THE RADIOLOGICAL EVALUATION OF ARTHROPATHY IN SYSTEMIC SCLEROSIS

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Abstract: The articular manifestations of 119 patients with systemic sclerosis (SSc) were studied. Of these, 54% had arthralgia and 30% had frank arthritis. Radiological findings included periarticular osteoporosis (9%), joint space narrowing (8%), and marginal erosions (15%), which were more frequently seen in patients with arthritis than in patients without arthritis. Erosive changes, resembling those seen in rheumatoid arthritis or erosive osteoarthritis were noted involving the MP, PIP and DIP joints. On longitudinal evaluation, 50% of patients with arthritis had new marginal erosions. The frequencies of pulmonary fibrosis, pulmonary hypertension and positive rheumatoid factor were significantly higher in patients with arthritis or arthralgia than in patients without arthralgia. Among the patients with arthritis, erosive arthropathy correlate with presence of anti Scl-70 antibody, though the analysis of other clinical and laboratory variables such as the skin or visceral involvement or positive rheumatoid factor showed no correlation with erosive arthropathy. These results suggested the presence of erosive arthropathy in SSc not attributable to overlap with RA.

Key words: Systemic sclerosis. Scleroderma. Arthropathy. Erosive arthritis

Articular manifestations are common in systemic sclerosis (SSc)\textsuperscript{1,2}. It ranges from transient arthralgia to a polyarthritis

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Takashina N et al: Arthropathy in SSc clinically indistinguishable from rheumatoid arthritis (RA). Radiological changes in the joints of PSS patients include periarticular osteoporosis, bone erosions and loss of joint space.

In this report, we present the results of radiographic joint findings in 119 patients with systemic sclerosis. The results of an analysis to determine possible correlations between observed radiological findings and other clinical features of SSc are also presented.

MATERIALS AND METHODS

One hundred and nineteen patients with SSc who attended the Kitasato University Hospital were studied. All patients fulfilled the American Rheumatism Association (ARA) preliminary criteria for the classification of SSc. But no patients fulfilled the preliminary criteria for MCTD in Japan, the 1982 revised SLE criteria of ARA or the criteria for polymyositis-dermatomyositis by Bohan. The one hundred and nineteen patients comprised 107 females and 12 males, who had a mean age of 50.5 years and a mean disease duration of 11.5 years.

A history of articular symptoms was obtained in each case. All peripheral joints were examined for evidence of active inflammation which was defined as being tender to palpation, painful on movement, or exhibiting signs of an effusion.

Radiological evaluation included posteroanterior (PA) and oblique views of the hands and PA and lateral views of the feet. A longitudinal comparison of radiographic findings was possible in 18 patients. All radiographs were evaluated by 2 independent observers. Correlations between articular manifestations or radiological findings and multiple clinical and laboratory variables were also analyzed. Statistical analysis were carried out with the chi-square test with Yates's correction.

RESULTS

Sixty-one (51%) gave a history of joint pain occurring at some time during the course of their disease. Frank arthritis was
Takashina N et al: Arthropathy in SSc observed in 36 patients (30%). Joint pain was the initial symptom of SSc in 9 (8%). The clinical pattern of joint involvement was chronic in half the cases and intermittent or episodic in the other half. The predominant pattern consisted of symmetrical polyarthritis. The active joint inflammations were frequently seen in metacarpophalangeal (MCP), proximal interphalangeal (PIP) and wrist joints.

The radiographic abnormalities seen in the hands of the patients in this study are summarized in Table 1. Generalized osteoporosis was seen in 5% of the patients. The prevalence of periarticular osteoporosis was higher in the group with arthritis than in the group without arthritis (25% versus 2%). Erosive changes were more frequently seen in patients with arthritis (39%) than in patients without arthritis (5%). The erosive changes included marginal erosions of MCP, PIP and DIP joints. Only one patient had dorsal erosions of MCP and PIP joints. The radiographs of the feet also showed bone erosions in the metatarsophalangeal joint (5 cases) and tarsometatarsal joint (1 case). Bony ankylosis was found in one patient, involving the wrist joint. Digital tuft absorption, subcutaneous calcinosis and flexion contractures were commonly seen in patients with or without arthritis. On the other hand, the frequency of resorption of the distal ulna was increased in patients with arthritis compared with that in patients without arthritis.

A longitudinal comparison of radiological finding was available in 18 of 36 patients with arthritis. Table 2 summarizes the progression of radiological abnormalities during the follow-up period (Mean 5.4 years). Although progression had occurred in all radiological abnormalities, nine patients (50%) developed marginal erosions which were identified most frequently. The other nine patients did not develop erosions in a comparable follow-up period (Mean 5.5 years).

The frequencies of clinical and laboratory findings in 36 patients with arthritis and 61 patients with arthralgia compared with 58 patients without arthralgia are shown in Figure 1. The
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Frequencies of pulmonary fibrosis, pulmonary hypertension and positive rheumatoid factor were significantly higher in patients with arthritis or arthralgia than in patients without arthralgia. However, no significant difference between these two groups was noted in the extent of scleroderma skin involvement.

Thirty-six patients with arthritis were divided into two groups, one with articular erosions and the other without erosions. The clinical and laboratory findings in 14 patients with erosions were compared with those in the remaining 22 patients without erosions. These results were summarized in Figure 2. Although the clinical variables such as the skin or visceral involvement or positive rheumatoid factor were not significantly different between two groups, the frequency of anti-Scl 70 antibody in patients with erosions was significantly higher than that in patients without erosions. On the other hand, the frequency of anti-nRNP antibody was significantly higher in the group without erosions.

DISCUSSION

Although digital tuft resorption and subcutaneous calcinosis as detected by radiography are regarded as common abnormalities, the occurrence of specific articular abnormalities has not been so well appreciated. In this study, the radiological evaluation of articular findings including longitudinal analysis of the hand were studied. The articular erosion was more frequently found in patients with arthritis. Although the erosions may represent focal resorptive change resulting from the continued traction of tendons on underlying demineralized bone in SSc, this result suggests the erosions are likely to arise from inflammatory synovitis rather than from the traction of tendons. Marginal erosions of MCP or PIP were similar to those of rheumatoid arthritis\textsuperscript{2,3} and DIP erosion resembled that of erosive osteoarthritis\textsuperscript{4} as previously reported. Dorsal erosion was found in only one patient, and was frequently on the dorsal aspects of the metacarpal or proximal phalangeal heads as
Takashina N et al: Arthropathy in SSc reported by Blocka et al. The higher frequency of resorption of the distal ulna in patients with arthritis also suggests that it may arise from inflammatory synovitis. On longitudinal evaluation, 50% of patients with arthritis had new marginal erosions. This findings suggest that like RA the synovitis of SSc frequently continues for a long time. The characteristics of patients with articular erosion were high frequency of anti-Scl-70 antibody, which was specific ANA for SSc, and low frequency of anti-nRNP antibody, which was characteristic ANA of MCTD. Frequency of the rheumatoid factor was significantly higher in patients with articular involvement, but there was no difference between patients with and without articular erosion, which was similar to Blocka's paper. It is controversial whether the erosive arthropathy arises from SSc or overlaps with disorders such as RA. These results suggested the presence of erosive arthropathy in SSc not attributable to overlap with RA.

REFERENCES
Table 1 Radiological Abnormalities of the Hands

<table>
<thead>
<tr>
<th>Radiological abnormality</th>
<th>Number of patients</th>
<th>Patients with arthritis (n=36)</th>
<th>Patients without arthritis (n=83)</th>
<th>Total (n=119)</th>
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<tbody>
<tr>
<td>Osteoporosis</td>
<td></td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>Generalized</td>
<td>3 (8%)</td>
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<tr>
<td>Periarticular</td>
<td>9 (25%)</td>
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<tr>
<td>Joint space narrowing</td>
<td>8 (22%)</td>
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<td>10 (8%)</td>
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<tr>
<td>DIP</td>
<td>3</td>
<td>1</td>
<td>4</td>
<td></td>
</tr>
<tr>
<td>PIP</td>
<td>3</td>
<td>1</td>
<td>4</td>
<td></td>
</tr>
<tr>
<td>MP</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td></td>
</tr>
<tr>
<td>Carpometacarpal</td>
<td>6</td>
<td>0</td>
<td>6</td>
<td></td>
</tr>
<tr>
<td>Intercarpal</td>
<td>5</td>
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<td>5</td>
<td></td>
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<tr>
<td>Radiocarpal</td>
<td>3</td>
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<td>3</td>
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<tr>
<td>Marginal erosions</td>
<td>14 (39%)</td>
<td>4 (5%)</td>
<td>18 (15%)</td>
<td></td>
</tr>
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<td>9</td>
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<td>PIP</td>
<td>6</td>
<td>2</td>
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</tr>
<tr>
<td>MP</td>
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<tr>
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<tr>
<td>Radiocarpal</td>
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<tr>
<td>Dorsal erosions (site)</td>
<td>1 (PIP, MP) (3%)</td>
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<td>1 (1%)</td>
<td></td>
</tr>
<tr>
<td>Ankylosis (site)</td>
<td>1 (wrist) (3%)</td>
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<td>1 (1%)</td>
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<tr>
<td>Digital tuft resorption</td>
<td>13 (36%)</td>
<td>42 (51%)</td>
<td>55 (46%)</td>
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<tr>
<td>Resorption of distal ulna</td>
<td>6 (17%)</td>
<td>6 (7%)</td>
<td>12 (10%)</td>
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<tr>
<td>Calcinosis</td>
<td>12 (33%)</td>
<td>22 (27%)</td>
<td>34 (29%)</td>
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<tr>
<td>Flexion contractures</td>
<td>16 (44%)</td>
<td>27 (33%)</td>
<td>43 (36%)</td>
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</table>

Table 2 Progression of Radiological Abnormalities of Hands during follow up period (Mean 5.4 years) in Patients with Arthritis

<table>
<thead>
<tr>
<th>Radiological abnormality</th>
<th>Number of patients (%) (n=18)</th>
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<tr>
<td>Osteoporosis</td>
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<tr>
<td>Generalized</td>
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<td>Radiocarpal</td>
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<tr>
<td>Marginal erosions</td>
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<tr>
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<tr>
<td>PIP</td>
<td>4</td>
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<tr>
<td>MP</td>
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</tr>
<tr>
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<tr>
<td>Intercarpal</td>
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<tr>
<td>Radiocarpal</td>
<td>2</td>
</tr>
<tr>
<td>Dorsal erosion (site)</td>
<td></td>
</tr>
<tr>
<td>1 (PIP, MP) (6%)</td>
<td></td>
</tr>
<tr>
<td>Ankylosis (site)</td>
<td></td>
</tr>
<tr>
<td>1 (wrist) (6%)</td>
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<tr>
<td>Digital tuft resorption</td>
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<tr>
<td>Calcinosis</td>
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</table>
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Fig 1 Clinical Features of Patients with and without Arthropathy

Fig 2 Clinical Features of Patients with and without Erosions in 36 Patients with Arthritis