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Causes of parity-related pelvic pain found incidentally on sacroiliac joint MRI: Osteitis condensans ilii and pelvic congestion syndrome

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Abstract

Chronic Pelvic Pain (CPP) is defined as severe pain that persists continuously or intermittently for six months or longer in women, is unrelated to sexual intercourse or menstruation, is likely to cause functional limitation, and requires medical treatment. Osteitis Condensans Ilii (OCI) and Pelvic Congestion Syndrome (PCS) are known causes of CPP. Sacroiliac joint Magnetic Resonance Imaging (MRI) can show different clinical mimickers of sacroiliitis and pelvic pain causes such as OCI and PCS. In this study, our aim was to investigate the frequency of OCI and PCS in patients referred to our clinic for Sacroiliac joint MRI due to low back-pelvic pain and to analyze their association with age, presence of sacroiliitis and multiparity. The the data of 700 female patients who attended the hospital with complaints of low back pain were investigated and it was found that the number of births experienced by the patient significantly correlated with OCI (OR:3.3) and PCS (OR:5.1). Even when MRI shows no evidence of sacroiliitis in a multiparous woman admitted with low back pain, these two differential diagnoses should still be considered by clinicians and radiologists.

Keywords: Sacroiliac joint, chronic pelvic pain, pelvic congestion syndrome, osteitis condensans ilii

1. Introduction

Chronic pelvic pain (CPP) is defined as severe pain that persists continuously or intermittently for six months or longer in women, is unrelated to sexual intercourse or menstruation, is likely to cause functional limitation, and requires medical treatment (1). The prevalence of CPP worldwide is reported to be 16-25% of multiparous women (2). Although there are a variety of causes of CPP, including gynecological, urological, gastrointestinal, musculoskeletal, and/or nervous system disorders, one study found no pathology in 35% of women with CPP who had undergone diagnostic laparoscopy (3). However, Osteitis Condensans Ilii (OCI) and Pelvic Congestion Syndrome (PCS) are known causes of CPP.

OCI is sclerosis secondary to mechanical stress on the auricular surface of the ilium, occurring often during or after latency. It is commonly bilateral and symmetrical (4). The mechanical stress caused by pregnancy is the most widely accepted theory for the cause of OCI (5). On physical examination, sacroiliac tests are negative in these patients, with minor sensitivity found only on the joint (6). OCI should be considered in the differential diagnosis of postpartum CPP, particularly because the articular surfaces of the sacroiliac and hip joints, as well as the soft tissue structures that joints, reflect pain to the lower back and pelvis (7).

PCS, as a known cause of CPP, is defined as the presence of enlarged pelvic veins as a result of ovarian vein failure (8). Some studies describe the presence of reflux as an ovarian vein diameter greater than 8 mm and a parauterine vein diameter greater than 5 mm in color Doppler ultrasonography, dynamic computed tomography, magnetic resonance imaging (MRI), conventional catheter angiography, or venography diagnostic imaging criteria (9-12). The diagnosis of PCS, on the other hand, necessitates a multidisciplinary approach, and diagnosis is usually achieved after ruling out secondary causes.

Pains arising from the hip, pelvis, and sacroiliac joint are entangled due to the complicated anatomy of the lower abdomen and pelvis. PCS-induced pain, particularly in multiparous women, can mimic sacroiliac joint pain (13). To investigate musculoskeletal problems in women presenting with CPP, MRI should be used to thoroughly examine the sacroiliac joint (14). Sacroiliac joint MRI can show conditions such as OCI and PCS clinically mimicking low back pain and sacroiliitis-related pain. Evaluation of pathologies in pelvic varicose veins using sacroiliac joint MRI helps the diagnosis of PCS (11). However, the number of studies examining PCS findings using sacroiliac joint MRI and other causes of CPP is insufficient to draw conclusions.

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The purpose of this study was to assess the prevalence of PCS and OCI findings in sacroiliac joint MRI in patients with low back pain, as well as their association with age, multiparity, and the presence of sacroiliitis.

2. Methods and Materials

Sacroiliac joint MRIs performed on a total of 1003 patients aged 15–56 years who were attended to at the Ondokuz Mayıs University Faculty of Medicine, Department of Radiology, between January 2017 and December 2018, were evaluated retrospectively. Because of the inability to clearly measure the diameter of the parauterine vein due to the imaging technique, motion artifacts, poor resolution, or the presence of an incidentally detected malignant mass or metastasis in the pelvic region, the data of 303 out of 1003 patients were excluded from the data group. Research analyses were performed on the data of the remaining 700 patients.

All sacroiliac joint MRIs included in the study were examined for the presence of active and chronic sacroiliitis using the Ankylosing Spondyloarthritis International Society's criteria. Diagnostic criteria are summarized in Table 1.

Table 1. Diagnostic criteria for sacroiliitis according to ASAS Classification

SpA findings	Sacroiliitis in Screening
Inflammatory low back pain	Active (acute) inflammation on MRI is highly significant for SpA-associated sacroiliitis.
Arthritis	
Enthesitis (heel)	
Uveitis	Definitive radiographic sacroiliitis according to modified New York criteria
Dactylitis	
Psoriasis	
Crohn's disease/Colitis	
Good response to NSAIDs	
Family history of SpA	
HLA-B27	
High level of C-reactive protein (CRP)	

The presence of a dilated vein of ≥ 6 mm in overall dimension surrounding the ovaries and uterus was acknowledged as the diagnostic criterion for PCS (12). The presence of a triangular sclerosis area on the iliac wing inferior to the sacroiliac joints was acknowledged as the diagnostic criterion for OCI (6). The number of deliveries for each patient were obtained from the hospital's informatics system. The patients in the study were assessed based on their age, parity number (patients with two or more deliveries were considered multiparous), active and chronic sacroiliitis, bone marrow edema (BME), and OCI and PCS results.

2.1. MRI Protocol

A 1.5-Tesla (Magnetom Symphony, Siemens Healthcare, Erlangen, Germany) MRI system and a 3-Tesla (Ingenia, Philips Healthcare, Netherlands) MRI system were employed. Before and after axial contrast, fat-suppressed T1-weighted Turbo Spin Echo (TSE), coronal fat-suppressed T2, and/or STIR images were assessed.

2.2. Statistical analysis

The study data were entered into SPSS v21 (Chicago, IL). Descriptive data were presented as mean, standard deviation, and percentage. For group comparisons, T-tests and chi-square tests were employed. For modeling, logistic regression analysis was performed using the enter method. The statistical significance level was accepted at $p<0.05$.

3. Results

In this study, the data of 700 female patients who attended the hospital with complaints of low back pain were investigated. The patients' mean age was 38.1±10.7, of which 55% (n:388) were multiparous and 26.0% had active sacroiliitis. Having acknowledged vein diameter as 6 mm and beyond as an indication of PCS, this finding was found to be positive in 9.3% (n:65) of the patients (Fig. 1). Of these, 24 (3.4%) were found to have OCI, 9 of which (1.3%) had BME. All patients (100%) with BME were found to have OCI; however, none showed any active sacroiliitis (Fig. 2). The measured PCS diameters ranged from 2 mm (n:141) to 11 mm (n:1), with 3 mm being the median (Fig. 3). Table 2 shows the descriptive data of the patient group.

The mean age of patients (n:65) with PCS (vein diameter of 6 mm and above) was found to be 43.2±8.4, and the mean age of patients with OCI (n:24) was 46.0±9.1. PCS (15.7%) and OCI (5.2%) were found to be statistically significantly higher in multiparous (n:388) women compared to others. Examination of the PCS diameters revealed that the PCS diameters of the multiparous group were significantly higher. Table 3 shows the comparison of the data of patients with and without multiparity.

Patients with and without PCS were grouped in the logistic regression analysis for PCS, and the number of deliveries, active and chronic sacroiliitis, BME, OCI, and age were included in the model. The analysis revealed that the model was significant (Nagelkerke R2:0.350, p:0.001), and a one-unit increase in the number of deliveries increased the likelihood of PCS 5.1 times (p:0.001, OR:5.128). Table 4 shows the logistic regression analysis for PCS.

In the logistic regression analysis for OCI, the number of deliveries, active and chronic sacroiliitis, bone marrow edema, and age of patients with and without OCI were included in the model. The analysis revealed that the model was significant (Nagelkerke R2:0.559, p:0.001), and a one-unit increase in the number of deliveries increased the likelihood of OCI 3.3 times (p:0.001, OR:3.287). Table 5 shows the logistic regression analysis for OCI.

4. Discussion

Chronic pelvic pain accounts for 10–15% of gynecological outpatient clinic visits and is a clinical entity with an unclear etiology (12). In patients being examined for CPP, the frequency of PCS and OCI should be taken into account and used in the differential diagnosis.

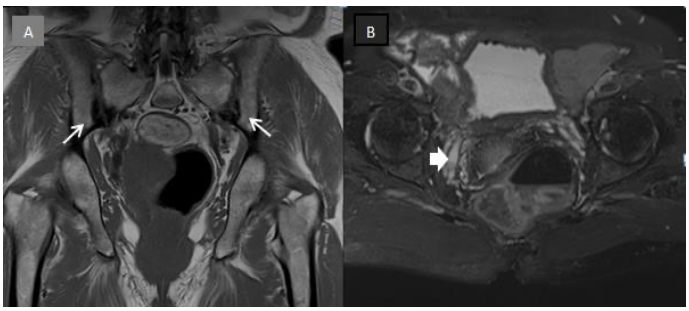

Fig. 1. A 38-year-old grand multiparous patient with OCI and PCS findings together and who has intermittent lower back pain for 3 years (A) Coronal oblique T1 weighted magnetic resonance image show symmetric sclerosis of iliac subchondral bone as very dark signal. Note bilateral SIJ spaces and surfaces are normal (white arrows). (B) Oblique axial T1-weighted postcontrast image demonstrates enlarged parauterine vein of the largest measuring 8.5 mm in diameter on the right side (thick arrow)

Table 2. Descriptive data of the patient group

Study parameters	Mean±SD (%)	n
Age	38.1±10.7	700
Active sacroiliitis	26.0%	182
Chronic sacroiliitis	21.1%	148
PCS diameter (mm)	3.9±1.6	700
PCS ≥ 6 mm	9.3%	65
Osteitis condensans ilii	3.4%	24
Bone marrow edema	1.3%	9
Multiparity	55.4%	388

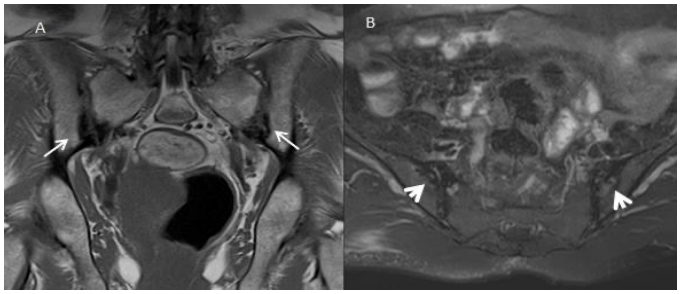

Fig. 2. Bilateral bone marrow edema (BME) of the sacroiliac joints in a 35-year-old OCI patient with an intermittent lower back pain duration of 4 months. (A) Coronal oblique T1 weighted magnetic resonance image show typical bilateral triangle bone sclerosis beneath auricular surface of iliac bone (white arrows). (B) Short tau inversion recovery (STIR) MRI reveals bilateral BME of iliac bone beneath the iliac sclerosis without joint space changes and joint surface erosions (short arrows)

Table 3. Comparison of the data of patients with and without multiparity

Study parameters	Multiparity – (n:312)	Multiparity + (n:388)	Statistics	p
Age	31.6±10	43.3±7.8	T:16.517	0.001*
Active sacroiliitis	20.3% (n:63)	30.7% (n:119)	χ^2:9.868	0.002*
Chronic sacroiliitis	10.9% (n:34)	29.4% (n:114)	χ^2:35.439	0.001*
PCS diameter (mm)	3.1±1.0	4.5±1.7	T:12.731	0.001*
PCS ≥ 6 mm	1.3% (n:4)	15.7% (n:61)	χ^2:42.806	0.001*
Osteitis condensans ilii	1.3% (n:4)	5.2% (n:20)	χ^2:7.833	0.005*
Bone marrow edema	1.0% (n:3)	1.5% (n:6)	χ^2:0.466	0.495

In the comparisons, Chi-square and T-test were employed. *p<0.050

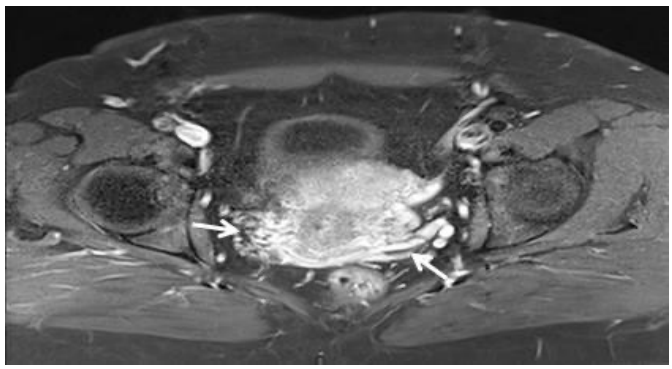

Fig. 3. A 42-year-old multiparous woman with hip and low back pain radiating to the groin and medial buttocks. Normal sacroiliac joint MRI shows axial FS T1-weighted postcontrast image reveal bilateral enlarged and tortuous parauterine veins of varying caliber, the largest measuring 9.4 mm in diameter on the left side (white arrows)

In recent years, some researchers have suggested that sacroiliac joint MRI may clinically demonstrate conditions that mimic low back pain and sacroiliitis and that PCS and OCI may be among these conditions (15). The aim of this study was to identify the frequency of findings in favor of PCS and OCI in sacroiliac joint MRI using a greater number of patients, as well as to show their confusion with SpA clinical criteria and their association with parity.

The sacroiliac joint MRIs taken prior to diagnosis of sacroiliitis in 700 female patients who presented at our clinic with complaints of low back pain were retrospectively evaluated, and the presence of OCI and PCS, which are the sources of parity-related pain, was investigated. In our study, only 26.0% of the patients showed active sacroiliitis symptoms; 9.3% of the patients had positive MRI results that met the diagnostic criteria for PCS. This rate was found to be 15.7% in multiparous patients, and the number of deliveries raised the probability of PCS incidence by 5.1 times. According to the current literature, 6% of women have ovarian varices, 10% have pelvic varices, and PCS develops in 50–60% of these women (15-18). Similarly, in a study by Cimşit et al. (19) sacroiliac joint MRIs taken with the pre-diagnosis of sacroiliitis were analyzed, and it was proposed that venous engorgement could induce low back pain mimicking sacroiliitis; it was subsequently reported that 5.3% of the patients exhibited PCS findings on MRI. The results of our study are consistent with the existing literature and clearly show that the frequency of PCS is higher in multiparous women. The most commonly stressed hypothesis regarding the prevalence of PCS in multiparous women during the premenopausal period is that the vascular capacity in the ovarian-uterine veins increases to 60 times the normal values during pregnancy. Excessively increased venous load is thought to cause deficiency and varicosity 12). Our results support this hypothesis and make an important contribution to the literature. Given these results, it would be prudent to include PCS in the differential diagnosis of CPP, particularly in multiparous women, and to examine PCS using more specific diagnostic methods (20).

Table 4. Logistic regression analysis for PCS

	B	Standard failure	Wald	p	Exp(B)
Number of deliveries	1.652	0.198	69.397	0.001*	5.218
Osteitis condensans ilii	-1.932	1.002	3.717	0.054	0.145
Age	-0.033	0.019	2.923	0.087	0.968
Active sacroiliitis	-0.716	0.528	1.836	0.175	0.489
Bone marrow edema	1.377	1.418	0.943	0.331	3.961
Chronic sacroiliitis	0.018	0.513	0.001	0.972	1.018
Constant	-4.401	0.759	33.658	0.000	0.012

Table 5. Logistic regression analysis for OCI

	B	Standard failure	Wald	p	Exp(B)
Constant	-6.979	2.152	10.516	0.001	0.001
Number of deliveries	1.050	0.302	12.062	0.001*	3.287
Age	0.045	0.045	0.978	0.323	1.046
Pelvic congestion syndrome	-1.015	0.850	1.427	0.232	0.362
Active sacroiliitis	-15.677	2541.368	0.001	0.995	0.001
Bone marrow edema	40.459	10921.958	0.001	0.997	0.001
Chronic sacroiliitis	-16.118	2674.186	0.001	0.995	0.001

Additionally, 3.4% of the patients in this study were diagnosed with OCI; OCI was found in all patients with BME, and none of these patients had signs of active sacroiliitis. In 2009, BME was shown to be a major criterion in the diagnosis of active sacroiliitis using sacroiliac MRI and according to the ASAS diagnostic criteria (21-22). Hence, clinicians are increasingly relying on sacroiliac joint MRI data to identify or rule out early sacroiliitis. Some studies have reported on cases in which BME was found in the MRI of individuals presenting with low back pain; these cases were initially followed as active sacroiliitis, but the diagnosis was changed during the follow-up to OCI (23). The reason for this confusion may be that in clinical practice, the diagnosis of OCI is made after radiological examinations and the exclusion of all other diagnoses that may cause low back pain, particularly sacroiliitis. The results of our study support OCI diagnosis following BME detection. However, thorough examination of the location and distribution pattern of the BME observed on MRI may aid in making the differential diagnosis between OCI and active sacroiliitis.

The rate of OCI detection in multiparous women was found to be 5.2%, which is higher than in nulliparous women and those who have had only one delivery. It was observed that each increase in the number of deliveries increased the incidence of OCI by 2.9 times. The incidence of OCI in the general population has been reported as 1–2.5% (6, 14, 24), and this rate may increase up to 8.9% in patients evaluated for inflammatory arthritis (25). The main reason why the incidence of OCI is unclear is that most patients are asymptomatic and have normal physical examination findings. OCI is typically detected incidentally through radiological examination (26,27). OCI is known to be more common in women in their third trimester of pregnancy and in the early postpartum period, and it often recurs in subsequent pregnancies. Based on the current literature, pregnancy can be viewed as a possible triggering factor leading to sclerosis (28,29). The results of this study pertaining to multiparity, unlike previous studies, underline the importance of investigating OCI in addition to PCS in multiparous women presenting with low back pain.

This study had both strengths and limitations. The most significant strength of this study is the sample size. The inclusion of a large sample group of 700 patients improved the reliability of our results and makes this study a valuable reference for other researchers. Another strength is the determination of varicose diameter width reported for diagnosis as 6 mm rather than 5 mm, which excluded asymptomatic enlargement that may occur in women with PCS. The first limitation of this study is its retrospective design. Thus, the level of evidence is not as high as that obtained from a prospective study. Second, the study used MRI taken for another diagnosis, and thus the MRI only contributes as a recommendation in differential diagnosis because of the lack of confirmation through physical examination specific to both PCS and OCI and the lack of data such as the duration of the disease, type of complaints, and the treatment approaches taken. Lastly, the imaging of symptomatic patients was assessed, implying that asymptomatic OCI or OCI patients with a final diagnosis were excluded from the study. Nevertheless, the similarity of our results with the literature and the identified correlation with multiparity are noteworthy.

This study revealed incidentally detected PCS and OCI findings in patients with a pre-diagnosis of sacroiliitis who underwent MRI. In conclusion, even though MRI shows no evidence of sacroiliitis in multiparous women presenting with low back pain, these two differential diagnoses should still be considered by clinicians and radiologists.

Ethical approval

This study was conducted in compliance with the ethical principles according to the Declaration of Helsinki, and it was approved by the Ondokuz Mayıs University Ethics Committee (approval number 2019/782). As this study was retrospective, the patients' consent was waived.

Conflict of interest
The authors declared no conflict of interest.

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