Clinical and Experimental Rheumatology 1999; 17: 37-38.

The role of arthroscopy in early arthritis

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The Rheumatology Rehabilitation Research Unit at Leeds is funded by the Arthritis Research Campaign (ARC).

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Introduction

Rheumatoid arthritis (RA) and psoriatic arthritis (PsA) are the two most common inflammatory arthritides, the causes of which remain unknown. Our understanding of pathogenesis is generally based on evidence from animal models and reports of established disease in humans. However, early arthritis until recently was rarely the focus of pathogenetic or therapeutic studies due to delay of referral or limited diagnostic and therapeutic technologies. Finally, the majority of patients present with the small hand joints first affected, so that access to the primary pathological site has been problematic (1).

Recent developments, however, in diagnostic technology and therapeutic potential now provide a good rational for the study of early arthritis. Diagnostic technology including arthroscopy, high frequency ultrasonography and magnetic resonance imaging is developing rapidly. The introduction of new techniques at an earlier stage of disease may provide fundamental information about pathogenesis and also useful information for the assessment of the response to new therapies. Comparison of the data from different imaging modalities will also be useful for the "calibration" of each technique.

Arthroscopy is an established technique for assessing the intra-articular features of joints to evaluate synovitis and chondropathy (2-8), and is also used for synovial membrane biopsies, joint lavage and to administer therapy. While it is invasive with potential adverse effects of haemorrhage and infection, the safety and tolerability of arthroscopy have been reported (9, 10). Specific guidelines for the training of rheumatologists in its use have been discussed and are currently being developed in association with ILAR.

Safety and patient tolerability

The use of fine needle scopes (1 - 2.7 mm diameter) allows arthroscopy to be performed under local anaesthesia and also permits examination of the small joints of the hand and wrist involved at an earlier stage. We have systematically assessed more than 500 arthroscopy patients after the procedure, by means of a questionnaire designed to elicit data regarding pain, discomfort, the patient's willingness to undergo the procedure again, and any adverse events identified on follow-up (9).

Eighty-eight percent of our patients reported arthroscopy to be as or more tolerable than expected; 68% experienced some pain (mean pain on VAS = 27/100 mm), which was related to the local anaesthetic in the majority. Similar studies have also reported arthroscopy to be quite acceptable to patients (10).

Synovial examination and biopsy

The benefit of arthroscopic examination and biopsy under direct visualisation is not universally accepted. However, a Pan-European study carried out in the UK, The Netherlands, Ireland and Sweden provided some evidence favouring this technique over blind needle biopsy (11). The pathogenic "hot-spot" is located at the synovial-cartilage junction where the pannus invades cartilage, causing destruction and ultimately deformity. Biopsy of this "hot-spot" can only be guaranteed by arthroscopy. Since analysis of this synovial membrane reveals a higher number of monocytes compared to synovial membrane taken from the same joints by blind needle biopsy, this may be highly significant in the disease process.

We have recently developed an arthroscopic technique for isolating the synovial membrane lining layer cells for the study of intracellular cytokines and signalling. Furthermore, we have noted distinct vascular patterns on macroscopic examination of the synovitis at arthroscopy, confirmed by Fiocco *et al.* (12), which may suggest differential factors important in the pathogenesis of the disease.

Comparison to other imaging modalities

Does arthroscopic synovitis correlate with the disease as revealed by other imaging modalities such as magnetic resonance imaging (MRI) ? In the first study of its kind we compared sequential MRI, arthroscopy and synovial membrane histology of the knee in RA patients undergoing intra-articular anti-CD4 monoclonal therapy (13). The results demonstrated a very good correlation at two different time points between

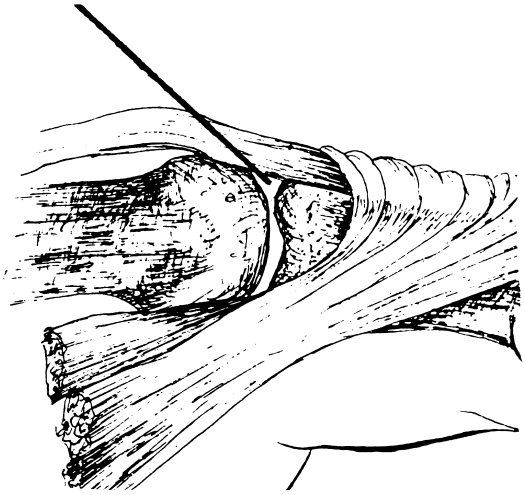

Fig. 1. Diagram showing the anatomy of the metacarpophalangeal joint demonstrating the entry portal (black line) on the dorso-lateral margin of the joint between the extensor tendon and the extensor expansion.

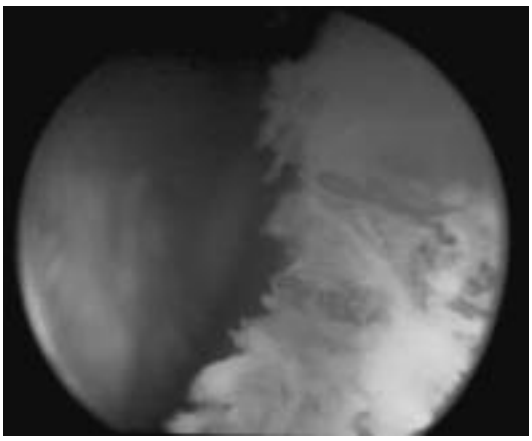

Fig. 2. Needle arthroscopy of the wrist joint of a patient with early arthritis showing synovial thickening, villous formation and increased synovial vessels characteristic of active synovitis.

all three assessment techniques. Ostendorf *et al.* (14) have previously reported on the correlation between arthroscopic inspection and MRI of the joints, although they suggest that arthroscopy may detect synovitis in early disease better than MRI. Comparison of arthroscopic assessment with high resolution ultrasonography is currently underway.

Assessment of drug therapy in RA

The sequential imaging study described above was unique in allowing the assessment of response to therapy in RA. It has been argued that arthroscopic lavage itself may be therapeutic. However, in our study a dose-response effect was documented, with the greatest improvement seen in the high dose patients and none in the placebo patients. This suggests that the changes observed were real, reflecting a drug-effect and not a response to lavage. We are currently undertaking a number of studies of drug therapy using this approach which should allow further validation of this approach.

Conclusion

Rheumatologists now recognise the need to make a diagnosis, assess severity, introduce appropriate therapy and monitor the response to that therapy, at the earliest possible stage (1). This is particularly relevant as more novel therapies are introduced and evaluated. Arthroscopy is not new (2, 3), but there is growing interest among rheumatologists (6-9) and improved technology has made the procedure less invasive and more informative. In the early phase of disease the inflammatory changes are often confined to the hand or wrist joints. Knee synovitis occurs late, it may be essential to access the small joints if we wish to examine the pathogenesis at the primary site of the disease. Further developments of small bore needle arthroscopes should improve access to the small and large joints while minimising invasiveness. Finally, the "calibration" of arthroscopy and synovial membrane histology with non-invasive imaging such as MRI and high resolution ultrasonography will be crucial in the development of these techniques for the study of the pathogenesis of RA and PsA.

Acknowledgements

We are grateful to Mr. Michael Walsh (Leeds), Dr. Staffan Linblad (Stockholm), Dr. Xavier Aryal (Paris) and Dr. Bob Ike (Minneapolis). We thank the ARC and Storz for arthroscopy equipment provided for the programme.

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