

## Skeletal Involvement in Pustulosis palmo-plantaris with Special Reference to the Sterno-costo-clavicular Joints\*

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Skeletal scintigraphy was performed in patients with pustulosis palmo-plantaris. There was an increased isotope uptake in the sterno-costo-clavicular area in 16 of 73 patients (22%). The skeletal involvement was further studied by computer tomography showing seven characteristics (including unilaterality) typical of the disease. Clinically, the arthritis is aseptic and benign, and only 9 of 16 patients with a positive scintigraphy complained of juxta-sternal arthralgia. *Key words:* Osteo-arthritis; Skeletal scintigraphy; Computer tomography. (Received April 16, 1987.)

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Pustulosis palmo-plantaris (PPP) is a poorly understood entity, often considered related to psoriasis, in other cases difficult to differentiate from other vesiculo-pustular conditions. In recent Japanese reports (1-3) a positive correlation between PPP and a sterno-costo-clavicular (SCC) arthritis has been demonstrated. The aim of the present study was to determine the incidence of skeletal changes in PPP, in the SCC area in particular. Scintigraphy was used to visualize skeletal inflammatory disease and computer tomography in order to further characterize the SCC changes.

### MATERIAL AND METHODS

Patients with the diagnosis of PPP were collected from the records of the out-patient department of dermatology from the last two-year period. Out of 104 patients traced, 86 came for a clinical examination. Three patients were excluded because of signs of psoriasis; in the others there were no signs or history of that disease.

The clinical study on the remaining 83 patients comprised a careful report on the duration and intermittency of the skin disease, correlation to seasons and infections, occurrence of arthralgia, and heredity for PPP or psoriasis. The clinical examination included character and localization of skin lesions.

After the diagnosis of PPP had been established active skeletal lesions were screened with <sup>99m</sup>Tc diphosphonate scintigraphy in 73 patients since ten patients declined to take part in the study. Patients showing an abnormally increased skeletal uptake were clinically examined by an orthopaedic surgeon. Special attention was paid to present and earlier symptoms and signs from joints. Areas of interest found either by the scintigraphy or by the clinical examination were studied by plain radiography or in the juxta-sternal region with computer tomography. One patient with a slightly increased uptake and without symptoms declined further examination. Since the normal radiological appearance of the sterno-clavicular and costo-sternal joints and the effect of aging on these joints are poorly described we also performed computer tomography on 40 patients without PPP

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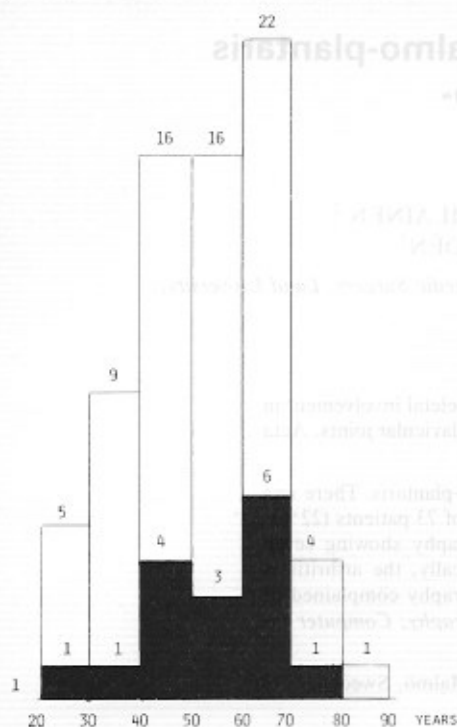


Fig. 1. Age distribution of patients with PPP ( $n=83$ ). Patients with a pathologic scintigram of the SCC area are shown (■), as well as those with a normal one (□).

who were examined for other reasons. There were 18 females with the mean age of 57 years (range 34–78 years) and 22 males with the mean age of 60 years (range 31–80 years). Of these 40 controls 18 patients were also studied by skeletal scintigraphy. Another control group for computer tomography was 7 patients with PPP with negative scintigraphy.

## RESULTS

The age distribution of the 73 patients with PPP examined by skeletal scintigraphy is presented in Fig. 1. The mean age was 52 years (range 21–81 years); there were 51 females and 22 males. The duration of the skin disease was 7.4 years (range 0.5–34 years). Both hands and feet were involved in 57 cases, hands only in 5 cases, and feet only in 11 cases. In typical cases, PPP was characterized by a confluent red infiltration in palms and/or soles with pustules and scales. In some cases, there were isolated pustules without infiltration, even spreading to fingers or toes.

*Skeletal scintigraphy* showed an increased uptake in the SCC area in 16 of 73 patients examined (22%). An example is shown in Fig. 2. The distribution of the increased uptake is shown in Table I. One patient also had an increased uptake in the lumbar spine; roentgenologically this was caused by a discitis-spondylitis characteristic of PPP (4). Two patients had an abnormal uptake in the mandible because of osteitis, one had an increased uptake in the left hip. He had received a total hip prosthesis nine months earlier because of a non-specific synovitis. The scintigraphy in the 18 control cases was normal.

In Table II the *dermatological findings* are presented from the whole patient group (83 patients), the patient group with a pathological scintigram (16/73 cases), and the remaining group with a negative scintigram (57/73 cases). With regard to several anamnestic variables percentual figures indicated differences between the group with scintigraphy-positive

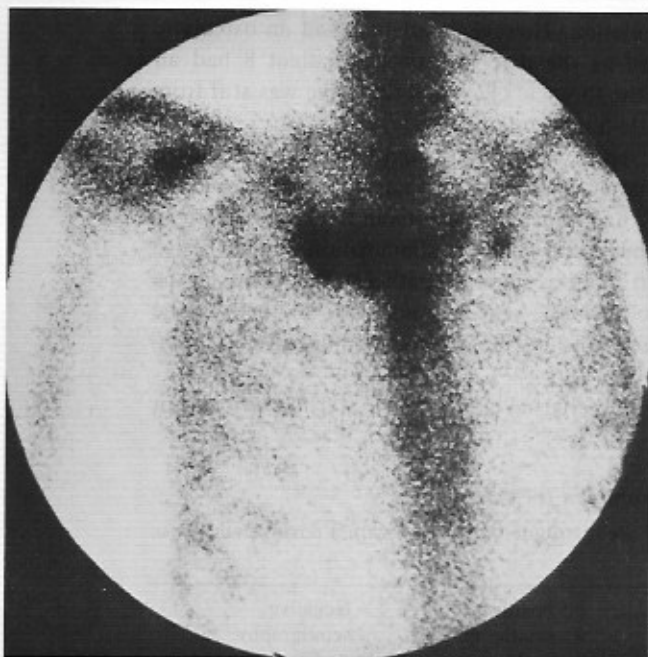


Fig. 2. Skeletal scintigraphy of the thorax from the front in a 60-year-old woman with PPP for ten years. There is an increased radioactivity on the right side of the manubrium sterni, anterior part of the first rib and the SCC junction. Clinically the patient was free from symptoms.

patients and that with negative patients; these were, however, statistically not significant. Nor were there any differences in clinical findings such as localization and pustule spreading between the two groups.

#### Skeletal symptoms and signs

Nine of the 16 patients with an increased skeletal uptake had clinical symptoms summarized in Table III. All nine had symptoms from the juxta-sternal region. Eight patients had complaints from the sterno-clavicular joints. The arthritis was asymmetric in 7/9 cases (Fig. 3). The majority of the cases had minor symptoms in episodes during the years. Case 9 admitted that he since some years sometimes had pain in the sterno-clavicular region but in spite of manual labour as a welder he had not recognized that he was totally stiff in the sterno-clavicular joint because of bilateral ankylosis.

The frequent occurrence of back pain is difficult to evaluate because back pain is a

Table I. Distribution of the increased radioisotope uptake in 16 patients with a positive Tc-diphosphonate scintigram in the region of the upper half of the sternum

The increased uptake was visually classified as minor or major. The number of patients with a major increase is shown in brackets. Complete symmetry of the lesions was present in only five cases

Skeletal area	Increased uptake n=16
Sterno-clavicular joint	12 (8)
First sterno-costal junction	16 (9)
Second sterno-costal junction	4 (1)
Manubrio-sternal joint	4 (1)

frequent complaint also in the general population. However, patient 4 had an osteolytic spondylitis involving LIV and LV as well as the disc in-between. Patient 8 had an ankylosing spondylitis with involvement of the thoracic chest and the spine was stiff from the upper thoracic region down to the middle lumbar region.

Osteolytic osteitis in the mandible occurred in two patients and bone tissue removed showed evidence of a non-specific inflammation. Culture was obtained from one patient and negative. Two patients, no. 1 and no. 7, had transient synovitis in the knees where an arthroscopic examination revealed nothing but minor signs of inflammation. Patient 7 also had a rapidly progressing arthritis in the left hip that started together with arthritis in the manubriosternal joint. He became unable to work one year later and after another year he was operated on with total hip replacement. The histologic examination revealed non-specific synovitis.

*Computer tomography.* All 15 patients with increased uptake of the sterno-clavicular or

Table II. Clinical findings in 83 patients examined for PPP

The 73 patients studied by skeletal scintigraphy are distributed into those with a positive and those with a negative result

	All patients n=83	Positive scintigraphy n=16	Negative scintigraphy n=57
Mean age (years)	52	53	52
Duration (years)	7	8	7
Intermittency (patients)	49=59%	9=56%	34=60%
Summer improvement	26=31%	7=44%	14=25%
Psoriasis heredity	17=20%	1=6%	13=23%
PPP heredity	7=8%	0=0%	4=7%
Correlation to infection	12=14%	2=13%	8=14%
Hands and feet	65=78%	10=62%	47=82%
Hands only	6=7%	1=6%	4=7%
Feet only	12=14%	5=31%	6=11%
Spreading pustules	13=16%	3=19%	9=16%

Table III. Skeletal symptoms and signs in nine patients with PPP

Numbers in brackets denote minor symptoms

No.	Sex	Years	Duration (yrs)		Sterno-clav. joint	Manubrio-sternal joint	Osteolytic spondylitis	Alveolar osteitis	DIP	Knee arthritis	Hip arthritis	Back pain
			cutaneous and locomotor	Sterno-clav. joint								
1 <sup>GM</sup>	F	28	10	1	L					L		
2 <sup>GL</sup>	F	43	25	2	(R) L							+
3 <sup>AMK</sup>	F	45	10	3	R (L)							+
4 <sup>BBH</sup>	F	54	2	4	(R) L		L: IV-L: V	+				+
5 <sup>DL</sup>	F	60	8	7	R + L				R L			+
6 <sup>ML</sup>	F	67	12	4	L							+
7 <sup>GP</sup>	M	46	6	2	+					L	L	
8 <sup>KEM</sup>	M	50	9	7	R							+
9 <sup>EN</sup>	M	62	10	8	R + L			+				



Fig. 3. A clinical picture of arthritis in the left SCC joint.

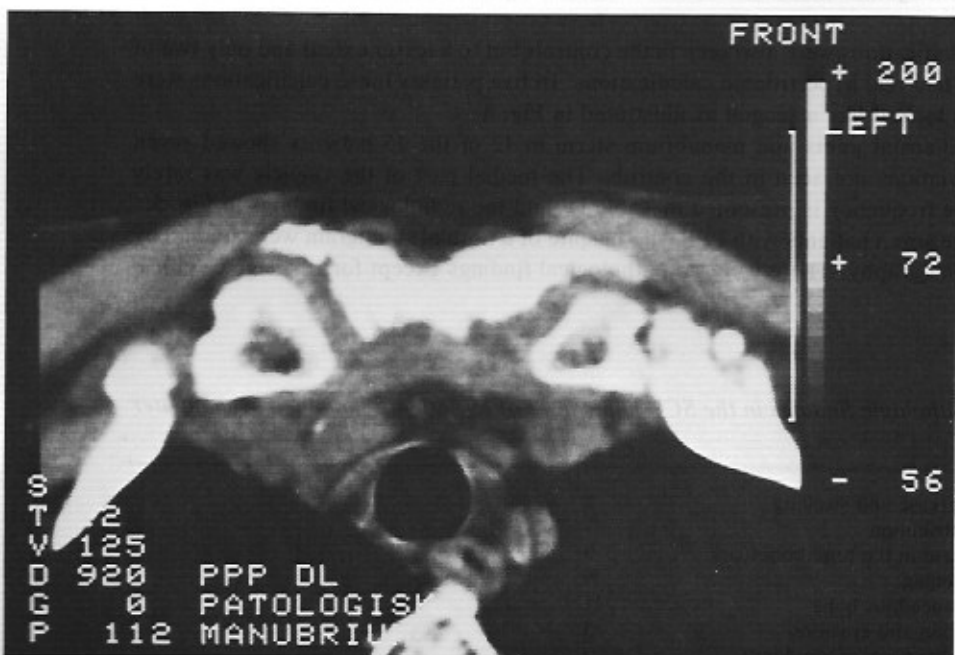


Fig. 4. Computer tomography showing seagull-like calcification of the sterno-clavicular joint.

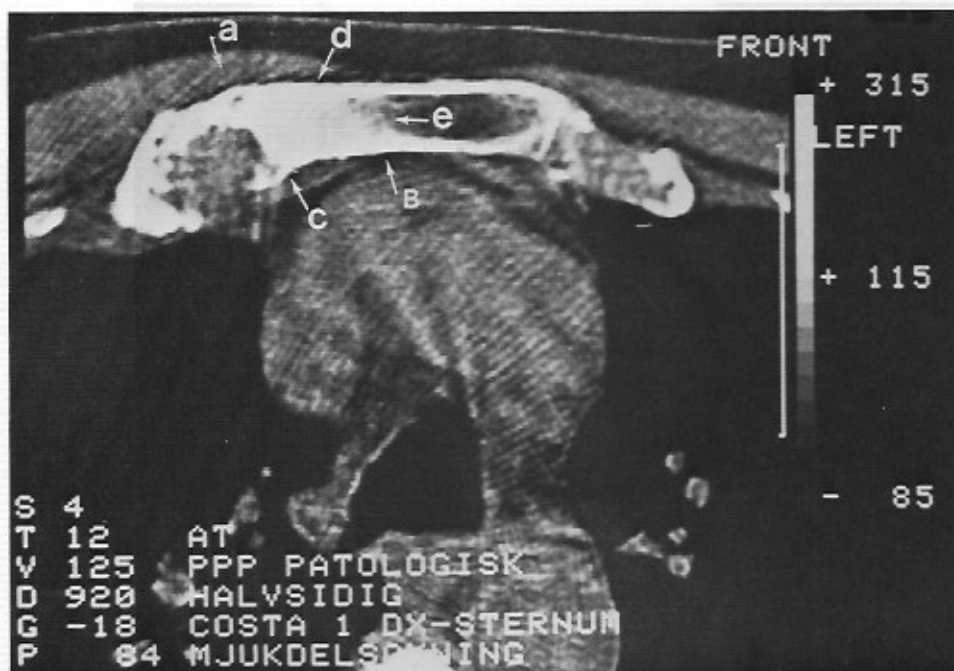


Fig. 5. The most common radiological findings in SCC joints: (a) soft tissue swelling, (b) half-sided distribution, (c) volume increase, (d) cortical thickening, (e) sclerosis of cancellous bone.

the sterno-costal joints had calcifications in the cartilage and/or the fibrous tissues of these joints.

Similar calcifications were also seen in the controls but to a lesser extent and only two of the controls had real hypertrophic calcifications. In five patients these calcifications were extreme and looked like a seagull as illustrated in Fig. 4.

The sterno-costal joints and manubrium sterni in 12 of the 15 patients showed seven different deviations not seen in the controls. The medial part of the clavicle was rarely affected. The frequency is presented in Table IV and the radiological findings in Fig. 5.

There were seven patients with PPP who in spite of a normal scintigram were studied by computer tomography. There were no pathological findings except for cartilage calcification.

Table IV. Pathologic findings in the SCC joints in 12 of 15 patients examined by computer tomography

Soft tissue increase and swelling	7
Half-sided distribution	7
Volume increase in the total bonestock	9
Cortical thickening	9
Sclerosis of cancellous bone	11
Bone destruction and erosions	3
Clavícula involvement (of any kind)	2
None of the above findings	3

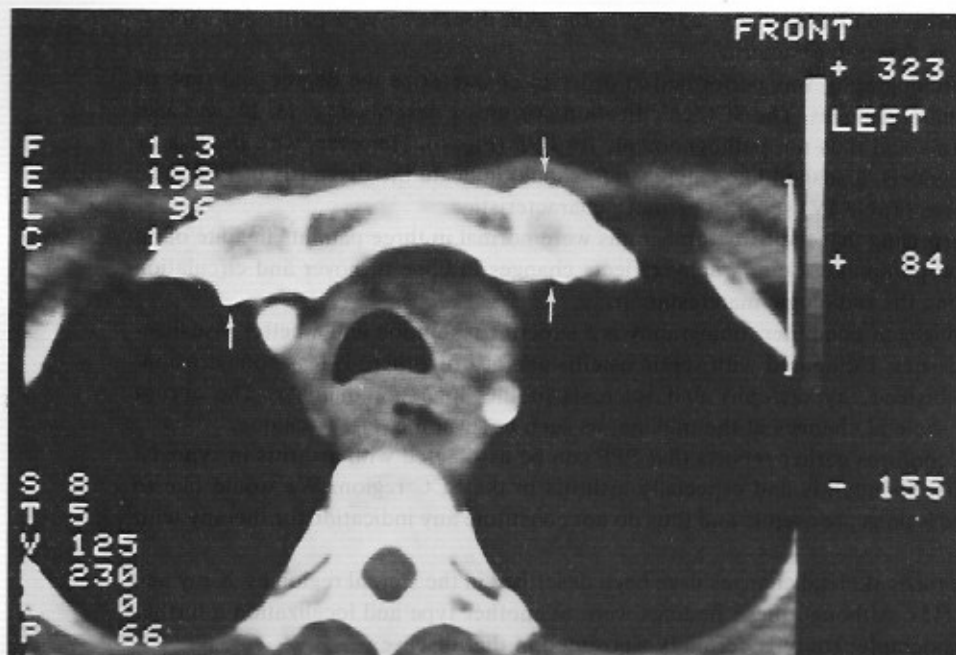


Fig. 6. Normal case of PPP with extensive calcification.

## DISCUSSION

The clinical entity of pustulosis palmo-plantaris was originally delineated by Barber (5) and Andrews (6, 7). From the beginning there has been a continuing discussion on its relationship to psoriasis. These early authors were convinced that PPP was caused by an infectious focus and that elimination thereof led to a cure of the skin disease. This hypothesis was supported by successful tetracycline treatment in some cases (8, 9). A causal relationship between an infectious focus and PPP has not, however, been corroborated by controlled studies or clinical experience in general.

Lately, an association between PPP and localized osteochondral disease has been reported (10). Thus, Japanese authors (3) studied 53 cases of "pustulotic arthro-osteitis". Clinically and roentgenologically, all patients had lesions in the sterno-clavicular region but some also had spondylitis, sacroilitis, or peripheral arthritis. In a consecutive PPP material the same group (2) found a 9.4% incidence of SSC arthritis based on clinical examination. Their findings were verified by X-ray tomography. In a previous Japanese work (11) the incidence was 10.6%.

In a prospective Swedish study of 52 cases of PPP all patients were examined by X-ray tomography of the sternal region but findings were positive in three cases only (12). In the present prospective study, skeletal scintigraphy disclosed a disease of the SCC joint in 16 of 73 cases, i.e. 22%. This high figure is probably explained firstly by the fact that all PPP patients regardless of clinical symptoms or signs were examined; secondly, that  $^{99m}$ Tc scintigraphy, a sensitive method for detecting inflammatory processes, was used.

When the patient material was divided into a scintigram positive group and a negative one, no difference was observed with regard to the various clinical parameters (Table II). There was e.g. no correlation to infection. Nor was there any correlation among the 16

scintigram positive patients to any activity in the skin disease or to a particular clinical pattern such as "pustular bacterid".

Computer tomography was performed in order to characterize the degree and type of the osteochondral changes. The SCC calcification previously described (1, 13, 14) was also seen in controls and thus not pathognomonic for PPP (Fig. 6). However, with the risk of some overdiagnosis, a seagull-like calcification should indicate the diagnosis of PPP. The other 7 features (Table IV) seem to be more characteristic.

It is not surprising that the SCC tomograms were normal in three patients in spite of an increased isotope uptake. Scintigraphy reflects changes in bone turnover and circulation often preceding the radiologic manifestations.

The advantages of computer tomography is a superior resolution and a better visualization of soft tissues. Compared with septic osteitis and arthritis there is less bone erosion/destruction. Instead, hypertrophy and sclerosis of the bone predominate. The abrupt arrest of the skeletal changes at the midline, as seen in several cases, is unique.

Our study confirms earlier reports that PPP can be associated with arthritis in synovial joints, osteitis, spondylitis and especially arthritis in the SCC region. We would like to stress that the lesions are aseptic and thus do not constitute any indication for therapy with antibiotics.

Also in psoriasis skeletal changes have been described in the sternal region by X-ray and tomography (15). Although these findings were of another type and localization a further computer tomography study is certainly warranted in that disease.

Patients reported in the Japanese studies seem to have more dramatic symptoms and were treated surgically relatively more frequently than in our series, in which only two patients were treated surgically because of osteitis in the mandibles and one patient with total hip replacement because of synovitis.

The clinical symptoms of the most commonly affected area (SCC) were in all but one case mild. Seven patients had no symptoms at all in spite of an abnormally increased uptake on the scintigrams. The arthritis usually requires no further examination or therapy. If symptomatic treatment is indicated common antiphlogistics are recommended.

Thus the clinical importance is rather that an arthritis in the SCC region may be helpful to reveal the nature of an osteitis or arthritis elsewhere, especially if the skeletal manifestation appears prior to the cutaneous disease.

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