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Original Article

Comparison of Sacroiliac CT Findings in Patients with Skin Psoriasis, Without Rheumatological Manifestations: A Retrospective Observational Study

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Abstract

Background: To describe CT characteristics of sacro-iliac joints (SIJs) in patients with psoriasis (PsO) without rheumatological manifestations, and compare them with controls of the same age and sex.
Methods: A monocentric, retrospective, observational study was conducted using the medical records of the rheumatology and dermatology departments of the Tertiary Medical Center in France . We included patients with psoriasis, without rheumatological manifestations, who underwent a CT scan including the SIJs. Each patient was matched with an age- and sex-matched control who had undergone a CT scan for rheumatological reasons. CT scan slices were interpreted by two independent rheumatologists, a resident and an expert, using a modified score. Joint space narrowing (JSN), erosions, sclerosis, and intra-articular gas were scored.
Results: Sixty patients and 57 controls were included. Global SIJs score was higher in the PsO group (6.63 ± 10.7) than in the control group (2.84 ± 4.87). Erosion and sclerosis did not differ between groups; however, the joint space narrowing score was higher in the PsO group (4.15 ± 10.8 vs. 0.873 ± 4.62, $P = .035$). There were no correlations between the global score and the disease duration or the severity of psoriasis. The number of gestations, active smoking, alcohol intake, and physical work had no impact on the global score.
Conclusion: The CT characteristics of SIJ from patients with PsO were different from those of age- and sex-matched controls, essentially secondary to joint space narrowing.
Keywords: psoriasis, sacroiliac joint, CT scan

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Introduction

Psoriasis (PsO) is a frequent, chronic papulosquamous skin disease presenting at any age. It affects 2-3% of the European population.[1] Psoriatic Arthritis is a part of peripheral spondyloarthritis characterized by peripheral and axial manifestations.[2] The clinical manifestations are multiple and could be revealed by various damages.[3] The diagnosis of psoriatic arthritis is a difficult art, and the CASPAR classification criteria[4] are useful to classify these patients.

Medical imaging is an essential tool in the diagnostic process of PsA. The natural history of PsA is characterized by a period with asymptomatic joint or enthesitic inflammation.[5] Several studies have shown that synovitis and enthesitis could be highlighted using MRI and ultrasonography in psoriasis patients.[6] The diagnosis of PsA is often delayed.[7] Moreover, treatment of PsO are effective in PsA, delaying the diagnosis of PsA, and could improve peripheral enthesopathy in psoriasis, even if it remains subclinical.[8]

Recently, a growing interest has been shown in axial manifestations in Psoriatic Arthritis. Characteristics of patients with ankylosing spondylitis seem to differ according to the presence or absence of psoriasis. Patients with psoriasis are older, more frequently male, and have less back pain at presentation. The grade of sacroiliitis is lower, as well as HLA*B27 positivity in psoriasis patients.[9] This notion has recently been taken into account in the French Society for Rheumatology recommendations.[10] A recent controlled study showed that, in 20 asymptomatic patients with skin psoriasis, 25% had inflammation of the SIJ using MRI, which was not statistically different from the global population.[11] Low-dose CT scan allows a better analysis of structural lesions than conventional radiography in ankylosing spondylitis.[12]

To our knowledge, no study has specifically evaluated the extent of structural lesions of the sacroiliac joints (SIJs) on computed tomography (CT) in patients with psoriasis, without rheumatological manifestations, compared with healthy controls.

This study aimed to assess SIJs features in CT scan slices in patients with psoriasis, comparing them to a control population.

Material and Methods

Study design and population

An observational, retrospective study was performed using medical records from the rheumatology and dermatology departments of Besançon University Hospital. Patients with psoriasis were identified through a database listing patients treated with bDMARDs in the dermatology department. From this list, we identified patients who had undergone a CT scan, for any reason, including the SIJs in their entirety through the hospital's imaging archiving system (PACS).

Each psoriatic patient was matched with a selected control according to age and sex. The control case had to undergo a CT whose slices also included SIJs. These exams, also extracted from the PACS, were made at the request of the department of rheumatology for various reasons (mainly discal sciatica).

Non-inclusion criteria were pelvic bone lesions, pelvic radiotherapy or the existence of arthrodesis. Psoriatic patients did not have a diagnosis of PsA or any rheumatological manifestations assessed by the dermatologist at the time of the CT scan and controls should not present psoriasis or evidence of inflammatory rheumatic disease. Data about age, psoriasis duration and severity, BMI, gestation, smoking, alcohol intake, and physical work were collected.

Two independent rheumatologists, an expert and a resident, scored CT scan slices blindly. Scoring was carried out with the help of a score previously suggested by Diekhoff et al[16] and modified for this study (Table 1). A kappa coefficient was previously evaluated on the first 10 patients and was 0.68

Main Point

- Psoriasis patients had more frequent SIJ structural damage than controls in this study comparing CT scans.

Table 1. Scoring system used to assess sacro-iliac joints' characteristics, modified from Diekhoff et al[16]

Joint space	Erosion	Sclerosis	Intra-articular gas
0 No joint space change	0 No erosions	0 No sclerosis	0 No intra-articular gas
1 Questionable widening or narrowing	1 Small isolated erosions or questionable single erosion	1 Questionable or little sclerosis (5-9 mm)	1 Intra-articular gas
2 Pseudowidening	2 Definite erosions or larger single erosion (>3 mm)	2 Evident sclerosis (≥10 mm)	
3 Partial ankylosis	3 Multiple (>5) or confluent erosions		
4 Extensive/total ankylosis			

The primary endpoint was to compare the global SIJ score in CT scan slices between psoriatic patients and controls free from psoriasis. Besides, we also assessed the distribution of intra-articular gas and diffuse idiopathic skeletal hyperostosis (DISH) lesions.

Patients and controls gave informed consent about the use of their medical data and did not object to the study, according to Good Clinical Practice guidelines, before the start of the study. This study was performed in compliance with the Declaration of Helsinki and French legislation for the protection of personal data. It has been registered on the French Health Data Hub under number F20220406094512. The experimental protocol has been approved by the Clinical Research and Innovation Department of Besancon University Hospital. No ethics committee approval was required in accordance with French regulations (Decree No. 2017-884 of 9 May 2017), as this retrospective study did not involve research directly on human persons. The study complies with the General Data Protection Regulation (EU 2016/679) and was conducted under the French Reference Methodology MR-004 (CNIL Declaration No. 2214506 v 0, dated 24 July 2019). All patients and controls were informed about the use of their medical data and did not object to their participation in the study, in accordance with Good Clinical Practice guidelines, prior to study initiation.

Scoring System and Outcome Measures

We used the score developed by Poddubnyy and modified by Diekhoff et al,[13] to characterize the type and localization of structural damage of the SIJ. Twenty-four regions were assessed for each patient, 12 for each SIJ, through three referent sections (anterior, middle, and posterior). Joint space narrowing (JSN), erosion, and sclerosis were analyzed in each region. The presence of intra-articular gas was also evaluated. Intra-articular gas was retained if a linear gas density was present in the joint space. The scoring system is presented in Table 1.

Statistics

Quantitative variables, expressed as mean ± standard deviation, were compared with Student's t-test or the Mann-Whitney U test, as appropriate. Qualitative variables, expressed as number and percentage, were compared using the chi-square test. Correlation coefficients of Pearson and Spearman were also calculated to assess a possible correlation between patients' characteristics and global scores. Interobserver correlation coefficient kappa was finally computed. A value of $p < 0.05$ was considered significant. Analyses were performed using SAS version 9.4 (SAS Institute Inc., Cary, North Carolina, USA).

Results

Sixty patients and 57 controls were included. The mean age was 52.2 ± 17.7 years old in the PsO group and 53.6 ± 16.7 years old in the control group. The sex ratio and BMI (27.7 kg/m^2 in the PsO group and 26.9 kg/m^2 in the control group) did not differ between groups. There is a trend of more frequent active smoking in the PsO group (69% in the PsO group versus 54% in the control group; $P = .075$). Concerning the PsO group, mean disease duration before imaging was performed was 20.2 ± 17.6 years. The skin area affected was 41.8 ± 22.6%. Regarding control group, 66.7% of exams were prescribed for lomboradiculalgia. These data are available in Table 2.

Table 2. Patients' characteristics

	Patients with psoriasis (n = 60)	Control group (n = 57)	p
Men (%)	31 (51.7%)	34 (54.4%)	>.05
Age at the date of CT scan (years old)	52.2	53.6	>.05
Psoriasis duration (years)	20.7	/	
Skin area involved (mean in %)	41.0	/	
BMI (kg/m^2)	27.7	26.9	>.05
Physical profession (%)	36.2	60.6	>.05
Smoking (%)	69.5	54.0	>.05
Alcohol intake (%)	17.2	19.6	>.05
Gestation before imaging (% of women concerned)	65.5	68.0	>.05

The global SIJs score was higher in the PsO group than in the control group (6.63 ± 10.7 vs. 2.84 ± 4.87; *P* = .015). JSN was higher in the PsO group (4.15 ± 10.8 versus 0.873 ± 4.62; *P* = .035). Neither erosion and sclerosis nor intra-articular gas differed between groups. Results are available in Table 3. The differences were seen in the middle slice.

There were no correlations between the global score and both disease duration (Pearson score 0.166 (–0.131; 0.435)) and psoriasis severity (Pearson score 0.00937 (–0.259; 0.276)). Number of gestations, number of prior bDMARDs, active smoking, alcohol intake, and physical work did not influence the global score either.

Discussion

Our study is the first to analyze sacroiliac joint characteristics using CT scan in patients with psoriasis without rheumatological involvement in comparison to matched controls without psoriasis. To date, there are only two studies evaluating sacroiliac involvement on standard radiography in psoriatic patients. The first study is old and found 11% radiographic sacroiliitis in psoriatic patients without evidence of PsA.[14] The second study found 20% radiographic sacroiliitis in patients with skin psoriasis without evidence of PsA.[15]

Table 3. CT Scan Findings Between PsO Patients and Matched Controls

	Control Group	PsO
Erosion	0.42 (±0.91)	0.2 (±0.48)
Joint space narrowing	0.873 (±4.62)	4.15 (±10.8)*
Sclerosis	1.76 (±2.07)	2.17 (±2.73)
Global score	2.84 (±4.87)	6.63 (±10.7)*
Gas	34 (62%)	34 (57%)

*$P < .05$.

Our study shows an increase in the joint space narrowing score. This is explained by the presence of two complete ankyloses of the sacroiliac joint. These results are surprising, especially as there is no more erosion in psoriasis, and possibly the presence of psoriasis has a greater influence on ossification. This suggests a greater spinal or sacroiliac ankylosis as it was suggested by Lorenzin et al[17] The importance of skin psoriasis in the severity of spondyloarthritis is assessed in two studies. Lorenzin et al. showed that the presence of plaque psoriasis is associated with more spinal progression in axial spondyloarthritis, with asymmetric sacroiliitis and more spondylitis; nevertheless, sacroiliitis progression was higher in patients without psoriasis.[16] The second study is from the DESIR cohort and showed that the presence of skin psoriasis was associated with more swollen joints and more biological treatment.[17] However, disease activity and severity were comparable. Finally, Jadon et al. also found that complete sacroiliac joint ankylosis was more frequently found in ankylosing spondylitis than in Psoriatic Arthritis.[18]

Our study has several strengths. Our study used a CT scan which is the most sensitive procedure to detect structural modifications, and we compared the results to matched controls. A review of patients' data was performed to ensure the absence of Psoriatic Arthritis after the realization of the CT scan, as was done in previous studies. Patients were systematically excluded if there was any doubt about the diagnosis. We took into account confounding factors known to modify SIJ structure, such as BMI, physical work, and gestation.

Nevertheless, our study has some limitations. First, it is a retrospective study. Furthermore, one of the major limitations of our study is the use of CT scans, which are not the best imaging modality for detecting inflammatory lesions. It would be interesting to repeat an identical study using MRI, but this would be a prospective study with less follow-up on patient outcomes. Nevertheless, CT scans can reveal erosions and ankylosis, post-inflammatory lesions, with greater precision than MRI. So, each imaging modality has its pros and cons. Anatomical variations of SIJs, known to promote sclerosis lesions, were not taken into account.[19] We can also assume a recruitment bias. Indeed, all psoriasic patients were treated with biologics. Then, even if patients with psoriatic arthritis were excluded from the study, the rheumatological burden could have been mitigated by biologics used for psoriasis.[9] It is well known that undiagnosed PsA is frequent, despite of dermatologists screening.[20] Finally, most patients in the control group suffered from back pain, making this control group imperfect controls.

Conclusion

The CT characteristics of SIJs from patients with skin psoriasis were different from those of age- and sex-matched controls, essentially secondary to joint space narrowing.

This study needs to be confirmed by further studies with a larger number of patients. A comparison between psoriatic patients receiving only local treatments and patients treated with biological agents could also be interesting.

Data Availability Statement: The data that support the findings of this study are available on request from the corresponding author.

Ethics Committee Approval: No ethics committee approval was required in accordance with French regulations (Decree No. 2017-884 of 9 May 2017), as this retrospective study did not involve research directly on human persons. The study complies with the General Data Protection Regulation (EU 2016/679) and was conducted under the French Reference Methodology MR-004 (CNIL Declaration No. 2214506 v 0, dated 24 July 2019). All patients and controls were informed about the use of their medical data and did not object to their participation in the study, in accordance with Good Clinical Practice guidelines, prior to study initiation.

Informed Consent: Informed consent was obtained from the patients who agreed to take part in the study.

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