

## Viability of chondroscopy as a means of cartilage assessment

Fundamental research in osteoarthritis is progressing. Disease modifying agents are emerging and are expected to improve pain or function by preventing, delaying, or even reversing the breakdown of articular cartilage. Evaluation of these potentially chondroprotective drugs requires outcome measurements assessing the amount or quality of articular cartilage. Because of this requirement, and in addition to the use of arthroscopy for diagnostic and therapeutic purposes in knee disorders, one pertinent question is whether arthroscopy can be considered as a means of assessing cartilage outcome. The answer to this question depends partially on the performance of other non-invasive outcome techniques.

Serological markers of osteoarthritis have not yet been successfully developed.<sup>1</sup> Measurement of joint space narrowing on weight bearing radiographs is a simple and non-invasive technique to assess the severity of chondropathy,<sup>2</sup> but remains an indirect evaluation of cartilage breakdown devalued by false positive and false negative findings.<sup>3</sup> Contrast computed tomography represents a valuable imaging method for patellofemoral joint cartilage, but it requires knee puncture and ionising radiation, and is relatively insensitive in the delineation of small cartilage lesions<sup>4</sup> which constitute the most suitable group for investigation of 'osteoarthritis modifying agents'. Magnetic resonance (MR) would appear to be the ideal technique for non-invasive assessment of articular cartilage, but clinical studies have often yielded disappointing results in detection and grading of cartilage lesions, with false negative findings concerning superficial lesions and underestimation of the arthroscopically determined abnormalities.<sup>5–6</sup> In addition, MR characteristics of chondral lesions and optimal MR sequences are not clearly defined,<sup>7</sup> and MR quantification of chondropathy is not yet available.

Arthroscopy provides a direct, magnified view of the six articular cartilage surfaces of the knee and is more sensitive than plain radiographs, computed tomography or magnetic resonance in the detection of cartilage lesions.<sup>8</sup> It is therefore considered the 'Gold Standard' for the assessment of articular cartilage.<sup>3</sup> Moreover, arthroscopy permits macroscopic evaluation of synovial abnormalities, the distribution of which is often patchy in osteoarthritis;<sup>9</sup> in this field, arthroscopy permits synovial biopsy in the pathological area, which seems to be more appropriate than closed synovial biopsy. Thus a new indication of arthroscopy is emerging: the monitoring of knee chondropathy conducted for research purposes in patients suffering from knee osteoarthritis, in order to evaluate the natural history or to prove 'de visu' the chondroprotective effect of potentially chondroprotective drugs.<sup>10</sup>

Arthroscopic follow up of chondropathy has required establishment and validation of a system of quantification of chondropathy. Two such systems are available: the use of a total 100 mm visual analogue scale of the severity of chondropathy<sup>10</sup> and a more analytical system developed by the French Society of Arthroscopy (Société Française d'Arthroscopie), taking into account the size, depth, and localisation of chondral lesions, and termed the SFA scoring and grading systems.<sup>11–12</sup> We investigated whether arthroscopic quantification of chondropathy had the characteristics required of a tool of evaluation: simplicity,

reliability, clinical relevance, sensitivity to change, and capacity to discriminate. Arthroscopy will always be an invasive procedure, but can be simplified by the use of local anaesthesia, performance on an outpatient basis, elimination of the tourniquet, and use of a small glass lens arthroscope (2.7 mm). This simplified arthroscopy, performed for clinical research, has been called 'chondroscopy'.<sup>10</sup> It is well tolerated and the joint lavage delivered during arthroscopy is a useful symptomatic treatment in knee osteoarthritis, counterbalancing the invasive nature of the procedure.<sup>13</sup> Intraobserver reliability of chondropathy measurement is much better than interobserver reliability.<sup>10</sup> Therefore, all the arthroscopy videotapes of one clinical study can be reviewed by a single investigator.

There is a good correlation between the visual analogue scale and the SFA systems, and the two are of complementary interest.<sup>11–12</sup> Radiographic and arthroscopic evaluations of cartilage breakdown are closely correlated, despite better sensitivity of the arthroscopic evaluation.<sup>10</sup> In a cross sectional study, pain and functional disability were not correlated with cartilage damage, but in a longitudinal study, changes in the severity of cartilage lesions were correlated with changes in functional impairment.<sup>14</sup> Chondroscopy proved capable of demonstrating statistically significant changes in cartilage lesions between two evaluations performed only one year apart, even in a small sample of patients (fewer than 20).<sup>15</sup> This finding might be explained by the direct approach to cartilage lesions and by the selection of patients requiring joint lavage and therefore suffering from 'active' disease. A preliminary study of repeated hyaluronic acid injections suggested that chondroscopy may be capable of identifying truly chondro-modulating agents.<sup>15</sup> The figure shows the degree of detail which might routinely be visualised using the technique.

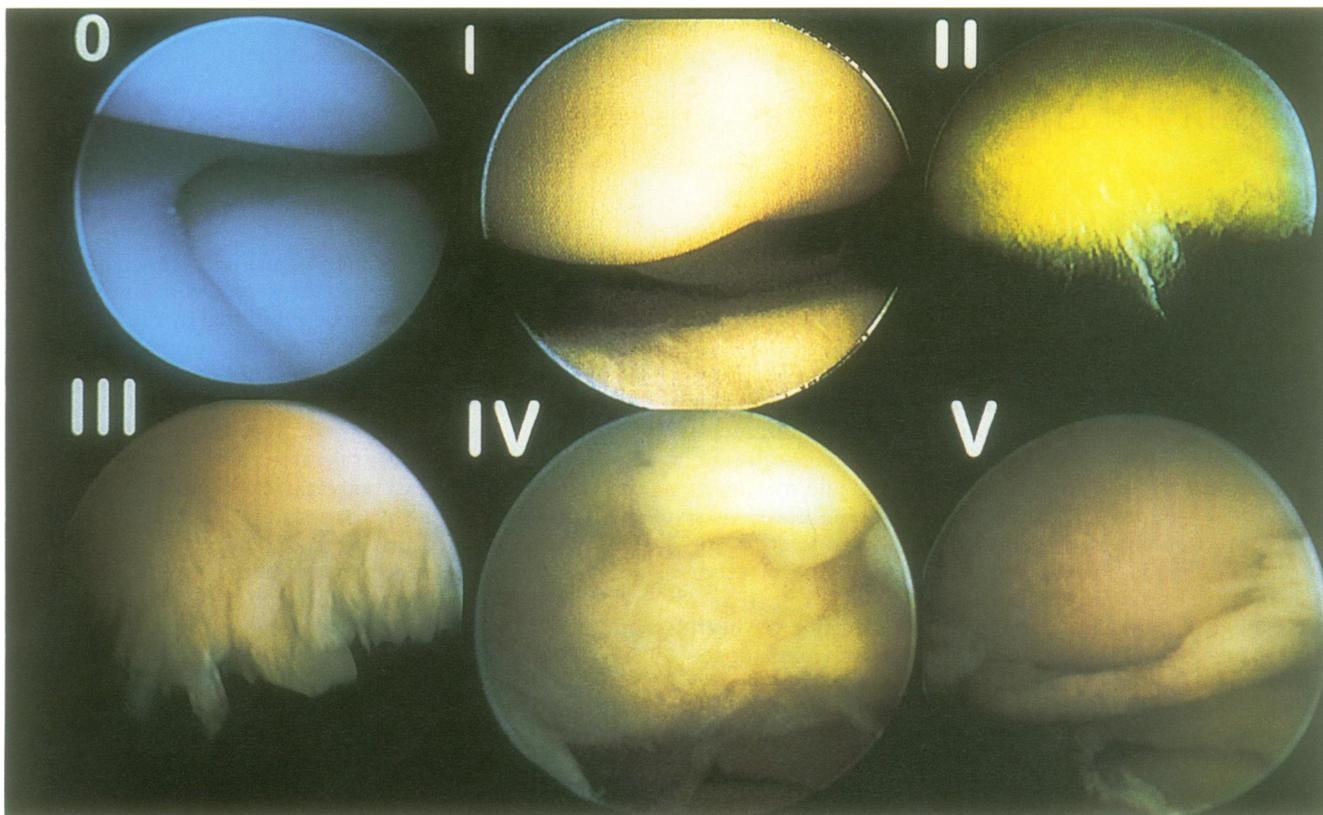
Our studies suggest that chondroscopy would be considered as a potentially relevant outcome measurement of osteoarthritis for research purposes. Further studies are required, however, to evaluate this method in other patients monitored by other investigators. The development of this technique confronts several problems:

*'Cultural' problems*—Rheumatologists who are not used to managing osteoarthritis patients with joint lavage could consider chondroscopy to be unethical; repeated arthroscopy may be considered unethical if the patient has dramatically improved after one year of follow up.

*Technical problems*—Few rheumatologists are trained to perform arthroscopy, few departments of rheumatology own the necessary arthroscopic equipment, few orthopaedic surgeons are interested in carrying out arthroscopy only in order to visualise and record articular cartilage surface without performing a therapeutic procedure, and few orthopaedic surgeons are used to performing arthroscopy under local anaesthesia.

*Imaging requirements*—Chondropathy videorecording must be of good quality with a clear image and a slow and complete exploration of the articular surface performed in a systematic manner.

Different solutions are available. Rheumatologists have the possibility of training in arthroscopy by working alongside an experienced arthroscopist. This is time consuming and represents a new orientation of their medical practice. Another solution is collaboration between a rheuma-



Chondroscopy of the knee. Grade 0 = normal articular cartilage (medial femorotibial compartment); grade I = swelling, softening or both (blister of the lateral femoral condyle); grade II = superficial fibrillations ('velvet like' appearance of the patella); grade III = deep fibrillations ('crab-meat like' appearance of the patella); grade IV = deep ulceration (medial femoral condyle); grade V = exposure of subchondral bone (medial femoral condyle).

tologist and an orthopaedic surgeon for, respectively, medical and chondroscopic management of the patient. Training sessions are necessary to become familiar with local anaesthesia, even for experienced arthroscopists, in order to obtain a painless procedure and useful videorecording.

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