Radiological Changes of the Hands in Systemic Sclerosis

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Brun B. Radiological changes of the hands in systemic sclerosis. Acta Derm Venereol (Stockh) 1983; 63: 349–352.

Radiological examination of the hands was performed in 41 patients with systemic sclerosis. Pathological changes were found in 39 patients. Eighteen patients had subcutaneous calcifications and 11 had atrophy of the finger pulps. Bone resorption of ungual tufts was found in 11 patients. Juxta-articular osteoporosis was seen in 9 patients and periarticular bone erosions in 8 patients indicating erosive arthropathy. Osteoarthritis and generalized osteoporosis were seen in 10 and 7 patients, respectively. Radiological examination of the hands is recommended during treatment. (Received December 6, 1982).

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The characteristic changes of the skin in systemic sclerosis consist of increased fibrosis of the dermis and subcutaneous tissue, often associated with subcutaneous calcifications (4, 7, 10). The type of collagen and the type of mineral are the same in both skin and bone. Involvement of bones and joints might therefore be expected as a primary manifestation of systemic sclerosis.

The hands are involved in most cases of systemic sclerosis. In the present study the radiological findings of the hands of patients with systemic sclerosis are presented and compared with earlier studies.

MATERIAL AND METHODS

In a 2-year period (1980–82) patients with systemic sclerosis consecutively admitted to the Department of Dermatology underwent radiological examination of the hands.

The study included 41 patients, 33 females and 8 males. Their mean age was 55 years (range 20-69). The mean duration of their disease was 10.3 years (range 3–30). Only patients fulfilling the following criteria were allocated to the study:

1. diagnostic criteria of systemic sclerosis according to the requirements of the American Rheumatism Association;
2. no known endocrine disease;
3. not receiving hormonal therapy (including glucocorticoids, oestrogens or androgens).

At the time of the examination 32 patients were receiving treatment with penicillamine combined with glutamine, while 8 patients received other treatments (glutamine, hydralazine, phenytoin). One patient had not yet received any treatment. No patient had to be excluded from the study because of known disease of the parathyroid glands.

The hands were radiographed in both posterior–anterior and oblique positions. The radiograms were evaluated concerning changes in bone and soft tissue. Soft tissue atrophy of the finger tips was measured as suggested by Yune et al. (11). Atrophy was deemed to be present when the vertical thickness of the soft tissue was less than 20 % of the width of the base of the distal phalanx.

RESULTS

The radiological examination of the hands in 41 patients was pathological in 39 cases, while normal in 2 cases. The pathological changes are shown from Tables I and II.

Subcutaneous calcifications were found in 18 of the 41 patients, located mainly distally in the fingers (Fig. 1). Soft tissue atrophy was found in 11 patients.

Osteoporosis was present in 17 patients. In 7 patients the demineralization was generalized. In 9 cases the osteoporosis was mainly juxta-articular, and in 1 case the osteoporosis was limited to one phalanx.

Table I. *Radiological changes in bones and soft tissue of the hands of 41 patients with systemic sclerosis*

	No. of patients	Distal phalanx	Mid--phalanx	Proximal phalanx	Carpus/ metacarpus
Soft tissue					
Calcifications	18	13	7	6	4
Atrophy of finger tuft	11	11	–	–	–
Bone					
Osteoporosis	17	16	16	17	16
Resorption	11	11	–	–	–
Condensation	3	3			
Amputation	4	4	2	1	

Bone resorption was found in the tufts of the terminal phalanges in 11 patients (Fig. 2*a*, *b*). Transverse band resorption was not seen.

Bone erosions, present in 8 patients, involved mainly the distal interphalangeal joints or the carpal bones (Fig. 3). Subperiostal resorption was seen in 2 patients.

Bony ankylosis of finger joints was seen in 2 patients, located to the distal and mid-phalangeal joints.

Seven patients had osteoarthritis in several joints of the hands. Localized bone condensation of the distal phalanx, located mainly to the tuft, was seen in 3 patients. Small bone cysts were seen in 5 patients, mainly in the carpus.

DISCUSSION

The present study confirms that radiological changes of the hands are frequent (95%) in systemic sclerosis. The more characteristic changes were atrophy of the soft tissue of the finger tips, subcutaneous calcifications, resorption of ungual tufts, and juxta-articular erosions and osteoporosis.

Atrophy of the soft tissue of the finger tips was found in 26.8% of the patients in this study. Yune et al. found soft tissue atrophy in 17–55% and Blocka et al. in 78% (11, 2). However, the presence of hypertrophy or atrophy will depend on the clinical state of the disease, which is probably not comparable in different studies.

Subcutaneous calcifications were found in 43.9% of patients in this study. In another elective study, by Bassett et al., calcifications were found in 25% (1). Earlier and more extensive studies showed calcifications in 10–25% (3, 4, 9, 11).

Table II. *Radiological changes of the joints of fingers and carpus in 41 patients with systemic sclerosis*

	No. of patients	Interphalangeal joints		Metacarpo-phalangeal joints	Carpal joints
		Distal	Proximal		
Osteoarthritis	10	6	3	–	3
Erosions	8	4	1	2	4
Ankylosis	2	2	–	–	–

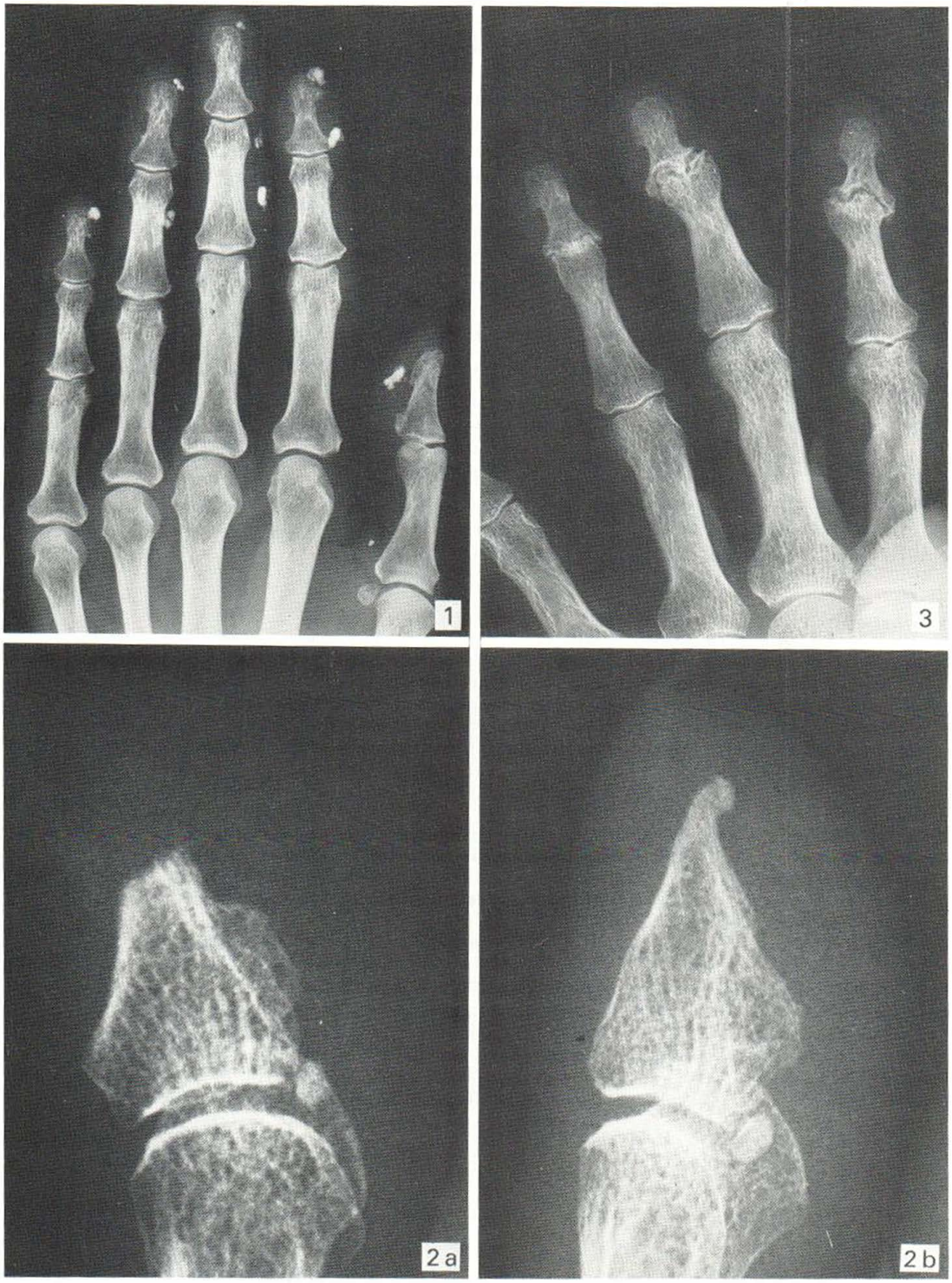

Fig. 1. Soft tissue calcifications of the hand in a 67-year-old woman.

Fig. 2. Bone resorption in the finger tuft of the terminal phalanx. (*a*) Terminal resorpton. (*b*) Resorption resulting in pencil-shape.

Fig. 3. Distal interphalangeal joints with severe arthritis.

Resorption of the digital tufts was found in 26.8% in this study, compared with 51% in another elective study (2). In several cases the distal phalanx had the characteristic pencil-shape (Fig. 2*b*). Resorption bands, which have been considered pathognomonic of systemic sclerosis (8), were not seen in any case in the present study.

Juxta-articular erosions were found in 19.5% and juxta-articular demineralization in 22.0% in this study, and in 9–15 and in 4%, respectively, in the study by Blocka et al. (2). This indicates the presence of an erosive arthropathy as a manifestation of systemic sclerosis, as earlier suggested. Synovial infiltrations with lymphocytes and plasma cells have been reported in 14 out of 29 patients with systemic sclerosis, and many patients have symptoms of a mild arthropathy (5, 6). However, the arthropathy in systemic sclerosis does not progress with synovial pannus formation and joint destruction, as is seen in rheumatoid arthritis. The most frequent abnormality of the joints was osteoarthritis (24.4%). Generalized osteoporosis was seen in 39%. The frequencies observed were not especially high, considering the age and sex of the patients studied. None of these findings are specific.

No special changes of the bones, such as osteosclerosis with increased mineral content, were observed, except for 3 cases of bone condensation of the ungual tufts. Osseous evidence of hyperparathyroidism was not observed in any case.

The high frequency of characteristic radiological changes of the hands in systemic sclerosis emphasizes that radiological examination of the hands should be performed repeatedly during treatment of patients with systemic sclerosis.

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