PROPOSED SCORING SYSTEM FOR ASSESSING SYNOVIAL MEMBRANE ABNORMALITIES AT ARTHROSCOPY IN KNEE OSTEOARTHRITIS

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SUMMARY
The synovial membrane is thought to play an important role in both the clinical and the anatomical evolution of osteoarthritis. Arthroscopy performed under local anaesthesia on an outpatient basis has been proposed as a means of cartilage and synovial assessment for research purposes. The authors propose a scoring system for assessing anterior synovial abnormalities at arthroscopy in knee osteoarthritis. This synovitis score takes into account the intensity and the extent of synovial lesions.

KEY WORDS: Arthroscopy, Knee osteoarthritis, Synovium, Synovitis score.

The synovial membrane is thought to play an important role in both the clinical and the anatomical evolution of osteoarthritis. It has been suggested that the synovium, together with the subchondral bone, muscles and ligaments, is involved in the occurrence of pain in osteoarthritis [1]. The role of the synovium in the degradation of articular cartilage has been shown by the demonstration of active in vivo synthesis of stromelysin and collagenase by cells of the human rheumatoid synovium using both in situ hybridization [2] and immunolocalization [3]. These studies suggested that the osteoarthritic synovium also synthesizes stromelysin, although at a lower level than does the rheumatoid synovium. It is accepted that synovitis occurring in osteoarthritis is related to the release of fragments of cartilage proteoglycan molecules into the joint fluid and/or to the presence of microcrystals in synovial fluid or the synovial membrane [4].

Synovitis and cartilage lesions can be evaluated by magnetic resonance and arthroscopy. Despite its invasiveness, arthroscopy is still considered the 'Gold Standard' for the assessment of articular cartilage and synovium because it provides a direct and magnified evaluation of these anatomical structures and permits guided synovial biopsy in pathological areas. In the knee joint, arthroscopy can be simplified by the use of local anaesthesia, elimination of the tourniquet, use of a small glass lens scope and performance on an outpatient basis. This procedure has been proposed as a means of cartilage [5] or synovial assessment [6] for research purposes. Lindblad and Hedfors [6] found a highly significant correlation between local macroscopic signs of inflammatory activity assessed at arthroscopy and microscopic signs in the corresponding tissue specimen as revealed by routine histopathological and immunohistochemical studies. Irrespective of clinical diagnosis (chondromalacia or various types of arthritis), a profound intra-articular variation in

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AYRAL ET AL: ARTHROSCOPIC SYNOVITIS SCORE

**METHODS**

Definition of the scoring system required two steps. The first was attribution of a point scaling system to quantify the three aspects of synovial membrane. The three synovial aspects were graded arbitrarily as follows: normal, 0; reactive, 0.5; inflammatory, 1.0.

The second step consisted of determining the anatomical size of each anterior synovial region of the knee (see Fig. 1), which are (i) the suprapatellar pouch, located above the upper part of the trochea and divided into (a) the posterior wall (located at the anterior part of the femur) and (b) the antero-medial and antero-lateral walls, which connect medially and surround the patella; (ii) the medial and lateral gutters, which are located medially and laterally between the upper part of the trochea and the perimeniscal synovium; (iii) the medial and lateral perimeniscal synovium; (iv) the fat pad located in front of the trochea; and (v) the synovium of the intercondylar notch, covering the anterior cruciate ligament and the infrapatellar plica.

To assess the size of these different synovial regions, a cadaver knee was dissected and the anterior synovium exposed. By computer assessment, the size of each anterior synovial region was expressed as a percentage of the whole anterior synovial surface.

**RESULTS**

The size of each anterior synovial region is summarized and the mathematical formula of the synovitis score is given in Table I. The investigator evaluates the aspect of the synovium covering each synovial region (normal, reactive or inflammatory). The size of each synovial region is multiplied by the grade (0, 0.5 or 1.0) of the synovitis intensity of this region. The synovitis score of the knee joint is obtained by adding the results of the various synovial regions (see Fig. 1 — Diagram of the anterior synovial regions of the knee (right knee — joint opened).
chondropathy of the knee for research purposes should
systems for assessing synovial abnormalities and
effectiveness to change. The use of arthroscopic scoring
validate this scoring system, i.e. to assess inter- and
intraobserver reliability, and to define its validity and

Example); then (ii) multiplying the anatomic size of the
intensity (range 0-1) for this posterior wall (0.55 in this
example). Then (iii) multiplying the extent (expressed in percentage) of the
posterior wall of the suprapatellar pouch is obtained by
adding the results of the different
aspects, i.e. 20, by its mean synovitis intensity
(0.55 in this example).

The calculation of the total synovitis score of the
knee is obtained by adding the results of the different
synovial regions. The value of the
synovitis score of the knee (range 0–100) is 41.25.

**DISCUSSION**

This proposed method of calculating a synovitis
score is the first quantitative system to take into account
the intensity of synovitis and its extent evaluated on the
basis of quantitative dissection of the different anterior
synovial regions of the knee. Further cross-sectional
and longitudinal studies should be carried out to
validate this scoring system, i.e. to assess inter- and
intraobserver reliability, and to define its validity and
sensitivity to change. The use of arthroscopic scoring
systems for assessing synovial abnormalities and
chondropathy of the knee for research purposes should
lead to a better understanding of the interrelations
between synovitis and clinical phenomena on the one
hand, and between the status of synovitis and
chondropathy and disease evolution on the other.

This validation will permit the consideration of
arthroscopy as the ‘Gold Standard’ for the evaluation
of the severity of synovitis in osteoarthritis. Thereafter
it should be possible to compare this technique with
other, less invasive techniques such as MRI.

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