

REVIEW ARTICLE

Clinical practice guidelines for the management of meniscal lesions and isolated lesions of the anterior cruciate ligament of the knee in adults

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Summary

Context: Meniscal lesions and isolated anterior cruciate ligament (ACL) knee injuries are common. In 2006, about 130,000 patients were admitted to hospital for meniscal surgery and 35,000 for ACL surgery in France. Surgical techniques and indications have evolved over recent years, and interest in meniscus preservation has increased due to the higher risk of femorotibial osteoarthritis following meniscectomy.

Objectives: To encourage good practices in meniscal lesions surgery (particularly meniscus preservation) and to clarify indications and techniques in ACL reconstruction surgery.

Methods: A systematic review of the literature (1996–2007) was performed. It was submitted to a multidisciplinary working group of experts in the field (n = 10) who drafted an evidence report and clinical practice guidelines which were subsequently amended in the light of comments from 50 peer reviewers.

Main recommendations: (i) Meniscal repair should only be used to heal peripheral meniscal lesions affecting healthy meniscal tissue (injury) in vascularised areas (red-red zone or red-white zone). The current trend is towards use of hybrid implants (fixation material combined with suture wire) and an exclusively arthroscopic technique. (ii) Traumatic meniscal lesions do not always require a meniscectomy; no surgery or meniscal repair should systematically be considered. (iii) The assessment and management of non-traumatic degenerative meniscal lesions depend on the extent of cartilage damage. (iv) All ACL ruptures do not require reconstructive surgery. The indication for reconstruction is based on symptoms, in particular functional instability. As far as acute ACL injuries are considered, reconstruction by arthroscopy should

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preferably be delayed to reduce the thromboembolic events or joint stiffness. (v) Bone-tendonbone graft and hamstring tendon reconstruction give similar results. (vi) Lateral tenodesis should be limited to specific cases.

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Introduction

In 1994, a consensus conference on arthroscopy of the knee organised in Paris by ANDEM (former French national agency for the development of medical evaluation) came to the following conclusions:

- (i) arthroscopic is the only technique for surgical treatment of traumatic meniscal lesions;
- (ii) it may be used to treat some degenerative meniscal defects;
- (iii) there is no good evidence for performing meniscal repair on a stable knee except in special cases in children and on the lateral meniscus;
- (iv) arthroscopy should not be used for diagnosis and therapy when the knee has sustained recent trauma;
- (v) arthroscopy is the preferred technique for chronic ligament lesions: it is the first exploratory procedure [...], it helps to reconstruct ligaments and perform meniscal repair [1].

The present guidelines on the management of meniscal lesions and isolated lesions of the anterior cruciate ligament (ACL) of the knee in adults were drafted by the *Haute Autorité de santé* (HAS) upon the request of the French Society of Arthroscopy (SFA), French Society of Orthopaedic and Trauma Surgery (SOFCOT), and the Directorate for Hospitals and Organisation of Care (DHOS). They were published on the HAS website (in French) in June 2008 [2]. Their aim is to encourage good practices in the meniscal lesion surgery (particularly meniscus preservation) and to clarify indications and techniques in ACL reconstruction surgery.

A companion HAS guideline on "Criteria for choosing rehabilitation after-care following anterior cruciate ligamentoplasty of the knee: Inpatient or outpatient care?" specifies the indications for rehabilitation techniques after ligament reconstruction of the knee. These are not addressed here.

Other topics outside the scope of the present guidelines are: diagnosis of a meniscal lesion (excluding degenerative meniscal lesions) or ACL tear, posterior cruciate ligament surgery and acute or chronic multiligament surgery, focal cartilage lesions, and revision surgery after failed ligamentoplasties.

Scope of these guidelines

The questions addressed by these guidelines are given in Table 1. Question 1 reviews meniscal repair which is the alternative to meniscectomy wherever possible. Questions 2 and 3 specify the indications for meniscectomy, meniscal repair, and no surgery in two clinical situations:

- traumatic meniscal lesions, whether isolated or associated with an ACL lesion (question 2),
- (ii) degenerative meniscal lesions which can be tricky to diagnose and treat (and in particular to differentiate from osteoarthritis) (question 3).

The principle underlying these three questions is meniscal preservation (meniscal repair or no surgery) or partial arthroscopic meniscectomy. Questions 4 and 5 address the treatment indications for an ACL tear and the techniques used.

The patients concerned by these guidelines are adults (mature skeleton) suffering from:

- (i) meniscal lesions of the knee, with or without ACL lesions;
- (ii) ACL lesions without meniscal lesions.

The guidelines are intended for orthopaedic surgeons, general practitioners, physical medicine and rehabilitation specialists, radiologists, rheumatologists, and physiotherapists.

Assessment method

The guidelines were produced using a method developed by HAS [3]. A multidisciplinary working group drafted the guidelines, which were submitted to external peer review and then validated by the HAS Board.

The following databases were searched over the period Jan. 1996–2007: MEDLINE, Pascal, Cochrane Library, National Guideline Clearinghouse, and HTA database. The keywords were knee meniscus rupture, ACL rupture AND guidelines, OR practice guidelines OR, health planning guidelines OR recommendations OR consensus development conference OR consensus conference OR meta-analysis OR systematic review OR controlled trial OR cohort study, longitudinal study OR follow-up study. These general keywords were combined with specific keywords relating to orthopaedics, diagnostic and surgical procedures, and osteoarthritis. Further references were provided by specialty societies and working group members. The grey literature was also searched.

Table 1Scope of the guidelines.

- 1 Which meniscal repair techniques are available
- 2 How to treat a traumatic meniscal lesion
- 3 How to diagnose and treat a non-traumatic meniscal lesion
- 4 What are the indications for ACL reconstructions
- 5 Which ACL reconstruction techniques are available

Table 2	Grading of guidelines.
Grade	Scientific evidence level
A	Trials of a high level of evidence (level of evidence 1), e.g. high-power randomised controlled trials (RCT) free of major bias and/or meta-analyses of RCT or decision analyses based on level 1 trials
В	Studies of an intermediate level of evidence (level of evidence 2), e.g. RCT with some bias, meta-analyses based on questionable methodology, well-conducted non-randomised controlled trials or cohort studies
С	Studies of a lower level of evidence, e.g. case control studies (level of evidence 3), retrospective studies, case series or comparative studies with considerable bias (level of evidence 4)

The literature was reviewed and used to draft an evidence report. A total of 445 articles were reviewed and 295 articles were included (see list of references in the *Argumentaire des recommandations* [4]). Priority was given to RCT included in clinical practice guidelines, systematic reviews, and meta-analyses that had been updated with the most recent RCT. If no RCT was found on a specific topic, all available clinical trials were reviewed.

Each study was allocated an evidence level. The guidelines were graded on the basis of the strength of the evidence of supporting studies (Table 2). If the evidence was too inconclusive to establish a grade, they were based on agreement among the professionals within the working group after taking into account the comments of peer reviewers. Working group members are listed in the acknowledgements. The final guidelines were validated by the HAS Board in June 2008.

Meniscal repair techniques

Meniscal repair gives satisfactory medium-term clinical results in 70 to 90% of patients and an acceptable secondary meniscectomy rate (4 to 28%), provided that it concerns peripheral red-red zone or red-white zone lesions, i.e. in a peripheral vascularised area (grade C). According to morphological studies (arthro-CT scan, arthro-MRI, arthroscopy), the rate of complete healing is 60%. Healing needs to be assessed in routine clinical practice only if symptoms persist after six months (grade C).

When surgery is indicated for these peripheral lesions, the alternative to repair is a total or subtotal meniscectomy for the segments concerned.

Repair in unvascularised white-white zones is not recommended (grade C) as the absence of vascularisation makes the healing process uncertain and meniscectomy is partial.

According to the literature, no given type of implant is clinically superior to another (grade C). Sutureless fixation materials have a higher complications rate (poor hold, synovitis, cartilage lesion, etc.) and were less successful in animal or cadaveric biomechanical studies. They are therefore less in favour (professional agreement). The current trend is towards the use of hybrid implants (fixation material combined with suture wire). However, because of complications such as neuropathic pain after open surgery (first generation devices) and after posterior approach surgery (second generation devices), hybrid implants tend to be reserved for cases of absolute necessity only.

It is impossible to favour one rehabilitation protocol over another (professional agreement in the absence of clinical studies).

Traumatic meniscal lesion management

Traumatic meniscal lesions do not always require a meniscectomy.

Diagnosis depends on a clinical examination seeking meniscal signs and signs of laxity.

Standard X-rays (anterior-posterior, lateral, patellofemoral 30° , and comparative Schuss view [Rosenberg] from the age of 40) should always be carried out (professional agreement). Magnetic resonance imaging (MRI) should be performed to specify the type of lesion, the state of the ACL and to look for a bone contusion (professional agreement).

In cases of acute painful knee locking, diagnostic and therapeutic arthroscopy may be proposed if MRI cannot be performed promptly (professional agreement).

Stable knee

According to the literature, a partial meniscectomy on a stable knee offers good long-term results, especially for the medial meniscus (84 to 95% of good and very good outcomes). The joint space narrowing rate is 21% after a mean follow-up of 13 years. For the lateral meniscus, the results are not as good (58 to 95% of good and very good outcomes). The joint space narrowing rate can reach 42% after 13 years. Meniscal repair has a 4 to 28% failure rate. It can only be used in vascularised areas. Patient age, medial or lateral location, and the extent of the lesion determine the course of action (grade C).

Meniscectomy and meniscal repair are not at odds for longitudinal vertical lesions; their indications complement each other (professional agreement).

Meniscal repair is proposed in cases of peripheral meniscal lesions in the red-red zone or red-white zone in young, motivated patients, especially for a lateral meniscus and a recent lesion (professional agreement in the absence of retrospective, case controlled or other comparative studies). Such cases are, however, uncommon. The most limited meniscectomy is proposed in other cases.

Anterior cruciate ligament deficient knee

Meniscal preservation is the rule. Treatment of the meniscal lesion and laxity are linked. A meniscal lesion associated to a chronic anterior laxity, even if the meniscal symptoms are predominant, should raise the possibility of ligament reconstruction (professional agreement).

When the ACL has been reconstructed and a meniscal lesion is present, the choice of treatment method will, whenever possible, preserve the meniscus (grade C)

Technique	Indication	Risk of secondary meniscectomy
Let the meniscus alone	Lateral meniscus Medial meniscus (limited to stable lesions, peripheral or otherwise)	0—7% for lesions up to 20mm 0—21%
Meniscal repair	Unstable peripheral meniscal lesions (mostly medial meniscus)	
Most partial meniscec- tomy possible	All other cases	

Table 3Methods of meniscus preservation after ACL reconstruction and in the presence of a meniscal lesion.

(Table 3). However, the indication for meniscal repair is debatable if a ligament reconstruction is not proposed.

Meniscectomy without ligament reconstruction should only be proposed if all the four following criteria are met (professional agreement):

- (i) symptomatic meniscal lesion (which excludes any meniscectomy of asymptomatic meniscal lesions discovered during the laxity assessment);
- (ii) irreparable meniscal lesion;
- (iii) no functional instability;
- (iv) inactive or elderly patient.

The patient should be informed of the foreseeable benefits and risks of failure.

Diagnosis and treatment of non-traumatic meniscal lesions

The assessment and management of non-traumatic degenerative meniscal lesions depend on the extent of cartilage damage. In the event of femorotibial gonalgia, symptomatic medical treatment over six months is advisable. X-rays (anterior-posterior view, Schuss [Rosenberg], lateral and patellofemoral 30°) should be carried out.

When the patient does not respond to a complete course of medical treatment, MRI should be performed to evaluate the menisci, the subchondral bone, the synovium, and to a lesser extent, the cartilage (Fig. 1) (professional agreement).

• If there is no narrowing of the femorotibial joint space visible on the X-rays, and if MRI reveals an isolated grade III lesion (complete meniscal signal absence), with no change in bone signal, consistent with the symptoms and the clinical examination, the meniscal lesion is considered to account for the pain. The most partial arthroscopic meniscectomy should be used after medical treatment has



Figure 1 Diagnostic and therapeutic decision tree for non-traumatic knee pain in patients aged over 40.

failed (professional agreement). The efficacy of related procedures (particularly involving the cartilage) is not proven.

• In the presence of any narrowing whatsoever of the femorotibial joint space on the X-rays, the patient should receive treatment for osteoarthritis and its risk factors. Arthroscopic meniscectomy is not recommended (grade B).

In the rare cases when the onset of symptoms is sudden and X-rays provide no explanation for the symptoms of mechanical internal injury of the knee joint, an MRI should be performed. Where there is no change in the bone signal, an arthroscopy involving a meniscectomy of the unstable lesions may be proposed. Extensive procedures of unproven efficacy (abrasive chondroplasty) should be avoided. The patient should be warned that the results are uncertain and temporary (grade C).

Indication for anterior cruciate ligament reconstruction

All ACL ruptures do not require reconstructive surgery (professional agreement).

The diagnosis of an ACL tear depends mainly on clinical symptoms and signs of anterior laxity (especially the Lachman test). Systematic use of subjective and objective International Knee Documentation Committee (IKDC) scores and instrumental or X-ray laxity measurements are not necessary for diagnosis. They are useful for assessing improvement and treatment outcomes, and comparing the latter with literature data. No studies report a functional or objective score threshold below which surgery should be considered.

Early surgery is not mandatory (grade C). It would appear to be advisable to delay surgery to reduce complications,

Patient characteristics	Treatment
Young, functional instability, practises contact or non-contact pivot sport or has a high-risk occupation	Reconstructive surgery with concomitant treatment for a meniscal lesion (as above)
Any age, no functional instability, does not practise pivot sport, no meniscal lesion	Functional treatment and monitoring Inform patient that surgery will be discussed if functional instability develops
Young, seen early, no functional instability has developed yet, significant laxity, practises pivot activity	May benefit from reconstructive surgery especially when reparable meniscal lesion present

Table 4Working group consensus on treatment of threecategories of patients.

stiffness, and deep vein thrombosis (grade B). Early surgery can be indicated for a bucket handle meniscus tear and/or a large mobile osteochondral lesion to treat the torn ligament and the associated lesion(s) simultaneously (professional agreement). Barring these cases, functional treatment is undertaken for recent ACL sprains.

Currently in France, a ligament reconstruction consists in autograft reconstruction as ACL sutures are ineffective (grade C). Prosthetic reconstruction has proved to be inadequate and iatrogenic (grade C).

The indication for delayed reconstructive surgery is based on symptoms, the most important being functional instability, and on the following criteria: patient's age, profession and sports activities (including level of practice), time elapsed since the lesion occurred, extent of laxity, and presence of associated – particularly meniscal or cartilage – lesions (related to time elapsed). The patient's social and occupational expectations are also taken into account (professional agreement).

The aim of ACL reconstruction is to prevent or eliminate functional instability and limit the risk of a secondary meniscal lesion. However, according to long-term studies, surgery cannot be indicated for the prevention of osteoarthritis.

The working group came to a consensus with regard to treatment of three categories of patients (Table 4). All the criteria given above must be taken into consideration in all other cases. Owing to the number and interdependency of the criteria, no ranking can be established and all possible clinical situations cannot be listed.

The decisive criterion is functional impairment (primarily functional instability) (professional agreement) but the following points can help in the decision (professional agreement):

 a Lachman test with a delayed firm endpoint is a sign of a partial tear or partially healed tear. This type of laxity requires anterior and rotatory laximetric analysis. There is too little information on the natural history of these partial tears to recommend any particular approach;

- gross pivot shift warrants surgery;
- the fact that the patient is over 40 is not in itself a contraindication to surgery, provided that there is no degenerative cartilage defect of the knee;
- the patient's social and occupational needs and the sports he/she practises must always be taken into consideration. The benefit/risk ratio between reconstructive surgery and adapting the patient's activities without surgery (linear work) must be assessed with the patient. A high level of pivot sport is grounds for surgery if the patient wishes to continue the sport;
- the presence of a peripheral meniscal lesion, especially if recent, warrants reconstructive ligament surgery.

Anterior cruciate ligament reconstruction: technique

It is advisable to perform arthroscopic ligament reconstruction (professional agreement) because of the possibility of assessing the joint fully at the same time, the shorter postoperative recovery, reduced morbidity, and faster recovery.

Choice of graft

There are no prospective comparative studies that allow conclusions on the use of the quadriceps tendon or the fascia lata.

Available meta-analyses and prospective randomised studies have revealed no significant difference between bone-tendon-bone (BPTB) grafts and hamstring tendons (HT) (4-strand) on laxity, as assessed by the Lachman test, pivot shift, and functional results (IKDC scores). Both types of graft can therefore be used (grade A).

Anterior knee pain and flexion deformity are more common with BPTB than with HT grafts but the recovery level in terms of sports is similar for both techniques (grade A). They may, however, impact on professional activities (need to kneel down).

Medium-term degenerative cartilage modifications on Xrays are more common after BPTB than HT grafts but are seldom symptomatic.

Choice of fixation

- Bone-patellar tendon-bone reconstruction: fixation by a femoral interference screw and a tibial interference screw is the gold standard technique. Double fixation to the femur or tibia is unnecessary, except if the interference screw does not hold well (particularly on the tibia). The screw may be metal or bioresorbable pure polylactic acid (PLA); no difference in clinical outcomes has been reported (grade C). Composite osteoinductive screws are undergoing evaluation. The use of titanium metal screws facilitates the reading of postoperative scans and MRI. The use of resorbable screws facilitates postoperative MRI readings and repeat surgery if required.
- Hamstring reconstruction: an extra-anatomical system, interference screw, or any other intracanal system can be used in the femur. So far, no biomechanical or clinical studies have provided evidence for recommending a double femur fixation. In the tibia, the traction is created

in the axis of the graft. A double or reinforced fixation may therefore be proposed especially if the bone does not hold well (professional agreement).

Lateral tenodesis

Isolated lateral tenodesis is not recommended at any age because of the satisfactory results obtained with intraarticular reconstruction, even after the age of 50, and because of the lack of anterior translation control with lateral tenodesis (professional agreement).

There is no indication for systematically combining lateral tenodesis in cases of chronic anterior laxity (grade B). Lateral reconstruction combined with intra-articular reconstruction should only be considered in the event of global anterior laxity (professional agreement in the absence of a comparative prospective study of sufficient power).

Double bundle reconstruction

Double bundle reconstruction is based on a logical anatomical principle. However, it is still undergoing assessment because of the greater surgical difficulty, the controversial mid-term functional benefits, the absence of studies on the difficulties of revision surgery, and the frequent need for quadruple fixation (grade B).

Computer-assisted surgery (CAS)

Although no studies have demonstrated any functional benefits, CAS helps to reproduce tunnel positioning and quantify laxity, particularly intra-operative rotatory laxity.

Because of its implementation problems, costs, and learning curve, CAS is still undergoing assessment but it may ultimately help establish surgical options.

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