THE CLINICAL ASSESSMENT OF JOINT INFLAMMATORY ACTIVITY IN RHEUMATOID ARTHRITIS RELATED TO RADIOLOGICAL PROGRESSION*

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SUMMARY
A simple clinical method for the assessment of joint disease activity is described, and analysed with respect to radiological progression of erosive disease. Ninety-four patients with rheumatoid arthritis attending a special research clinic as part of a prospective study were studied over a three-year period. A significant correlation was found between clinical activity, assessed at intervals of four months, and progressive erosive disease but not with juxta-articular osteoporosis. This clinical method compares favourably with a modification of the articular index described by the Cooperating Clinics of North America.

There is no universally accepted clinical method for the assessment of joint disease activity in rheumatoid arthritis (RA) whether for routine clinical work or for drug trial and research purposes. Those that have been evaluated are complicated and subject to high inter-observer error; this whole problem is the subject of several recent reviews (Levy and Dick, 1975; Huskisson, 1976). We thought that a simple clinical method for the assessment of joint disease activity would be helpful to all clinicians, especially non-rheumatologists involved in the overall care of patients with RA.

Clinical activity has been assessed using this method in all patients attending the Middlesex Hospital Prospective Study over the last three years and correlated with changes seen in their annual radiographs of hands and feet.

PATIENTS AND METHODS
The design of the prospective study has already been described (Fleming et al., 1976). At the special research clinic attendance the rheumatoid status was recorded (American Rheumatism Association, 1959) and the site of clinical joint involvement (swelling, tenderness, or pain on movement) noted. The rheumatoid factor was estimated by the sheep-cell agglutination test (S.C.A.T.) after Roitt and Doniach (1969). Annual radiographs were taken of hands and feet and read serially by the same observer (A.Y.) without knowledge of the clinical status. Erosive changes were regarded as diagnostic (Brook and Corbett, 1977) if there were two or more large erosions (1.5 mm or more of cortical defect). Smaller erosions and subchondral cysts were included in assessment of the extent and progression of involvement. Joint space narrowing was included in the assessment of progression only if unequivocal. Juxta-articular osteoporosis was graded subjectively as absent, definite or severe.

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Progression of radiological disease over the three-year period was recorded as present if new erosions developed, old erosions enlarged, or unequivocal joint-space narrowing occurred on a background of erosive change. Joint disease activity was divided into three categories and assessed as follows:

1. **Highly active disease**: this means widespread synovitis of joints which are either hot, red, and tender or cold, clammy and densely thickened. Early morning stiffness often lasts several hours.
2. **Moderately active disease**: synovitis or early morning stiffness is present in a few joints only or in tendon sheaths.
3. **Inactive disease**: early morning stiffness is less than half an hour in duration and any joint symptoms can be ascribed to mechanical damage or primary or secondary osteoarthritis.

Ninety-four patients who were still attending the research clinic regularly from 1975 to 1978 have been studied. The mean research clinic follow-up time was 7.34 years ranging from four to twelve years. The group included 52 female and 42 male patients and only those who fulfilled the A.R.A. criteria for classical, definite, or probable RA were included. Fifty-seven were S.C.A.T. positive and 37 were S.C.A.T. negative.

**RESULTS**

A highly significant correlation was obtained between clinical activity and radiographic progression (Table I). Patients' clinical status was divided into two groups:

### TABLE I

**RELATIONSHIP BETWEEN CLINICAL STATUS AND RADIOGRAPHIC PROGRESSION**

<table>
<thead>
<tr>
<th>Radiographs</th>
<th>Clinical status</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Inactive</td>
<td>Active</td>
</tr>
<tr>
<td>Static</td>
<td>39</td>
<td>17</td>
</tr>
<tr>
<td>Progressive</td>
<td>0</td>
<td>38</td>
</tr>
</tbody>
</table>

\[ \chi^2 = 40.85; P < 0.001. \]

those who were inactive at every four-monthly visit and those who had at least one episode of clinically active joint disease recorded over the three-year period. Radiographs were divided into two groups; those that remained static whether initially erosive or not, and those that progressed.

In Table II, those patients with clinically active disease have been divided into two groups. There were 23 patients whose clinical status varied between inactive and active disease recorded at their four-monthly clinic appointment. In this intermittently active group, 12 remained radiologically static and 11 progressed. Thirty-two patients with persistent clinical activity had active disease recorded at every one of their four-monthly visits, and only five of these did not progress radiologically.

Fig. 1 compares the number of active episodes with respect to radiological status in the 23 patients with intermittently active disease. Each dot represents one patient
TABLE II
RELATIONSHIP BETWEEN CLINICAL ACTIVITY AND RADIOGRAPHIC PROGRESSION

<table>
<thead>
<tr>
<th>Radiographs</th>
<th>Clinical activity</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Inactive</td>
</tr>
<tr>
<td>Static</td>
<td>39</td>
</tr>
<tr>
<td>Progressive</td>
<td>0</td>
</tr>
</tbody>
</table>

$\chi^2$ (for whole table) = 37.35 (with Yates' correction); $P < 0.001$; $\chi^2$ for each cell compared separately is also highly significant.

![Graph showing relationship between clinical activity and radiographic progression](http://rheumatology.oxfordjournals.org/)

Fig. 1.—Vertical axis represents the number of times active disease was recorded per patient. Twelve patients remained radiologically static while 11 patients progressed.

TABLE III
RELATIONSHIP BETWEEN CLINICAL ACTIVITY AND OSTEOPOROSIS

<table>
<thead>
<tr>
<th>Osteoporosis</th>
<th>Clinical activity</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Inactive</td>
</tr>
<tr>
<td>Present</td>
<td>6</td>
</tr>
<tr>
<td>Absent</td>
<td>36</td>
</tr>
</tbody>
</table>

$\chi^2 = 4.03; P < 0.05$.

and the vertical axis represents the number of times active disease was recorded at the four-monthly visits.

Table III shows the association between unequivocal juxta-articular osteoporosis and clinical activity. For statistical purposes definite and severe osteoporosis have been combined.

This simple clinical method was also compared with an articular index similar...
to that used in the trials of the Cooperating Clinics' Committee of the American Rheumatism Association. This includes the modalities of tenderness on pressure, pain on passive movement and the presence of soft-tissue swelling in a composite joint score. The total possible score by their method is 68 and includes joints, such as the distal joints of the toes, which we have excluded. In our study the following joints were given a score of one if they exhibited any of the signs of synovitis (as above): the proximal interphalangeal joints of the fingers and toes (total 20), the metacarpophalangeal joints of the fingers (10), the metatarsophalangeal joints of the toes (10), midtarsal and/or subtalar (2), ankle (2), knees (2), hips (2), shoulders (2), elbows (2), wrists (2), cervical spine (1), acromioclavicular (2), and temporomandibular (2). The total possible score is 59.

Fig. 2 compares the total joint score recorded at each visit on the vertical axis...
with the three clinical grades in columns on the horizontal axis. Each dot represents one clinical assessment, each patient having three visits a year for three years making a total of nine clinical measurements.

DISCUSSION

Patients with RA are frequently also under the care of orthopaedic surgeons, general physicians and family doctors and we believe that there is a need for a simple clinical method for the global assessment of disease activity particularly for non-rheumatologists. An awareness of the importance of active joint disease is especially relevant in two common clinical situations, in which a non-rheumatologist would find a simple method useful. One is the 'burnt out' rheumatoid whose joint symptoms and signs are due to mechanical derangement and secondary degenerative disease, who would not benefit from potentially dangerous specific antirheumatoid drugs. The other is the patient with recent onset RA and persistently active joint disease who should be considered for the early introduction of drugs like gold and D-penicillamine.

The tenderness of the joint has been considered by some investigators to be the most reliable indication (Savage, 1958; Copeman, 1966). The traditional signs of inflammation (pain, swelling, heat, redness and loss of function) are relatively easy to detect, but their quantitation on a scale of severity is difficult (Beecher, 1959).

Three thoroughly documented techniques are available for the assessment of joint disease activity either as a composite index of various measurements (Lansbury, 1966) or based on a count of the number of active joints (Cooperating Clinics of the American Rheumatism Association 1965, and Ritchie et al., 1968). The prospective study of RA from the Middlesex Hospital was begun before Ritchie's index was published and so the assessment used by the Cooperating Clinics of the American Rheumatism Association was employed with slight modifications. As can be seen in Fig. 2 this method compares very well with the simple global assessment of joint disease activity described here.

There have been few studies of the relationship between clinical activity and erosive joint disease, which in simplistic terms follows the formula: time x inflammation = joint damage. Most patients who develop erosions do so in the first two years of their disease (Brook and Corbett, 1977). In a well controlled trial of cyclophosphamide in RA (Cooperating Clinics of A.R.A., 1970) the marked reduction of inflammatory activity with high dose cyclophosphamide may explain the impressive slowing of progressive radiological abnormalities. This association was also noted in a double-blind study to evaluate the effect of gold on radiological progression using a simple assessment of clinical activity (Sigler et al., 1974). The emphasis of both these studies was on the beneficial effect of medication on radiological changes over a relatively short period of time and both reported a corresponding reduction in active synovitis.

In our study, we have shown a very close correlation between a relatively simple global assessment of joint activity and radiological status over a three-year period. As expected the patients who remained persistently inactive clinically did not progress radiologically irrespective of treatment (Table I). Similarly, most patients with active disease have progressive X-ray changes. From Table II, however, it can be seen that five patients who had persistently active joints remained radiologically static. Three of these patients had such severe erosive disease, with marked osteoporosis, joint space narrowing, subluxation and ankylosis of joints that it was difficult to envisage any further progression. All were on more than 5 mg of prednisolone. The other two patients
had had RA for three-and-a-half years and gold therapy had been instituted early within a year of onset. There were 23 patients whose clinical status varied between inactive and active disease recorded at their four-monthly clinic appointment (the intermittent group in Table II). The radiological outcome was also variable, with 12 remaining static and 11 progressing. Fig. 1 shows that the number of active episodes recorded over a three-year period could predict the radiological outcome, and the same results were found when analysed over a two-year period.

It has not been possible to analyse the effect of treatment on radiological changes because of the small numbers in the whole group who could be compared adequately with respect to dosage regimens and the time in the course of the disease when treatment was begun. However, when analysed generally as a group, no significant patterns emerged except an impression that patients on more than 5 mg of prednisolone over the three-year period had severe changes characterized by severe osteoporosis, marked joint space narrowing with subluxation and ankylosis of joints, similar to the findings of Rasker and Cosh (1978). It will be possible to achieve sufficient numbers for statistical analysis as the prospective study continues to enlarge.

Other factors possibly affecting the development of new erosions and the progressive enlargement of old ones, for example, the amount of rest and splintage of joints and the type of occupation pursued by the patient will be the subject of a future paper.

Acknowledgements

We wish to thank Drs. A. C. Boyle, S. Mattingly and D. L. Woolf for permission to study their patients.

The study has been generously supported by the Arthritis and Rheumatism Council.

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