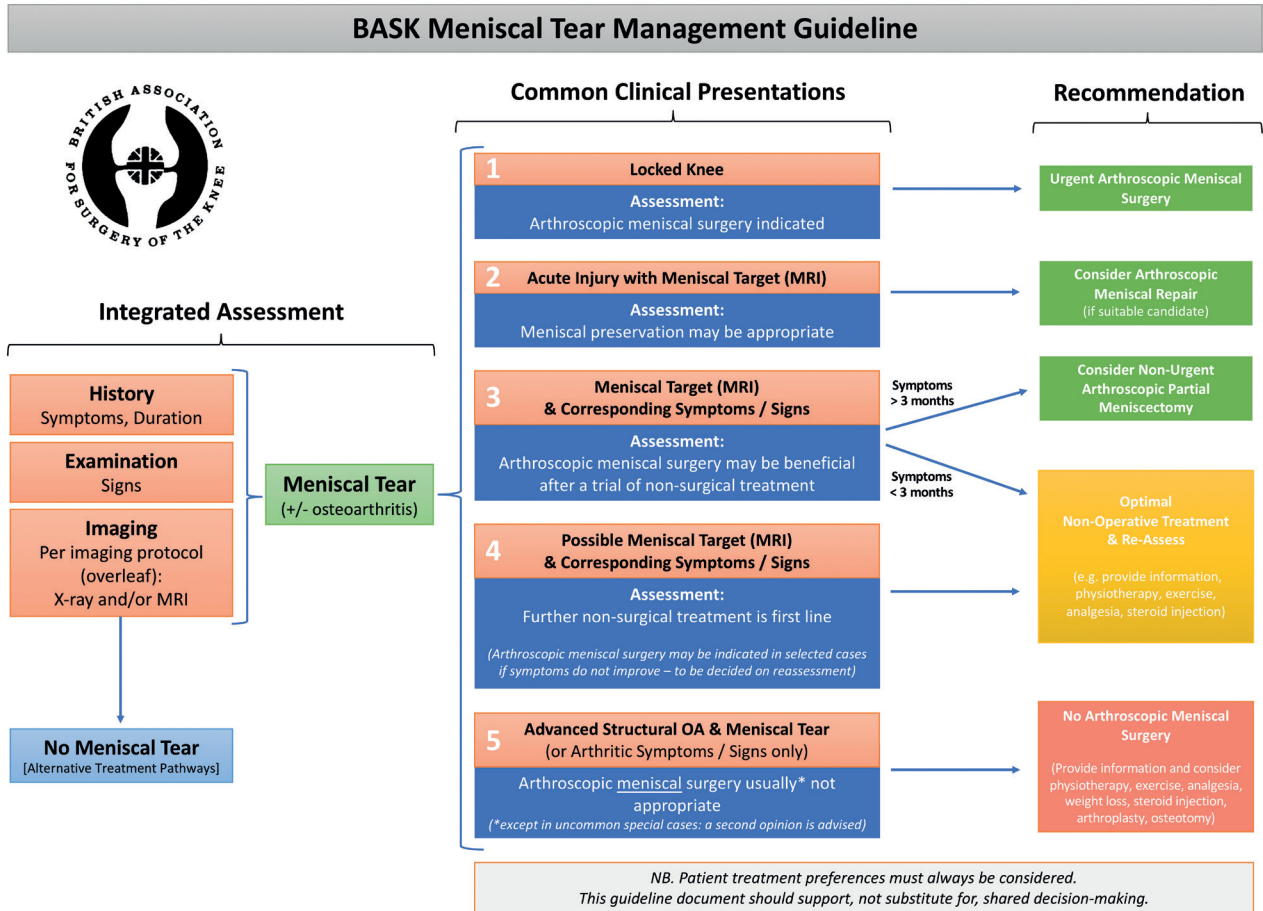


Fig. 2

The British Association for Surgery of the Knee (BASK) Meniscal Tear Management Guideline flowchart.

the guideline, accompanying definitions, and case management examples were circulated electronically to the membership of BASK for feedback. Of the 195 full active members of BASK with valid consent and contact details to receive surveys, 117 (60%) completed the survey in full. Of these, 87 respondents (74%) agreed with the treatment guideline without changes, a further 28 (24%) agreed and thought minor changes should be made, and two disagreed and thought major changes should be made (2%). Overall, 113 respondents (97%) agreed to practice according to this guideline with no further changes. Specific comments were received from 34 respondents (12 from the no changes group, 21 from the minor changes group, and one from the major changes group). Of the comments, 13 confirmed support, leaving 21 responses with suggestions for changes. The only major comment was to highlight the importance of the discretion of the surgeon and the preferred treatment of the patient, and one minor comment also made this point. Of the other minor comments, nine suggested small amendments to the definitions and descriptions, two related to introducing age cut-offs, four related to the importance of highlighting rare but important cases where meniscal surgery may be appropriate despite advanced OA, and four related to improving the clarity or wording of the guideline itself.

All comments and the ratings were reviewed by the steering committee and the Working Group and, based on these, further minor changes were made. The final guideline was reviewed and approved by the Working Group in September 2018.

Results

Terminology and guideline eligibility. The agreed terminology developed for the purposes of developing the guideline has been published and is included on the second page of the document (Supplementary Fig. ab).¹⁸ A meniscal ‘tear’ is a defect or split in the meniscocapsular complex, which can occur in a degenerative or non-degenerative meniscus. A degenerative meniscus was defined as one with progressive degradation of meniscal tissue as may be revealed by intra-meniscal high signal on MRI. It was agreed that for the guidance from the flowchart to be applicable, MRI confirmation of a lesion would be necessary.

The classification of meniscal lesions was based on appearances on MRI into target, possible target, or no target.¹⁸ The target group represented ‘treatable’ lesions for which the group agreed that meniscal surgery may be indicated based on appearance. Some caution is required, however, in the interpretation of a static knee MRI, given the potential for the displacement

of a tear on movement. Three categories of severity of OA were defined; however, the clinical ratings exercise and subsequent discussions indicated that only advanced OA was considered a major contraindication to arthroscopic meniscal surgery. Therefore, the recommendations for treatment are for all patients with early, mild, or moderate OA (Fig. 2; Supplementary Fig. ab) are the same – that is, they are based on the pattern of the meniscal lesion, the symptoms and signs, duration of symptoms, and previous treatment. Patients with advanced OA were placed in a separate category (see the ‘Treatment recommendations’ section below). It was agreed that no age specifications would be included but the guideline was not designed for use in children.

Common clinical presentations. Based on summary responses (treatment appropriateness; treatment recommendations), an initial total of 45 clinical scenarios were rationalized to just five common and discriminative clinical presentations. It was recognized that clinician judgement is still required, however, especially where the presentations of the patients do not fit clearly into one of these categories. The five accepted presentations were: 1) locked knee; 2) acute injury with a target meniscal lesion; 3) target meniscal lesion with corresponding symptoms and signs; 4) possible target meniscal lesion with corresponding symptoms and signs; and 5) advanced structural OA.

Treatment recommendations. The group agreed to four possible treatment recommendations for meniscal lesions: urgent arthroscopic meniscal surgery; consider arthroscopic meniscal repair; consider non-urgent arthroscopic partial meniscectomy; and optimized non-surgical treatment and re-assessment. Patients with advanced OA were included in a fifth category for “no arthroscopic meniscal surgery” and may need assessment of other pathology that might require alternative treatment, such as osteotomy or arthroplasty. The recommendation for each presentation is shown on the first page of the document (Fig. 2).

Urgent arthroscopic surgery was recommended for patients with a locked knee. In most cases, these patients will have a confirmed diagnosis of a displaced meniscal tear from MRI. However, it was accepted by the group that for patients presenting with a locked knee, clinicians may apply their judgement on the need for preoperative MRI imaging.

Meniscal repair was recommended to preserve the meniscus when a reparable target lesion is identified following an acute injury. A decision to proceed in these cases requires clinical judgement about the potential for healing based on patient, anatomical, biomechanical, and biological factors. No recommendation on the urgency of intervention was included, as it was agreed that this decision should be made by the clinician on a case-by-case basis, in careful consultation with the patient. Further work to refine guidance on this decision about treatment is planned.

In most patients, according to the guideline, at least three months should have elapsed from the onset of symptoms before arthroscopic meniscal surgery is considered. Only patients with “meniscal” or “possibly meniscal” symptoms and signs were considered eligible for arthroscopic meniscal surgery (Fig. 2; Supplementary Fig. ab). In patients with “meniscal” symptoms and signs and a “meniscal target”, routine arthroscopic

meniscal surgery may be considered three months from the onset of symptoms. In some patients, earlier surgery may be appropriate and it was advised that a second opinion from an appropriately experienced colleague be sought and documented before proceeding with arthroscopic meniscal surgery in these cases. In patients with “possibly meniscal” symptoms and signs or a “possible meniscal target”, further optimized non-surgical treatment for an additional three months was recommended (on first assessment in secondary care). Optimized non-surgical treatment was agreed to be patient- and condition-specific; however, the group suggested that this may include providing patient education, structured physiotherapy, and, in some cases, an intra-articular steroid injection (Fig. 2).

Arthroscopic meniscal surgery was judged to be inappropriate in nearly all patients with advanced OA or with arthritic symptoms and signs only (Fig. 2; Supplementary Fig. ab). It was acknowledged, however, that there are some uncommon special circumstances when it was advised that a second opinion from an appropriately experienced colleague be sought and documented before proceeding with arthroscopic meniscal surgery.

Finally, there was universal agreement that the patient’s preferred form of treatment must always be considered. The guideline document should support, not substitute for, shared decision making.

Discussion

In this study, we have delivered a guideline to the management of a meniscal tear using validated consensus methodology in collaboration with BASK. For patients with advanced OA on imaging or arthritic symptoms only, arthroscopic meniscal surgery is not recommended. In patients with a locked knee, urgent arthroscopic surgery is recommended. For patients sustaining an acute injury to the knee that results in a target meniscal lesion, arthroscopic meniscal repair should be considered to preserve meniscal tissue if possible. For all other patients, a minimum period of three months of non-surgical therapy is recommended before considering arthroscopic meniscal surgery. An additional three months of non-surgical therapy, including physiotherapy, is recommended for all patients without a clear target meniscal lesion with correlating meniscal symptoms on first assessment in secondary care.

Reviewing the published evidence throughout the development of this guideline, several areas of uncertainty were highlighted. First, as previously identified by other groups, no trial has been performed in patients with a meniscal lesion and a locked knee.^{31,32} A locked knee is functionally disabling and, given the high ratings for the appropriateness of surgical treatment for this indication, recruitment to such a trial may not be feasible due to strong patient preferences and a lack of equipoise. For patients with advanced OA, evidence from randomized controlled trials indicates that arthroscopy is unlikely to be effective.³³ For patients eligible for meniscal repair to preserve meniscal tissue after an acute injury, there were high ratings for the appropriateness of surgery, but no relevant high-level evidence was identified and this should be a priority area for further research.³⁴⁻³⁸ Although a number of clinical trials have been undertaken to evaluate the effectiveness of arthroscopic partial

meniscectomy, the interpretation of these is challenging due to broad inclusion criteria: knee pain, any meniscal lesion, often with OA, no previous nonoperative treatment, and high rates of crossover in patients recruited to a non-arthroscopic partial meniscectomy treatment arm.^{17,30} The consensus view, based on this evidence, was that most patients should receive a minimum of three months of nonoperative treatment before undergoing surgery. First-line nonoperative treatment was recommended for all patients with only a possible target meniscal lesion or possible meniscal symptoms. These recommendations reflect recent evidence from clinical trials, as the patients recruited to these trials had generally non-specific clinical and radiological findings.³⁰ In these trials, most patients improved when randomized to undergo structured physiotherapy; however, up to 30% ‘crossed over’ to undergo arthroscopic partial meniscectomy due to a lack of improvement.³⁰ These ‘crossover’ patients reportedly improved after surgery, and this is the basis of the recommendation for first-line nonoperative treatment with surgery being reserved for non-responders.

Regarding the harms of arthroscopic meniscal surgery, a new analysis of national epidemiology data from patients who had undergone arthroscopic partial meniscectomy informed the decisions of the group.²⁹ The work established that while this surgery is low-risk and not associated with an increased risk of myocardial infarction, cerebrovascular accident, or death when compared with the rates for the general population, infection and pulmonary embolism, although rare, may be provoked by arthroscopy.²⁹ The recommendations were prepared in the context of this new evidence, with the evidence for benefits weighed against the anticipated risk of harms.^{29,30}

In England, although there has been a recent decline in the rate of arthroscopy of the knee being performed, there remains considerable age-group and regional variation in practice and the ‘appropriate’ rate of surgery remains unknown.³⁹ The reporting of this guideline aims to facilitate a standardized approach to treatment to minimize variation in practice and, once applied, it may also allow for the estimation of an ‘appropriate’ rate of surgery.

The aim was to distil the current evidence and expert opinion, where there was a lack of evidence or uncertainty. The development of the guideline was informed throughout by high-quality published and previously unpublished evidence about the benefits and harms associated with arthroscopic meniscal surgery. The previously unpublished evidence included a systematic review and analysis of 20 years of national epidemiological data performed for this purpose.^{29,30} Any rigorously undertaken consensus process aims to deliver the best possible output from the evidence available at the time, but this does not guarantee that the output is ‘correct’ or indeed that there is a ‘correct’ output.^{40,41} A period of validation is required followed by modification if indicated to be required in response to new evidence.

The composition of the consensus group is crucial to ensure that the output is valid and of value.¹⁹ The aim of this study was to produce a ‘best-practice’ guideline for use by surgeons and patients in secondary (hospital) care, but it is hoped that it will also inform a coordinated treatment approach along with primary (general practice) care practitioners and physiotherapists.

For this purpose, the BASK research committee decided that the output from a group of recognized expert surgeons would be most likely to become the accepted standard of practice for surgeons in secondary care. Indeed, the high level of agreement within the group and the feedback from the BASK membership support this reasoning. One potential criticism of a consensus group composed of experts, however, is that high-volume surgeons are more likely to recommend surgery due to their belief in an intervention.⁴² Such a lack of ‘equipoise’ has been termed the ‘enthusiasm hypothesis’.^{43,44} Nevertheless, all members of the group had reported a change in their practice directly in response to the publication of evidence favouring the effectiveness of physiotherapy in many patients with meniscal lesions. Other groups, such as general practitioners, rheumatologists, and physiotherapists may interpret the evidence differently for their own areas of practice, but this study was not designed to change the practice of these groups, and further work to deliver collaborative recommendations from all involved groups would be beneficial. There was a clearly identified need for further clinical evidence in several areas; for example, no previous clinical trial has limited recruitment to patients eligible for meniscal surgery according to these new standards, and this should be a priority for further research.^{17,30}

Although guidelines have been published by other groups, these have presented conflicting recommendations, suffered from a number of limitations, and have not yet been accepted into practice.^{31,32,42,45,46} In contrast, on peer-review, 97% of specialist knee surgeons (113/117) agreed to practise according to the guideline presented here and, with the support of the national knee society, BASK, and the NHS Getting It Right First Time (GIRFT) programme in the United Kingdom,⁴⁷ adoption into routine clinical practice and secondary care commissioning is anticipated. Further development is also planned to prepare more general guidance, involving other stakeholder groups including general practitioners, health commissioners, rheumatologists, patients, and physiotherapists.

In conclusion, the management guideline reported here represents current expert surgical opinion regarding the appropriate management of patients with a meniscal lesion. It was delivered using a series of consensus exercises and has been endorsed in its current form by the national knee society, BASK, and by the NHS GIRFT programme. The aim of the guideline is to standardize treatment and facilitate best-practice based on current evidence. Validation in clinical practice is now required and, where uncertainty was highlighted, there is an urgent need for more evidence.



Take home message

- In the context of shared decision making, this guidance aims to protect patients from unnecessary surgery while ensuring appropriate access to arthroscopic meniscal surgery where benefit is anticipated.
- Arthroscopic meniscal surgery should not be performed in patients with advanced osteoarthritis except in rare special cases.
- Most patients presenting with a target meniscal lesion and symptoms should first undergo at least three months of nonoperative treatment. For patients not responding to this nonoperative treatment, meniscal surgery may be beneficial and should be considered.
- Urgent surgery may be indicated for patients with a locked knee. Meniscal repair should be considered in patients with a reparable meniscal tear following acute injury.

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Supplementary material



The British Association for Surgery of the Knee (BASK) Meniscal Tear Management Guideline.

References

- Englund M, Guermazi A, Gale D, et al. Incidental meniscal findings on knee MRI in middle-aged and elderly persons. *N Engl J Med* 2008;359:1108–1115.
- Katz JN, Smith SR, Yang HY, et al. Value of history, physical examination, and radiographic findings in the diagnosis of symptomatic meniscal tear among middle-aged subjects with knee pain. *Arthritis Care Res (Hoboken)* 2017;69:484–490.
- MacFarlane LA, Yang H, Collins JE, et al. Associations among meniscal damage, meniscal symptoms and knee pain severity. *Osteoarthritis Cartilage* 2017;25:850–857.
- Tornbjerg SM, Nissen N, Englund M, et al. Structural pathology is not related to patient-reported pain and function in patients undergoing meniscal surgery. *Br J Sports Med* 2017;51:525–530.
- Herrlin S, Hällander M, Wange P, Weidenhielm L, Werner S. Arthroscopic or conservative treatment of degenerative medial meniscal tears: a prospective randomised trial. *Knee Surg Sports Traumatol Arthrosc* 2007;15:393–401.
- Gauffin H, Tagesson S, Meunier A, Magnusson H, Kvist J. Knee arthroscopic surgery is beneficial to middle-aged patients with meniscal symptoms: a prospective, randomised, single-blinded study. *Osteoarthritis Cartilage* 2014;22:1808–1816.
- Kise NJ, Risberg MA, Stensrud S, et al. Exercise therapy versus arthroscopic partial meniscectomy for degenerative meniscal tear in middle aged patients: randomised controlled trial with two year follow-up. *BMJ* 2016;354:i3740.
- Yim J-H, Seon J-K, Song E-K, et al. A comparative study of meniscectomy and nonoperative treatment for degenerative horizontal tears of the medial meniscus. *Am J Sports Med* 2013;41:1565–1570.
- Sihvonen R, Paavola M, Malmivaara A, et al. Arthroscopic partial meniscectomy versus sham surgery for a degenerative meniscal tear. *N Engl J Med* 2013;369:2515–2524.
- Katz JN, Brophy RH, Chaisson CE, et al. Surgery versus physical therapy for a meniscal tear and osteoarthritis. *N Engl J Med* 2013;368:1675–1684.
- Bollen SR. Is arthroscopy of the knee completely useless? Meta-analysis—a reviewer's nightmare. *Bone Joint J* 2015;97-B:1591–1592.
- Katz JN, Jones MH. Treatment of meniscal tear: the more we learn, the less we know. *Ann Intern Med* 2016;164:503–504.
- Slomski A. Surgery no benefit to patients with meniscal tears. *JAMA* 2016;316:1250.
- Buchbinder R. Meniscectomy in patients with knee osteoarthritis and a meniscal tear? *N Engl J Med* 2013;368:1740–1741.
- Lohmander LS, Thorlund JB, Roos EM. Routine knee arthroscopic surgery for the painful knee in middle-aged and old patients—time to abandon ship. *Acta Orthop* 2016;87:2–4.
- Gandhi R, Perruccio AV, Kakar S, Haddad FS. Putting the baby back in the bathwater: the interpretation of randomised trials in surgery. *Bone Joint J* 2015;97-B:1456–1457.
- Liebs TR, Ziebarth K, Berger S. Randomized controlled trials for arthroscopy in degenerative knee disease: was conservative therapy appropriately tried prior to arthroscopy? *Arthroscopy* 2018;34:1680–1687.e6.
- Abram SGF, Beard DJ, Price AJ. National consensus on the definition, investigation, and classification of meniscal lesions of the knee. *Knee* 2018;25:834–840.
- List D. The consensus group technique in social research. *Field Methods* 2001;13:277–290.
- Hawker G, Bohm ER, Conner-Spady B, et al. Perspectives of Canadian stakeholders on criteria for appropriateness for total joint arthroplasty in patients with hip and knee osteoarthritis. *Arthritis Rheumatol* 2015;67:1806–1815.
- Riddle DL, Jiranek WA, Hayes CW. Use of a validated algorithm to judge the appropriateness of total knee arthroplasty in the United States: a multicenter longitudinal cohort study. *Arthritis Rheumatol* 2014;66:2134–2143.
- Brook RH. Assessing the appropriateness of care—its time has come. *JAMA* 2009;302:997–998.
- Brownlee S, Chalkidou K, Doust J, et al. Evidence for overuse of medical services around the world. *Lancet* 2017;390:156–168.
- Lawson EH, Gibbons MM, Ko CY, Shekelle PG. The appropriateness method has acceptable reliability and validity for assessing overuse and underuse of surgical procedures. *J Clin Epidemiol* 2012;65:1133–1143.
- Fitch K, Bernstein SJ, Aguilar MD, et al. The RAND / UCLA Appropriateness Method User's Manual. RAND Corporation. 2001. https://www.rand.org/pubs/monograph_reports/MR1269.html (date last accessed 25 March 2019).
- Dalkey N, Helmer O. An experimental application of the Delphi Method to the use of experts. *Manage Sci* 1963;9:458–467.
- McAlindon TE, Bannuru RR, Sullivan MC, et al. OARSI guidelines for the non-surgical management of knee osteoarthritis. *Osteoarthritis Cartilage* 2014;22:363–388.
- Crossley KM, van Middelkoop M, Callaghan MJ, et al. 2016 Patellofemoral pain consensus statement from the 4th International Patellofemoral Pain Research Retreat, Manchester. Part 2: recommended physical interventions (exercise, taping, bracing, foot orthoses and combined interventions). *Br J Sports Med* 2016;50:844–852.
- Abram SGF, Judge A, Beard DJ, Price AJ. Adverse outcomes after arthroscopic partial meniscectomy: a study of 700 000 procedures in the national Hospital Episode Statistics database for England. *Lancet* 2018;392:2194–2202.
- Abram SGF, Hopewell S, Monk AP, et al. Arthroscopic partial meniscectomy for meniscal tears of the knee: A systematic review and meta-analysis. *Br J Sports Med* 2019. (Epub ahead of print) PMID: 30796103.
- Beaufils P, Becker R, Kopf S, et al. Surgical management of degenerative meniscus lesions: the 2016 ESSKA meniscus consensus. *Knee Surg Sports Traumatol Arthrosc* 2017;25:335–346.
- Siemieniuk RAC, Harris IA, Agoritsas T, et al. Arthroscopic surgery for degenerative knee arthritis and meniscal tears: a clinical practice guideline. *BMJ* 2017;357:j1982.
- Thorlund JB, Juhl CB, Roos EM, Lohmander LS. Arthroscopic surgery for degenerative knee: systematic review and meta-analysis of benefits and harms. *BMJ* 2015;350:h2747-h2747.
- Mosich GM, Lieu V, Ebramzadeh E, Beck JJ. Operative treatment of isolated meniscus injuries in adolescent patients: a meta-analysis and review. *Sports Health* 2018;10:311–316.
- Kaminski R, Kulinski K, Kozar-Kaminska K, et al. A prospective, randomized, double-blind, parallel-group, placebo-controlled study evaluating meniscal healing, clinical outcomes, and safety in patients undergoing meniscal repair of unstable, complete vertical meniscal tears (bucket handle) augmented with platelet-rich plasma. *Biomed Res Int* 2018. (Epub ahead of print) PMID: 29713647.
- Monk P, Garfield Roberts P, Palmer AJR, et al. The urgent need for evidence in arthroscopic meniscal surgery. *Am J Sports Med* 2017;45:965–973.
- Biedert RM. Treatment of intrasubstance meniscal lesions: a randomized prospective study of four different methods. *Knee Surg Sports Traumatol Arthrosc* 2000;8:104–108.
- Xu C, Zhao J. A meta-analysis comparing meniscal repair with meniscectomy in the treatment of meniscal tears: the more meniscus, the better outcome? *Knee Surg Sports Traumatol Arthrosc* 2015;23:164–170.
- Abram SGF, Judge A, Beard DJ, Wilson HA, Price AJ. Temporal trends and regional variation in the rate of arthroscopic knee surgery in England: analysis of over 1.7 million procedures between 1997 and 2017. Has practice changed in response to new evidence? *Br J Sports Med* 2018. (Epub ahead of print) PMID: 30279217.
- Keeney S, Hasson F, McKenna HP. A critical review of the Delphi technique as a research methodology for nursing. *Int J Nurs Stud* 2001;38:195–200.
- Powell C. The Delphi technique: myths and realities. *J Adv Nurs* 2003;41:376–382.
- Lyman S, Oh LS, Reinhardt KR, et al. Surgical decision making for arthroscopic partial meniscectomy in patients aged over 40 years. *Arthroscopy* 2012;28:492–501.
- Dunn WR, Schackman BR, Walsh C, et al. Variation in orthopaedic surgeons' perceptions about the indications for rotator cuff surgery. *J Bone Joint Surg [Am]* 2005;87-A:1978–1984.
- Chassin MR. Explaining geographic variations. The enthusiasm hypothesis. *Med Care* 1993;31(Suppl):YS37-YS44.
- Stone JA, Salzler MJ, Parker DA, Becker R, Harner CD. Degenerative meniscus tears - assimilation of evidence and consensus statements across three continents: state of the art. *J ISAKOS Jt Disord Orthop Sport Med* 2017;2:108–119.
- Ardrin CL, Ekås G, Grindem H, et al. 2018 International Olympic Committee Consensus Statement on Prevention, Diagnosis, and Management of Pediatric Anterior Cruciate Ligament Injuries. *Orthop J Sports Med* 2018;6:2325967118759953.
- No authors listed. GIRFT: Getting It Right First Time. <https://gettingitrightfirsttime.co.uk/girft-reports/> (date last accessed 23 April 2019).

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