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## Abstract

With increasing life expectancy and advances in medicine, degenerative disease of the knee now occurs in patients with higher activity levels and functional expectations. Providing appropriate treatment for these patients depends on an accurate assessment to gather not only clinical information but also functional, psychosocial, and cultural factors that are essential for therapeutic decision. This patient's evaluation requires a rigorous clinical examination, complementary examinations, and the use of assessment scores.

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## Abbreviations

ACL	Anterior cruciate ligament
HKA	Hip knee ankle
HSS	Hospital for Special Surgery
IKS	International Knee Society
KOOS	Knee injury and Osteoarthritis Outcome Score
WOMAC	Western Ontario and McMaster Universities Arthritis Index

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## Clinical Examination:

The goal of the clinical examination is to establish the diagnosis of osteoarthritis and to clarify the etiology and severity through a clinical history and thorough physical examination. These findings will help to determine the appropriate treatment, assess the risk of developing complications,

and evaluate expectations and functional needs of the patient. The goal is to provide the most appropriate treatment, taking into account the risks and the expected benefits.

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## History

### Critical Components

- Demographic and anthropometric data: age, gender, ethnicity, weight, and height
- Medical and surgical history that may complicate the management or result in surgical or anesthetic risk, local history including prior trauma and surgery, and known allergies
- Prior treatment including systemic (NSAIDs, other medications) as well as local treatments such as injections and the therapeutic effects thereof
- Lifestyle: environment, home, activity level, etc.

The interview then focuses on the knee through the history of the disease, highlighting the main functional complaint (frequently pain), date of onset of symptoms, and the possible existence of an aggravating event or injury. The status of other weight-bearing joints (hips and contralateral knee) should be reviewed.

Functional assessment is essential. The main functional signs are researched and assessed:

- Pain, specifying the timing and circumstances of the occurrence, intensity, and modes of relief. Visual analogue scales seem to be the most reliable evaluation method for pain (Flandry et al. 1991).
- Walking limitations evaluated by distance or time and the presence of a limp.
- The potential use and kind of walking aids: canes, crutches, splints, and wheelchair.
- The discomfort caused by climbing or descending stairs and taking a seat.
- Limitations to the practice of leisure activities and patient-specific sports.

This evaluation aims to measure functional disability associated with the disease in the patient while anticipating functional expectations of the

patient. These data will be involved in the therapeutic decision and will prepare the patient to have reasonable functional expectations.

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## Physical Examination

Physical examination will collect objective data that will determine the status of the degenerative knee and clarify the nature and severity of the disease. Key components include:

- Alignment: normal, varus, or valgus
- The presence of any scars
- The presence and size of any intra-articular effusion
- The location of the pain by palpation of the knee, compartment by compartment
- Knee range of motion: flexion, extension, and any flexion contracture
- Coronal plane laxity including the reducibility of any deformities
- Sagittal plane laxity
- Meniscal tenderness
- Peri-patellar pain on palpation
- Gait assessment

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## Patient's Expectations

Once all clinical information is collected, it is necessary to focus on the patient's expectations. Is he/she satisfied with his/her knee? What does he/she expect from the treatment proposed to him/her? Which activity does he/she want to continue or to resume after the treatment? These data are essential, firstly because they significantly affect postoperative patient satisfaction (Gandhi et al. 2008) and secondly because expectations may in some cases need to be modified to avoid complications as well as disappointment with the results.

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## Complementary Examinations

Radiographs are necessary and usually sufficient to diagnose osteoarthritis and make treatment decisions in conjunction with clinical data. More

advanced imaging (CT, MRI) are rarely needed. Views should include:

- A schuss view of both knees (AP weight-bearing view of the knee taken in 30° of flexion): It is useful to define the degree of osteoarthritis, generally classified using the Ahlbäck classification (Ahlbäck 1968), modified in 1991 (Dejour 1991) (Table 1). There are other less common radiological classifications such as the classification of Altman (Altman et al. 1986) or the classification of Kellgren and Lawrence.
- Full weight-bearing anteroposterior and lateral views of the knee: these views allow assessment of the tibial slope, the patellar height, and the existence of medial or lateral compartment gapping that indicate frontal plane laxity.
- An axial view of the patella to assess patellofemoral osteoarthritis and patellar centering.
- A full weight-bearing long leg film to measure alignment accurately.
- Finally, anteroposterior views of the knee in stress (varus and valgus) can be interesting to consider potential ligament release during surgery, in cases of irreducible frontal plane deformity (Verdonk et al. 2009).

Advanced imaging may be necessary in certain cases, especially in cases where conservative treatment is an option. MRI and CT arthrograms can provide insight into meniscal or chondral injuries, detect and better define osteonecrosis, and evaluate damage to the cruciate ligaments. Such information is critical, especially when considering a unicompartmental prosthesis that relies on intact cruciates and relatively normal cartilage in other compartments. Over time, repeated use of all imaging modalities in association with history

and physical examination provides useful information regarding the evolution of the disease process and response to treatment.

## Scores

Historically, the first scores were created to evaluate the objective aspects of degenerative knees. They were applied pre- and then postoperatively to assess outcomes from the point of view of the surgeon. It is only later that the evaluation of functional, psychosocial, and cultural context came to complete scores in the contemporary context of the evaluation of results and quality of life by the patient himself.

One of the oldest scores is the HSS score (Hospital for Special Surgery knee-rating system score) created in 1974 (Insall et al. 1976). Revised in 1989, it became the KSS (Knee Society score) (Insall et al. 1989) which is now one of the most used scores in the world for the objective evaluation of degenerative knee. This score has the advantage of being simple to use and calculate, collecting clinical, functional, and radiological data. It consists of two parts: a knee score of 100 points and a function score of 100 points. The knee score is a clinical score evaluating pain (50 points), mobility (25 points), and stability of the knee (25 points) with penalties for the existence of a flexion contracture, a lack of active extension, and malalignment. The function score assesses the ability to walk (50 points) and climb and descend stairs (50 points) with penalties for the use of a walking aid, so we can see that the functional assessment is relatively limited with the IKS score. In addition to this clinical evaluation, a radiographic evaluation is available (Ewald 1989).

The KOOS score (Knee injury and Osteoarthritis Outcome Score) created in 1995 in Sweden by Roos is also widely used. Its psychometric properties have been validated (Roos et al. 1998). This score is intended to follow the evolution of the degenerative knee and can be used after any knee surgery, not just arthroplasty. This score is built as an extension of the WOMAC score (Western Ontario and McMaster Universities Osteoarthritis

**Table 1** Ahlbäck classification

Stage	Ahlbäck classification
0	Normal
I	Narrowing lower than 50 %
II	Narrowing more than 50 %
III	Complete narrowing
IV	Cupula

Index) and is more adapted for younger and more active patients. The full version of the WOMAC was created in 1988 by Bellamy and later shortened by Whitehouse. This short version is most widely used (Whitehouse et al. 2003). The KOOS consists of five evaluation areas: pain, other symptoms, function in daily living, sports and recreation function, and knee-related quality of life. Each of these areas is calculated on a 100-point scale after normalization. Using a total score is not recommended with this scale.

The Oxford score was created in 1998 (Dawson et al. 1998). It is widely used worldwide in the evaluation of patients with osteoarthritis of the knee but is much less effective in follow-up after surgery. This is a score out of 60 points (60 is the worse score, 12 is the best score), which contains 12 questions about pain, mobility, and walking. It has been statistically validated based on current recommendations.

The psychosocial assessment is a less explored area, and the questionnaires used are generic questionnaires not specific to knee surgery. The best known and most widely used is the SF-36 and particularly its short version: the SF-12 (Ware et al. 1996). This score includes two parts: a physical score and a mental score. The calculation method is original because the score places the patient on either side of a mean. The calculation must be performed online on the dedicated website (<http://www.sf-36.org>).

The scores used in the evaluation of degenerative knee today are innumerable. However, several reviews of the literature regarding the use of these scores (Davies 2002; Marx 2003) all conclude that none of them are perfect. The main problem is that there is no score to assess all aspects of patients in a single questionnaire: clinical, functional, satisfaction, and expectations. This limitation pushes surgeons to use several different scores. The patient's satisfaction, which is probably the most important indicator of success from the patient's point of view, is rarely assessed with traditional scores, although we know that it is often noncorrelated to the objective results. In addition, with the proliferation of evaluation scores, it is now necessary to examine the psychometric properties of these scores to ensure

their quality, whether in the creation of a score (Fermanian 2005) or at its cross-cultural adaptation in another language (Beaton et al. 2000), which in practice is rarely done.

The committee of the Knee Society has recently published a new KSS (Noble et al. 2012), which provides many advantages over the previous version and the other scores.

- It has been statistically validated through a large-scale prospective study on patients with total knee prostheses.
- It provides modern notions of evaluation such as “patient-reported outcomes” (PRO) (Acquadro et al. 2003; Willke et al. 2004), a contemporary evaluation method directly involving the patient.
- It contains two new fields of investigation: expectations and satisfaction of patients.

Thus, the new KSS contains two main components: an objective component and a subjective component, itself composed of a “patient expectations” domain, a “satisfaction” domain, and an “activities” domain. The objective component is out of 100 points: 25 points for alignment with a 10-point penalty if there is malalignment, 25 points for stability, 25 points for knee flexion, and 25 points for pain using two visual analogue scales and finally penalty of 30 points for a lack of active extension. The subjective component includes 15 points for “expectations” including expectations of pain relief, activities of daily living, and activities of sports and leisure. It should be noted that there is a preoperative and a postoperative evaluation. The “satisfaction” domain is out of 40 points and considers pain while sitting and lying and knee function while performing activities of daily living and sport and recreation. Finally the “function” domain of 100 points assesses knee function in the standard activities of daily living and sport and recreation and is adapted to more active patients with a wide range of activities proposed. The subjective component is a self-administered questionnaire that allows the remote monitoring of patients. This score is currently available online on the website of the Knee Society (<http://www.kneesociety.org>).

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## Conclusions

Degenerative pathology of the knee occurs in patients that are today more and more active with significant functional requirements that weigh heavily in therapeutic decision-making.

The evaluation of these patients should be complete with a thorough clinical examination, a focused imaging, and the use of modern evaluation scores which should strive to evaluate all aspects of the patient, including clinical data, patient expectations, and psychosocial context of each patient. In total, these methods allow selection of the most appropriate treatment while preparing the patient to the results he/she can expect.

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## Cross-References

- ▶ [Inlay Joint Resurfacing and High Tibial Osteotomy in Middle-Aged Athletes](#)
- ▶ [Lateral Unicompartmental Knee Replacement and Return to Sports](#)
- ▶ [Sports After Total Knee Prosthesis](#)
- ▶ [Sports and High Tibial Osteotomy](#)
- ▶ [Sports and Knee Arthroplasty: How to Deal with the Extensor Mechanism](#)
- ▶ [Sports Participation and Risk of Knee Osteoarthritis: A Critical Review of the Literature](#)
- ▶ [Treatment of Pain in Total Knee Arthroplasty Favoring Post-op Physical Activity](#)
- ▶ [Unicompartmental Knee Replacement and Return to Sports](#)

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