Survey of arthroscopy performed by rheumatologists

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Abstract

Objective. To determine the international distribution and practice of arthroscopy performed by rheumatologists and to evaluate proposed guidelines on minimum standards for training in arthroscopy in the context of current clinical practice.

Methods. A questionnaire was sent to all rheumatology centres identified as practising arthroscopy, by (i) searching Medline from 1966 to 1999, (ii) searching the abstract books of the annual general meetings of ACR, BSR and EULAR from 1980 to 1999, and (iii) correspondence with all the centres identified.

Results. Thirty-six rheumatology centres were confirmed as performing arthroscopy (24 in Europe, 10 in USA and two in Australia) and 33 (92%) centres completed the questionnaire. Twenty-five (76%) of the 33 centres performing arthroscopy had started to perform it since 1990 and 72 rheumatologists are now trained in arthroscopy. A total of 16 532 arthroscopies had been performed (median = 220 arthroscopies/centre, range 20–5000); 50.5% of the arthroscopies had a primary clinical indication and 49.5% had a primary research indication. Most centres fulfilled the minimum standards for arthroscopic facilities and the proposed minimum standards in training were acceptable to 76% of respondents. Complication rates were calculated for 15 682 arthroscopies where routine follow-up data were available [joint infection, 16 (0.1%); wound infection, 17 (0.1%); haemarthrosis, 141 (0.9%); deep venous thrombosis, 31 (0.2%); neurological damage, 3 (0.02%), thrombophlebitis, 12 (0.08%), other, 8 (0.06%)]. Irrigation volume correlated with wound infection rate ($r = 0.41$, $P = 0.03$) and centres performing cartilage biopsy had a higher rate of haemarthrosis ($P = 0.007$).

Conclusion. The last decade has seen rapid growth in arthroscopy performed by rheumatologists in an out-patient setting under local and regional anaesthesia. Proposed minimum standards for training in rheumatological arthroscopy reflect current practice accurately and are acceptable to the majority of arthroscopists. Complication rates of rheumatological arthroscopy are similar to those reported in the orthopaedic literature.

In the 1960s, rheumatologists began to redevelop an interest in arthroscopy in order to directly visualize and biopsy the synovium in rheumatoid arthritis [1]. Initial interest waned because of lack of correlation of arthroscopic findings with more established clinical, laboratory and radiological findings [2, 3] combined with the requirement for hospitalization and general anaesthesia. In the last decade, rheumatologists have once more begun to practise arthroscopy in ever-increasing numbers for diagnostic, research and therapeutic indications [4, 5]. This has in no small part been due to an increasing interest in the pathogenesis of synovitis and the establishment of a clear relationship of macroscopic and microscopic findings with clinical and radiological features of joint disease [5–8]. In addition, the production of high-definition, small-bore arthroscopes (1–2.7 mm) and the development of local and regional anaesthesia protocols [9, 10] have allowed day-case arthroscopy to move from the operating theatre to procedure rooms, and even into the out-patient clinic [11]. Both the American College of Rheumatology (ACR) and the European League Against Rheumatism (EULAR) have supported this development by promoting formal
arthroscopy teaching courses and by scheduling arthroscopy study groups or sessions as part of their annual general meetings.

While the development of arthroscopy in rheumatology represents a significant step forward in our ability to investigate joint disease, it is important that standards of training, practice and technical competence are established by rheumatologists in order to ensure both the safety of patients and the full realization of the potential of this useful technique. These standards should be in line with current clinical practices and established training guidelines [12]. Accordingly, through an initiative of the International League Against Rheumatism (ILAR), a working party of arthroscopy users from the EULAR Early Synovitis Study Group have prepared guidelines on minimum standards for the training of rheumatologists in arthroscopy. These have recently been endorsed by ILAR and passed to the regional leagues (personal communication, R. Reece). We undertook to identify and survey all rheumatology centres that are performing arthroscopy in order to determine the current clinical practices and safety experience of arthroscopy and to establish whether the proposed guidelines are practical and acceptable.

Methods
A search of Medline from 1966 to 1999 was performed to identify all publications in rheumatology journals which included the term ‘arthroscopy’. In addition, the abstract books of the ACR, EULAR and the British Society for Rheumatology (BSR) annual general meetings (1980–1999) were searched for abstracts which contained the term ‘arthroscopy’ or which described work that included human synovial or cartilage analysis. From inspection of the abstracts, a list was compiled of rheumatology centres that had reported their experience with arthroscopy and of rheumatology centres that had performed research on synovial or cartilage tissue obtained at arthroscopy. One of the authors (RR) provided a list of rheumatology centres practising arthroscopy which were known to him through the BSR special interest group in arthroscopy and the EULAR courses on arthroscopy. Finally, each respondent to the questionnaire was asked to list any other rheumatology centres in their country which they knew to be performing arthroscopy.

A questionnaire was formulated which asked the principal arthroscopist to complete the questionnaire, to confirm that arthroscopy was being performed by rheumatologists, and to detail the duration and extent of arthroscopy experience, training received in arthroscopy and current arthroscopy practices and facilities. These questions were designed to cover all areas listed in the proposed guidelines for training in arthroscopy, which were endorsed by ILAR. Each centre was mailed with a questionnaire and a pre-addressed envelope. If no reply was received, a further questionnaire was mailed 6 weeks later.

Results

Response to questionnaire
Forty-seven centres were provisionally identified and mailed. Forty-three replies were received after the two mailings, and a total of 36 rheumatology centres which performed arthroscopy were identified. Of the responders, 32 rheumatology centres were currently performing arthroscopy, one had stopped performing arthroscopy but provided details of their practice and 10 had never performed arthroscopy. Of the four centres which did not reply, three were identified as performing arthroscopy by other respondents and the status of one was not determined.

International distribution of rheumatology centres performing arthroscopy
Of the 36 centres identified, 10 were in the USA, 24 were in Europe (six in England, three in Italy, three in the Netherlands, two in Germany, two in Belgium, two in Spain, two in Switzerland, one in France, one in Ireland, one in Austria, one in Sweden) and two were in Australia.

Duration and extent of arthroscopy practice
Of the 33 centres that completed the questionnaire (USA, 8; Europe, 23; Australia, 2), 25 (76%) had started performing arthroscopy since 1990 (Fig. 1) and a total of 72 rheumatologists had been trained in arthroscopy (median 2 per centre, range 1–6). A total of 16,532 arthroscopies were recorded as having been performed by 33 rheumatology centres (median 220 arthroscopies per centre, range 20–5000), with a mean of 57 arthroscopies performed per centre per annum.

Sources of arthroscopic training
Respondents were asked to list all modalities of arthroscopic training in which they had participated. All respondents had received either formal training or informal supervised training from a colleague. Twenty-four (73%) listed informal training from an orthopaedic or rheumatology colleague, 13 (39%) had participated in an unspecified formal course (ACR, orthopaedic, etc.),
11 (33%) had participated in a formal EULAR arthroscopy course, four (12%) had undertaken an orthopaedic fellowship or rotation and three (9%) listed ‘self-taught’ as a source of training.

Adequacy of proposed guidelines on minimum standards in arthroscopic training

Each respondent was asked to comment on whether the degree of training recommended for competency in the proposed guidelines was adequate (observe five arthroscopies, assist at 10 arthroscopies and perform 10 arthroscopies independently). Twenty-five (76%) deemed the standards adequate for purposes of joint inspection and biopsy while eight (24%) deemed them inadequate, preferring a longer duration of training.

Indications for arthroscopy

Each respondent was asked to list all indications for performing arthroscopy. Thirty (91%) centres performed arthroscopy for diagnostic purposes, 27 (82%) for therapeutic purposes (joint lavage), 32 (97%) for research purposes and five (15%) for operative purposes. Of the arthroscopies performed, 50.5% had a primary clinical indication and 49.5% had a primary research indication.

Facilities

All centres performed arthroscopy in a dedicated area. Thirteen (39.5%) used an operating theatre, 13 (39.5%) used a procedure room, three (9%) used both and four (12%) used an out-patient room. The majority of centres complied with the recommendations for facilities required for performing arthroscopy under the proposed guidelines (Table 1).

Arthroscopic procedure

Anaesthesia

Thirty-one (94%) centres performed arthroscopy using local anaesthetic infiltrated directly into the skin and joint, two (6%) used a regional anaesthetic (femoral nerve block) and three (9%) also used general anaesthetic for complicated or operative procedures.

Sedation

When asked how often sedation was administered during arthroscopy, 10 (30%) centres replied that they always prescribed concomitant sedation, seven (21%) often prescribed sedation, eight (24%) rarely prescribed sedation, six (18%) prescribed sedation at the patient’s request and two (6%) never prescribed sedation. Benzodiazepines were the preferred sedative agent, with the following frequencies of use: diazepam 12, midazolam 5, versed 3, bromazepam 2, lorazepam 2, temazepam 2, alprazolam 1, clorazepam 1 and biperidin 1.

Joint irrigation

Twenty-nine (88%) centres used normal saline, two (6%) used Hartman’s solution, one (3%) used Ringer’s solution and one (3%) used an unspecified physiological solution. The mean volume of irrigation fluid used was as follows: knee joint arthroscopy, 1.8 l (S.D. 1.5, range 0.1–7); wrist joint arthroscopy, 0.3 l (0.2, range 0.06–1); metacarpophalangeal joint arthroscopy, 0.34 l (0.25, range 0.02–1).

Joints examined by arthroscopic inspection under local/regional anaesthesia

Thirty two (97%) centres performed knee joint arthroscopy, nine (27%) centres performed elbow joint arthroscopy, nine (27%) centres performed metacarpophalangeal and/or proximal interphalangeal joint arthroscopy, five (15%) centres performed shoulder joint arthroscopy, and four (12%) centres performed elbow joint arthroscopy.

Arthroscopic equipment

Thirty-two of the 33 centres used a Storz arthroscope, though some used more than one make of arthroscope (six used a Dyonics arthroscope, one used a Wolf arthroscope, one used a Stryker arthroscope and one used a Nephew Dynamics arthroscope). Seventeen respondents used both a video recorder and an image printer, twelve used a video recorder only, two used an image printer only and one recorded findings in the operative notes only.

Operative procedures performed at arthroscopy (Fig. 2)

Respondents were asked to list all procedures that they performed at arthroscopy. Of the five who performed meniscectomy, four of these had formal orthopaedic training.

Synovial scoring systems and synovial biopsy selection

Fifteen of the respondents used the Lindblad/Hedfors system, seven used the ACR 1992 system, one used the Yates and Scott system and five used their own modified system in combination with one of the above. None used the Paus and Paible or the Zschabitz system. Nineteen selected synovial biopsies from areas of macroscopic

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**Table 1. Compliance with criteria of minimum standards for facilities required for arthroscopy and adequacy of training criteria as recommended in the proposed guidelines**

<table>
<thead>
<tr>
<th>Criterion</th>
<th>Yes (%)</th>
<th>No</th>
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<tbody>
<tr>
<td>1. Availability of designated procedure room</td>
<td>33 (100)</td>
<td>0</td>
</tr>
<tr>
<td>2. Access to appropriate arthroscopy equipment</td>
<td>33 (100)</td>
<td>0</td>
</tr>
<tr>
<td>3. Sufficient staff numbers (appropriate skills not assessed)</td>
<td>33 (100)</td>
<td>0</td>
</tr>
<tr>
<td>4. Operator scrub area</td>
<td>28 (85%)</td>
<td>5</td>
</tr>
<tr>
<td>5. Equipment cleansing/sterilization facilities on site</td>
<td>28 (85%)</td>
<td>5</td>
</tr>
<tr>
<td>6. Patient recovery area</td>
<td>27 (82%)</td>
<td>6</td>
</tr>
<tr>
<td>7. Resuscitation equipment on site</td>
<td>30 (91%)</td>
<td>3</td>
</tr>
<tr>
<td>8. Permanent record of procedures</td>
<td>32 (100)%</td>
<td>0</td>
</tr>
<tr>
<td>9. Adequacy of training criteria for arthroscopy and biopsy</td>
<td>25 (76%)</td>
<td>8</td>
</tr>
</tbody>
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*One respondent did not complete this section.*
inflammation, two selected biopsies from fixed sites in the joint, six selected biopsies from both fixed sites and areas of macroscopic inflammation and three selected biopsies from random sites and areas of macroscopic inflammation. The average number of synovial biopsies collected at each arthroscopy was as follows: 0 biopsies (3 respondents), 1–5 (4), 5–10 (13), 10–15 (4), 15–20 (1) and > 20 (3).

Cartilage scoring systems and cartilage biopsy selection
Sixteen of the respondents used the Ayral system, two used the Noyes and Stabler/ACR system, two used the Ayral and the Noyes and Stabler/ACR system and one used their own scoring system. Three selected cartilage biopsies from areas of macroscopic inflammation or degradation, two selected biopsies from fixed sites in the joint and two selected biopsies from both fixed sites and areas of macroscopic inflammation. The mean number of cartilage biopsies taken at each arthroscopy was as follows: 0 biopsies (26 respondents), 1–5 (7).

Post-procedure care
Wound closure was obtained with wound closure strips (26), sutures (five) or a combination of wound closure strips and sutures (two). These were left in place for a mean of 6.8 days (range 2–21 days). Twenty-nine centres routinely followed up a total of 15 682 patients by either clinic appointment or phone call (mean 9.9 days, range 1–56 days).

Post-operative complications
Frequencies of post-operative complications related to arthroscopy are given in Table 2. Only centres which performed routine follow-up after arthroscopy were included in the analysis of complications. They were compared with a prospective analysis of complications in arthroscopic surgery performed by experienced orthopaedic arthroscopists, statistical comparison not being valid because of the different methods used in the two studies. There was no correlation between the total number of post-operative complications and the level of experience in each unit, as assessed by the number of arthroscopies performed per centre per annum (r = 0.13, P = 0.5). Centres which performed cartilage biopsy had a higher rate of post-operative haemarthrosis than those which did not perform cartilage biopsy (8 vs 0, values as median, P = 0.007). The irrigation volume of the knee joint was correlated positively with the rate of wound infection (r = 0.41, P = 0.03) and the total complication rate (r = 0.39, P = 0.04).

What should we call arthroscopy performed by rheumatologists?
Twenty-nine respondents expressed a preference for a new terminology for arthroscopy performed by rheumatologists while four considered ‘arthroscopy’ appropriate. The preferred term was ‘rheumatological arthroscopy’, which was chosen by 11 respondents, eight chose ‘needle arthroscopy’, four chose ‘mini-arthroscopy’, two chose ‘arthroscopy in rheumatology’, two chose ‘medical arthroscopy’, one chose ‘small bore arthroscopy’ and one chose ‘research arthroscopy in rheumatology’.

Regional variation in the practice of arthroscopy
We compared the general trends in arthroscopy in North America (eight centres) and in Europe (23 centres). There was no significant difference in indications for arthroscopy (clinical vs research), facilities criteria, anaesthetic and operative procedures or complication rates.

Discussion
This survey confirms the rapid international growth in rheumatological arthroscopy over the last decade, 73% of centres having started performing arthroscopy since 1990. Thirty-six rheumatology centres were identified as performing arthroscopy; 33 (92%) of these centres participated in this survey and account for the total of 72 rheumatologists who are now trained in arthroscopy and who have performed 16 352 rheumatological
arthroscopies. These figures may underestimate the actual extent of rheumatological arthroscopy as it is likely that an unspecified number of rheumatology centres that have not yet presented or published their experience of arthroscopy were not included. As there is no national or international register of rheumatology centres performing arthroscopy, this survey relied on the respondents to identify other rheumatology centres performing arthroscopy. The findings of this survey are also limited by the retrospective nature of the data and by the different methods of data collection at each centre. There is a need for a register to be established to promote further research, training and proper evaluation of rheumatological arthroscopy. The most appropriate format for this would seem to be through special interest groups within the regional bodies EULAR, ACR and the Asian Pacific League Against Rheumatism, a multicentre prospective study being the appropriate method for evaluating safety.

There was good agreement in arthroscopic practices despite diverse geographical locations. Most centres met the ILAR-endorsed minimum standards recommended for performing arthroscopy (Table 1) and there was a large degree of consistency in arthroscopic techniques. While most respondents had undertaken either a formal arthroscopy course or an orthopaedic attachment, this study did not evaluate the quality of informal training under the supervision of a trained colleague, which was the most frequent source of training. There is a clear medicolegal and ethical imperative for training guidelines and practices to be agreed, in order to legitimize, standardize and document the future training of rheumatologists in arthroscopic procedures [13, 14]. ILAR has endorsed a set of minimum standards formulated by a group of arthroscopy users from the EULAR Early Synovitis Study Group (ESSG). The majority of respondents (76%) agreed that these minimum standards were adequate for arthroscopy and biopsy. A longer period of training would be necessary for surgical procedures, as is the practice in orthopaedic surgery [12]. In order to maintain competency in arthroscopy, a minimum number of arthroscopies would also need to be performed annually and the arthroscopist should include continuing professional development and audit of arthroscopy practice within their agreed job plan. These issues remain to be addressed by rheumatological arthroscopists.

While there has been undoubted enthusiasm for arthroscopy at centres interested in obtaining synovial tissue for research purposes [5, 14], the principal indication for arthroscopy given by the respondents was evenly divided between clinical (50.5%) and research (49.5%). This study did not seek to evaluate the appropriateness of the individual clinical indications, whether they were for diagnostic biopsy, inspection or joint lavage. Given the small but significant risk of infection associated with arthroscopy [15–18] and the increasing availability of MRI and other non-invasive means for investigation of joint disease, it is important that these clinical indications for arthroscopy are validated appropriately by peer review. Indeed, the therapeutic benefit of arthroscopic lavage remains to be convincingly proven by a double-blind, randomized, controlled trial.

Most respondents used macroscopic features of synovitis in selecting synovial biopsies, but there was considerable variation in the scoring of synovial inflammation [6, 7, 19]. The diversity of systems used will prove confusing in comparisons of studies of macroscopic findings and an initiative is required in order to recommend or develop an agreed scoring system which is validated with microscopic features of inflammation and clinical and radiological outcome. Better agreement was seen in the scoring of chondropathy, the majority of centres using the Ayral system [8]. While this should strongly recommend this system, the same author found that the interobserver reliability of a simple 100-mm visual analogue scale of chondropathy is equally valid when a short period of training is undertaken [20].

The calculated rates of complications of rheumatological arthroscopy are limited by the retrospective nature of the data but are in line with the rates reported in the orthopaedic literature [17, 21]. There was no evidence that rheumatological arthroscopy performed in procedure rooms or out-patient suites under local anaesthesia carried any higher risk of major complications, such as joint infection, haemarthrosis or thromboembolic disease. Small, prospective studies of the recent experiences in three rheumatological centres [16, 22, 23] suggest even lower rates of major complications, possibly related to the use of smaller-calibre arthroscopes and to improving technical proficiency. It was noted that a higher irrigation volume was associated with an increased rate of joint infection and this probably reflects a longer total procedure time. An increased rate of haemarthrosis was noted in centres performing cartilage biopsy and these patients should be advised appropriately and monitored carefully following biopsy.

Conflicting and variable terminology is used to describe the use of smaller-calibre arthroscopes under local or regional anaesthesia by rheumatologists. The term ‘needle’ is imprecise for an object of up to 4 mm in diameter and the term ‘rheumatological arthroscopy’ has also been criticised for imprecision [14]. Clearly, the majority of respondents recognize the need for a distinct terminology to identify that this is arthroscopy performed by rheumatologists in an ambulatory setting. This would both highlight the technological differences of this type of practice and give impetus to its development. The majority of respondents selected the term ‘rheumatological arthroscopy’ and the majority of procedures performed involved inspection, lavage and biopsy without surgical procedure. Therefore, it would seem appropriate to propose that ‘rheumatological arthroscopy’ be adopted.

References