Radiographic signs in the temporomandibular and hand joints in patients with psoriatic arthritis

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The temporomandibular (TMJ) and hand joints of 64 patients with psoriatic arthritis (PA) were examined radiographically with panoramic tomography and dorsovolar projection. The associations between radiographic signs in the condyle of the TMJ and finger joints were analyzed with Pearson's product-moment correlation coefficient. Twenty-six patients (41%) had radiographic signs in their TMJs. Arthritic signs were seen in 14 (22%) and degenerative signs in 12 (19%) patients. Fifty-five patients (86%) had radiographic signs in their hands; 33 patients (52%) had arthritic and 22 (34%) degenerative signs. In the TMJ statistically significant correlations were found among erosion, flattening, and cortical sclerosis and also between osteophyte and cortical sclerosis. In the finger joints erosion correlated significantly with dislocation and loss of space. Erosion in the condyle of the TMJ was the only sign that correlated with changes in the finger joints such as erosion, dislocation, and ankylosis. Erosion in the TMJ also correlated with erosion in the metacarpophalangeal joint and wrist. □ *Ankylosis; dislocation; erosion; flattening; inflammation; osteophyte; sclerosis*

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Psoriatic arthritis (PA) is an inflammatory, often asymmetric, and mostly seronegative polyarthritis characterized by distal interphalangeal joint involvement and erosion of the terminal phalanges (1, 2). Other joints affected to a greater or lesser extent are the shoulders, knees, ankles (3, 4), spine (5), and sternal synchondrosis (6). The temporomandibular joint (TMJ) may also be involved (7, 8).

In an autopsy study of subjects with no known joint diseases, Kopp et al. (9) found significant correlations between degenerative changes in the TMJ and in the metatarsophalangeal joint and between degenerative changes in the TMJ and in the sternoclavicular joint. In a radiographic study of patients with craniomandibular disorders, however, Kopp & Rockler (10) found no significant correlation between radiographic signs in the TMJ and hand joints. On the other hand, Ericson & Lundberg (11) reported a correlation between radiographic findings in the TMJ and finger joints in individuals without joint or muscle symptoms. In a previous study (8) neither erosion nor the number of radiographic signs in the condyle of the TMJ correlated significantly with the subjectively assessed number of joints affected by PA or with the severity of PA.

The purpose of the present study was, first, to investigate radiographic signs in the TMJ and hand joints in patients with psoriatic arthritis and, second, to find correlations between radiographic signs observed in the TMJs, between radiographic signs observed in the hand joints, and between the signs observed in the TMJs and hand joints.

Patients and methods

Sixty-four patients (36 men and 28 women; mean age, 54 years; range, 29–78 years) of 110 patients with a medical diagnosis of

psoriatic arthritis in accordance with the criteria of Moll & Wright (12) were randomly selected for radiographic examination of both TMJs and of hand joints and wrists. In the original group ($n = 110$), which has previously been considered representative of psoriatic arthritis patients in Finland, the diagnosis of psoriatic arthritis had been confirmed radiographically in 86% of the patients. Details about the PA patient group have been reported earlier (13).

The radiographic examination of the TMJs was made using panoramic tomography with an orthopantomograph (OP 3, Instrumentation Co/Palomex) roentgen equipment. The exposures were made with the incisors in the edge-to-edge position and also with the mouth maximally opened. The radiographs of the TMJs were analyzed as one group by two examiners (M. Könönen and E. Kilpinen) independently and in random order without knowledge of the history and clinical data of the patients. In cases of disagreement over interpretation, the radiographs were reviewed by both examiners together to reach a final diagnosis. Radiographic signs such as flattening, osteophyte, erosion, and sclerosis were recorded by means of dichotomized values. The right and left condyles were scored separately, and combined values of the condyles were used in the analyses.

Hand joints and wrists were examined from dorsovolar radiographs by two examiners (J. Wolf and E. Melartin) independently and without reference to provenance. In cases of disagreement the aforementioned procedure was carried out. The hand radiograph of each patient which showed most signs was selected for further analysis. Involvement of the interphalangeal, metacarpophalangeal, and carpal joints was determined. Erosion and other signs often present in psoriatic arthritis, such as cupping of the proximal portion of the phalanges (pencil-in-cup deformity), bony ankylosis, osteolysis of the bones (arthritis mutilans), and dislocation, were recorded (1, 2). Furthermore, degenerative radiographic changes such as microcysts, osteophytes, and reduced joint space were noted (14). Erosion or ankylosis of at least one of the joints studied was used as the radiographic criterion for arthritis.

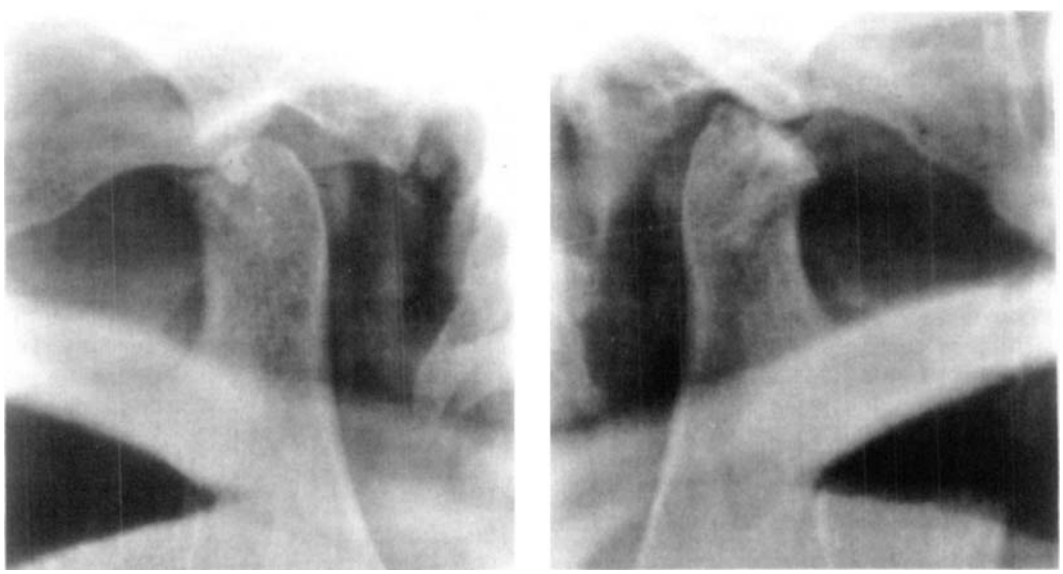

Fig. 1. A 65-year-old man with psoriatic arthritis for 24 years and subjective TMJ involvement for 6 years. Panoramic radiograph showing extensive erosion in the left condyle of the temporomandibular joint (left) and flattening and cortical sclerosis in the right (right).

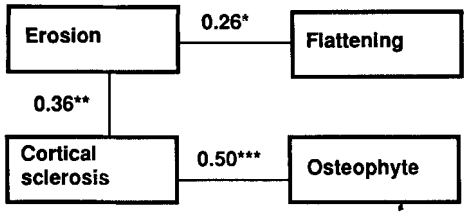

Fig. 2. Statistically significant correlations between radiographic signs in the condyle of the TMJ in patients with psoriatic arthritis ($n = 64$). * = $p < 0.05$, ** = $p < 0.01$, *** = $p < 0.001$.

Statistics

The correlations are given by using Pearson's product moment correlation coefficient. The level of statistical significance is given when $p \leq 0.05$ and is otherwise denoted not significant (NS).

Results

Twenty-six patients (41%) had radiographic signs in the condyle of the TMJ. Erosion (Fig. 1) was the commonest radiographic finding (22%; 14 patients), followed by osteophyte (17%; 11 patients), cortical sclerosis (14%; 9 patients), flattening (9%; 6 patients), and subcortical sclerosis (3%, 2 patients). None of the signs in the condyle of the TMJ were age-dependent. In the TMJ, erosion correlated with flattening ($p < 0.05$) and cortical sclerosis ($p < 0.01$). Osteophyte also correlated with cortical sclerosis ($p < 0.001$) (Fig. 2).

Fifty-five patients (86%) had changes in the hands. Thirty-three patients (52%) were regarded as having arthritic (Fig. 3) and 22 (34%) degenerative joint disease. The mean number of involved interphalangeal joints in

Fig. 3. A dorsovolar radiograph of the hands of a 62-year-old man with widespread destructive psoriatic arthritis (arthritis mutilans). Osteolysis of the phalanges and telescoping of the digits are seen in both hands. Pencil-in-cup deformities are present in the distal interphalangeal joints of the index and middle fingers.

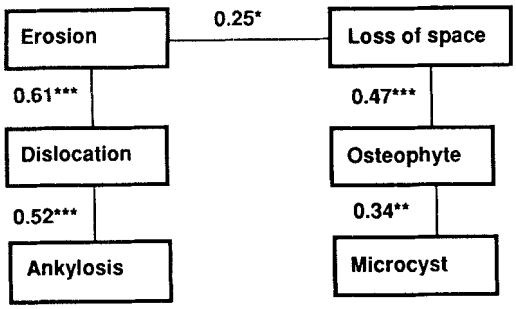

Fig. 4. Statistically significant partial correlations between radiographic signs in the finger joints (five proximal interphalangeal and four distal interphalangeal joints) after elimination of the effect of age in patients with psoriatic arthritis ($n = 64$). * = $p < 0.05$, ** = $p < 0.01$, *** = $p < 0.001$.

the hands was 1.7 (range, 0–7). Reduced joint space was the commenest finding in the interphalangeal joints (78%), followed by osteophyte (73%), erosion (47%), dislocation (28%), microcyst (22%), and ankylosis (13%). Osteophytes ($r = 0.55$; $p < 0.001$), microcysts ($r = 0.42$; $p < 0.001$), reduced joint space ($r = 0.39$; $p < 0.01$), and erosion ($r = 0.24$; $p < 0.05$) were related to age. Significant partial correlations between radiographic signs in the finger joints after elimination of the effect of age are shown in Fig. 4. The strongest correlation was found between dislocation and erosion ($r = 0.61$; $p < 0.001$).

Among the 33 patients with arthritic changes, the interphalangeal joints were most often involved. Erosions in interphalangeal, metacarpophalangeal, and carpal joints were seen in 30 (47%), 18 (28%), and 15 (23%) patients, respectively. Bony ankyloses were present in 8 (13%) and dislocations in 15 patients (23%). Pencil-in-cup deformations in one or more finger joints were noted in six patients (9%). Two patients (3%) had widespread destructive peripheral arthritis (arthritis mutilans) with osteolysis of the phalanges and telescoping of the digits (Fig. 3).

The number of radiographic changes in the condyle of the TMJ did not correlate significantly with the number of radiographic changes in the interphalangeal joints. Erosion in the condyle of the TMJ was the only sign that correlated with erosion in interphalangeal joints ($p < 0.01$), metacarpophalangeal joints ($p < 0.001$), and carpal joints ($p < 0.01$). Further, erosion in the condyle correlated with other arthritic changes in the interphalangeal joints such as ankylosis ($p < 0.05$) and dislocations ($p < 0.05$).

Discussion

The temporal component of the TMJ is poorly imaged by panoramic tomography, and therefore only the condyles were evaluated (15, 16). Because of this and the fact that tomography is best suited to studying the condition of the TMJ (17), the frequency of radiographic signs in the TMJ reported in the present study is probably an underestimate. It has been shown, however, that in tomographic images radiographic signs are as frequent in the condyle as in the temporal component (18). Moreover, Åkerman et al. (19) concluded that radiographic signs suggesting TMJ disease are more reliable when found in the condyle than in the temporal component. It has been shown that panoramic tomography is well suited for screening for TMJ disease in patients with PA (20).

Hands are easier to image than TMJs. Further, the intra- and inter-observer reliability is higher in the interpretation of radiographs of hands than of TMJs (21). Because of the asymmetric nature of PA, the radiograph of the hands of a patient showing most signs was selected for further analysis. As the TMJs are functionally interrelated, signs from both condyles were used in calculating TMJ changes in each patient. To reduce both intra- and inter-observer bias, orthopantomographs and radiographs of the hands were read separately by two observers and then in consultation to achieve a final diagnosis (14).

The patient was regarded as having arthritis if erosion and/or ankylosis was present in at least one joint (1) and as having osteoarthrosis if the signs detected were reduced joint space, subcortical sclerosis, and osteophyte. Erosion, the most typical sign indicating an inflammatory joint disease

(1), was the commonest radiographic change in the condyle of the TMJ in the present study. Erosion is the radiographic change most frequently associated with signs and symptoms of craniomandibular disorders in patients with PA (22). Further, radiographic signs detected in the condyle correlated with each other but were not related to age, suggesting that osteophyte and cortical sclerosis were due to secondary osteoarthrosis, a healing process after inflammatory attack (23). Moreover, erosion of the condyle was the only TMJ sign that correlated with radiographic changes in the hand joints.

Thirty-four per cent of the patients showed predominantly osteoarthrosis in their hands. Given the age of the patients, many of these were apparently cases of primary osteoarthrosis (14). This was further supported by the finding that most of the radiographic signs in the hand joints were age-related. It also corroborates one line of correlations found in the present study (Fig. 4). The present study supports earlier findings that the incidence of osteoarthrosis in PA is high (24).

The prevalence of radiographic changes in hand joints was in accordance with that reported by Lassus et al. (24). Although some radiographic features, such as pencil-in-cup deformities (9% in the present study), are highly suggestive of PA, many of the radiographic signs seen in PA are indistinguishable from those of rheumatoid arthritis or other inflammatory joint diseases (25). However, bone can react in limited ways, so it is not surprising that manifestations of joint diseases are radiographically similar, especially in the early stages. With the exception of severely destructive arthritis mutilans, arthritis in PA is less severe than that in rheumatoid arthritis (25).

Kopp & Rockler (21) found no significant correlation between the indices of radiographic signs in the TMJ and hand joints when the influence of age was eliminated, whereas Ericson & Lundberg (11) reported a significant correlation between radiographic changes in the finger and TMJ joints. However, in the latter study the influence of age on the correlations was not eliminated.

The present study shows that radiographic signs of erosion, flattening, osteophyte, and subcortical sclerosis in the condyle of the TMJ are correlated and that they indicate changes caused by the inflammatory process in the TMJ. Changes in the hand joints were related to age. Two lines of correlation were found: one suggesting an inflammatory attack and the other suggesting primary osteoarthrosis and/or secondary osteoarthrosis.

The results indicate that correlations between changes, especially erosion, in the hands and TMJs in patients with PA are mostly due to the inflammatory joint disease.

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