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Idiopathic Pelvic Girdle Pain as it Relates to the Sacroiliac Joint

Hip Radiograph Findings in Patients Aged 40 Years and Under with Posterior Pelvic Pain

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Abstract

Background: Several sacroiliac joint (SIJ) provocative tests used to assess posterior pelvic pain involve moving and stressing the hip. It is unknown if there is a subgroup of patients with posterior pelvic pain who have underlying hip deformity that could potentially influence performance and interpretation of these tests.
Objective: To describe the prevalence of radiographic hip deformity and hip osteoarthritis in a group of adults 40 years old and under who met the clinical diagnostic criteria for treatment of posterior pelvic pain with an image guided intra-articular SIJ injection.
Design: Retrospective cohort study.
Setting: Tertiary university orthopedic department
Patients (or Participants): One hundred and forty-eight patients were evaluated (83% (123/148) female; mean age 31.3 $\pm$ 6.2 years). All had completed a trial of comprehensive noninvasive treatment for posterior pelvic pain and had a minimum of three positive SIJ provocative tests on physical examination.
Methods: Retrospective review identified patients undergoing SIJ injection for pain recommended and performed by seven physiatrists between 2011 and 2017. Hip radiographs were read by a physician with expertise in hip measurements with previously demonstrated excellent intrarater reliability.
Main Outcome Measurements: Percentage of patients with hip deformity findings.
Results: No patients meeting the inclusion criteria had significant radiographic hip osteoarthritis (Tonnis ≥2 indicating moderate or greater radiographic hip osteoarthritis) and 4/148 (3%) were found to have mild radiographic hip osteoarthritis. Prearthritic hip disorders were identified in 123 (83%, 95% CI: 76, 89%) patients. For those patients with prearthritic hip disorders, measurements consistent with femoroacetabular impingement (FAI) were seen in 61 (41%) patients, acetabular dysplasia in 49 (33%) patients, and acetabular retroversion in 85 (57%) patients. Acetabular retroversion was identified in 43% (crossover sign) and 39% (prominent ischial spine) of patients.
Conclusions: Approximately 57% of adult patients under the age of 40 years with the clinical symptom complex of SIJ pain were found to have radiographic acetabular retroversion. This is a higher percentage than the 5%-15% found in asymptomatic people in the current literature. Further study is needed to assess links between hip structure, hip motion, and links to pelvic pain including peri and intra-articular SIJ pain.
Level of Evidence: III

Introduction

Posterior pelvic pain can lead to severe impairments for patients and present as a diagnostic and treatment dilemma for healthcare providers. As this disorder is difficult to define, terminology used to describe posterior pelvic pain often overlaps with other entities. Potential contributors to posterior pelvic pain include disorders of the lumbar spine, hip, and both intra-articular and peri-articular structures surrounding the sacroiliac joint (SIJ). Several studies indicate that the SIJ is a source of pain in 13%-30% of low back pain patients.[1-3] A study[3] of 368 patients with low back pain who were referred to a spine surgeon who recommended injections to determine

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the etiology of their pain found that 25% of those patients' pain source was actually from the hip or SIJ rather than the spine. Further, the etiology could not be determined by patient reported response to injections of the lumbar spine, hip, and SIJ in 10% of the patients. This indicates that there is overlap in patients' presenting clinical symptom complex.

The SIJ, the largest axial joint in the body, functions as a load-transferring mechanical junction between the pelvis and the spine.[4,5] SIJ dysfunction is defined as an aberrant position and movement of the SIJ structures with or without pain.[6] SIJ dysfunction can lead to pain due not only to intra-articular structures, as it is a true synovial joint, but also due to stresses of periarticular structures including supporting ligaments and musculature.[4,7,8] SIJ pain is frequently reported near the posterior superior iliac spine with radiation to the buttock or thigh.[4] SIJ pain may be associated with joint hypo- or hypermobility, degenerative arthritis, overuse, infection, stress fracture, in the setting of pregnancy or inflammatory arthropathies,[4] but often is idiopathic.

Additionally, aberrant motion at the lumbar spine, hip, or pubic symphysis can alter the distribution of force across the SIJ.[4] Previous work has shown that SIJ pain improves when the vertical shear loads on the SIJ are reduced by strengthening the rectus abdominis and pelvic floor musculature.[9] Additionally, if the SIJ becomes hypomobile, it may not be able to effectively dissipate forces.[4]

Hip disorders, including both hip structure and motion aberrancies, should also be considered as a contributing factor to posterior pelvic pain. Studies of patients undergoing surgery for hip acetabular labral tears and hip deformity describe that these patients also reported low back and posterior pelvic pain as part of their clinical symptom complex.[10-12] In a study of 130 patients undergoing hip arthroscopy for a hip acetabular labral tear, 20% reported posterior pelvic pain.[13] Of those patients, 33% had complete resolution of symptoms after arthroscopy suggesting the hip disorder is linked to the posterior pelvic pain. Additionally, hip structure has been shown to directly affect hip range of motion[14,15] Patients with femoral acetabular impingement (FAI) were found to have reduced hip flexion and internal rotation. Patients with osteoarthritis (OA) were found to have reduced multiplanar motion. Reduced hip range of motion in rotation and flexion has been shown to be associated with low back pain.[16-22] Prior work suggests that patients with low back pain have less active hip medial rotation,[16,17] less passive hip medial rotation than lateral rotation,[18,23] deficits in lead-leg active and passive hip medial rotation,[19,21] deficits in dominant-leg active and passive hip medial rotation,[16] and less hip flexion.[22] Further, there are associations with hip range of motion in patients with specific hip deformities such as FAI and acetabular dysplasia, also known as developmental hip dysplasia (DDH), which lead to labral abnormalities and early degenerative hip arthritis.[24-30] In summary, the literature suggests there is a relationship between hip range of motion, hip deformity, and lumbar spine and posterior pelvic girdle pain.

Table 1
SIJ provocative maneuvers that require the examiner to passively move the hip and apply force through the hip and pelvis

SIJ Provocative Maneuver	Involves Passive Motion of the Hip
Compression	No
Sacral thrust	No
Distraction	No
Thigh thrust/Posterior pelvic pain provocation test	Yes
FABER/Patrick's test	Yes
Gaenslen's test	Yes

There are no specific objective imaging or lab tests to confirm the diagnosis of SIJ dysfunction or pain. When a patient with posterior pelvic pain fails to improve with noninvasive treatment, and three or more SIJ provocative tests reproduce posterior pelvic pain, an image-guided SIJ intra-articular injection is often recommended. The literature suggests that patients with a minimum of three positive provocative SIJ tests are most likely to respond to an image-guided intra-articular injection.[8,31,32] However, this literature does not identify which cluster of three tests should be used. Half of these SIJ provocative physical examination tests require the examiner to passively move the patient's hip and apply force through both the hip and pelvis (Table 1). The question becomes, do these provocative SIJ tests assess only SIJ-related pain or is there a link to the bony structure and soft tissues of the hip that affect the patient's response? Further, is there a subgroup of patients with posterior pelvic pain who have underlying hip structure that affects the provocative test and thereby their response to the test?

The purpose of this study was to describe the prevalence of radiographic hip deformity and hip OA in a group of adults age 40 years and younger who met the clinical diagnostic criteria for treatment of posterior pelvic pain with an image-guided intra-articular SIJ injection. Our hypothesis was that adults age 40 and under without moderate to severe radiographic hip OA but with the clinical symptom complex and physical examination findings consistent with posterior pelvic pain related to the SIJ would have radiographic findings of hip deformity at a greater percentage than what is currently found in asymptomatic people.

Methods

Patients

After institutional review board approval was obtained, a retrospective chart review was performed to identify patients who underwent SIJ injections

completed between 1 July 2011 and 1 July 2017 by seven physiatrists practicing in a tertiary university setting at six different site locations across a metropolitan region. To avoid assessing patients with moderate to severe hip OA, only adults aged 18 to 40 years of age were included. All patients were evaluated by a physiatrist for posterior pelvic pain defined as pain below L5 across the buttocks with or without pain in the lateral hip, groin, or lower extremity. The physical examination performed was within the standard of care for assessment of lower extremity muscle stretch reflexes, sensation, motor strength, and provocative special tests directed to assess SIJ pain. All of the patients were not satisfied with prior multifaceted treatment for their pain. Previous treatment may have included any combination or all of the following: medications, rest bracing, ice heat, therapeutic exercise, manual medicine, acupuncture, and dry needling. An image-guided intra-articular SIJ was recommended if the patient reported reproduction of their posterior pelvic pain with a minimum of three SIJ provocative tests: compression, sacral thrust, distraction, thigh thrust, flexion abduction external rotation (FABER)/ Patrick's test, Gaenslen's test.[4,32–34] Performance of these tests have been described[35] and found to have moderate to excellent reliability between examiners when used as a composite of tests.[36] As part of standard of care practice, all patients in our practice are required to have some form of imaging within the previous 2 years as part of the evaluation and recommendation for a fluoroscopically guided injection. Because some patients have imaging completed prior to their visit in our clinic and they have variable symptom complexes on presentation, the imaging varies between radiographs, computed tomography (CT), and magnetic resonance imaging (MRI). Hip measurements are initially completed utilizing radiographs. Detailed measurements for hip surgical planning are completed on three dimensional CT scans. CT measurements cannot be directly compared to radiograph measurements. Hence, hip radiographs are the preferred imaging for initial hip measurements. Because degenerative changes can occur within a 2-year period, we used only those radiographs obtained in the previous 6 months.[37] Patients were excluded from this study if their radiographs were completed prior to 6 months before their injection, only CT or MRI was available, or the technique used or quality of the radiograph was not appropriate to complete accurate measurements. Other exclusion criteria included history of surgery of the lumbar spine, pelvis, or ipsilateral hip, cancer, infection, and pregnancy.

Hip Radiographs

All patients with available hip radiographic imaging, including an anteroposterior (AP) pelvis radiograph and either a lateral hip frog-leg of the affected side or a 45° Dunn view of both hips and a prior SIJ injection were included. For the purpose of this study, a physician (SS) blinded to the patient findings independently reviewed the radiographs This physician has experience performing hip measurements and was found to have excellent intrarater reliability (intraclass correlation ranges 0.88-0.99) in performing these measurement for a sample of 22 hip radiographs assessed prior to this study.[38] Measurements assessed included alpha angle, lateral center of edge angle (LCEA), acetabular inclination, crossover sign, prominent/ischial spine, and Tonnis grade.[37]

Hip Radiographic Measurements

Overall, radiographic measurements were completed using standardized methods as reviewed by Clohisy and colleagues.[37] The alpha angle was measured using standard technique as described by Notzli and Clohisy.[39,40] An angle ≥55° was used as the "abnormal" cutoff based on expert recommendation for the assessment of FAI deformity.[41] The (LCEA)[42] and acetabular inclination (AI)[43] were measured to describe acetabular hip dysplasia and global over coverage of the femoral head as found in pincer-type FAI. Cutoffs for global over coverage have not been determined. However, LCEA >40° and an AI <0° are considered abnormal and describe pincer type impingement. An LCEA <20° and an AI >10° are considered abnormal and describe acetabular hip dysplasias.[42,44] The anterior center edge angle (ACEA) was performed to describe FAI (>40°) and acetabular hip dysplasia (<20°).[41,42] The crossover sign was assessed to describe acetabular retroversion found in people with mixed deformities including pincer-type FAI and acetabular hip dysplasia, also known as DDH.[45] The presence of a prominent ischial spine was also used as an additional indicator of acetabular retroversion. The Tonnis grade (grades 0-4) was used to assess radiographic hip OA. A Tonnis grade of 2 or higher was considered indicative of moderate to severe radiographic hip OA.[41]

Analysis

Differences in patient characteristics were compared using a *t*-test or Wilcoxon test for continuous variables and chi square or Fisher's exact test for categorical variables, as appropriate. Based on these definitions, an abnormality on any measure for either side of the hip indicated presence of a disorder. Descriptive statistics were used to summarize each disorder using frequency (percentage) and radiographic measurements using mean (standard deviation [SD]). The prevalence (95% confidence intervals [CI]) of radiographic hip deformity and hip OA in adults 18 to 40 years of age and meeting criteria for treatment with image-guided intra-articular sacroiliac joint injection were reported.

Results

Patients

Of the 480 SIJ injections performed between July 2011 and July 2017 by seven physiatrists, 325 were unique patients. Of these, 178/325 patients had hip radiographs within the 6 months prior to their initial examination by the physiatrist. Thirty of 178 (17%) patients had suboptimal radiographs related to patient positioning; the remaining 148/325 (45%) had appropriate hip radiographs. The radiograph technique met the criteria as described by Clohisy et al[37] to appropriately perform measurements to assess the hip bony structure. (Figure 1). The mean (SD) age of these patients was 31.3 (6.2) years with 83% (123/148) being female and 92% (137/148) were Caucasian. (Table 2) The mean, SD, and number missing measurements are provided in Table 3 and all patients had a minimum of two imaging modalities for assessment of the radiographic measurements.

Hip Radiographic Findings

No patients meeting the inclusion criteria had significant radiographic hip OA (Tonnis ≥2). Tonnis 0 grade was present in 144/148 (97.3%) patients. A Tonnis grade of 1 indicating mild radiographic hip OA was found in 4/148 (2.7%) of patients. Overall 83% (95% CI: 76%, 89%) of patients were found to have measurements consistent with prearthritic hip disorders (Table 4). There were no differences in the patient characteristics in those with a prearthritic hip disorder and those who were normal (Table 2).

Using the four radiographic parameters for FAI, 41% of patients were identified as meeting the criteria for FAI. Measurements consistent with FAI were positive in 24% of patients for α angle ≥55°, 7% for ACEA, 3% for LCEA >40°, and 18% for AI. Two measurements assessing acetabular retroversion were performed and found 43% of patients with a positive crossover sign and 39% with prominent ischial spine. Of the three measurements performed to assess acetabular hip dysplasia, findings of acetabular hip dysplasia were present in 26% of patients for AI >10°, 20% LCEA <20°, and 5% for ACEA <20° (Table 4).

Table 2
Patient characteristics and descriptions (N = 148) for patients undergoing SIJ injection for treatment of posterior pelvic pain

Patient Characteristics	All (n = 148)	PAHD (n = 123)	Normal (n = 25)	*P* value
Female gender, no. (%)	123 (83.1)	102 (82.9)	21 (84.0)	.90
Caucasian race, no. (%)	136 (91.9)	112 (91.1)	24 (96.0)	>.99
Age (years), mean (SD)	31.3 (6.2)	31.3 (6.5)	31.2 (5.2)	.91
Number of films, median (IQR)	2 (2, 2)	2 (2, 2)	2 (2, 2)	.70

no. = number of patients; SD = standard deviation; IQR = interquartile range reported as the 25th, 75th percentile; PAHD = prearthritic hip disorders.

Discussion

This is the first study to investigate hip radiograph measurements to assess hip deformity without moderate or greater degenerative changes of the hip in patients seeking treatment for posterior pelvic pain. Compared to the current literature, this study demonstrates high rates of acetabular retroversion in a cohort of patients undergoing treatment for SIJ pain, and similar rates of cam deformity (nonspherical femoral head) FAI and acetabular hip dysplasia were present. All patients included in this study were evaluated by a physiatrist, had three or more positive provocative SIJ tests, were not satisfied with the results of multifaceted medical and physical treatment, and chose to undergo an SIJ image guided intra-articular injection as part of a comprehensive treatment plan. Radiographs completed within the previous 6 months with appropriate positioning to assess measurements confirmed this patient cohort did not have moderate to severe radiographic hip OA. No degenerative changes (Tonnis grade 0) were noted in 97% of hips and mild degenerative changes (Tonnis grade 1) were found

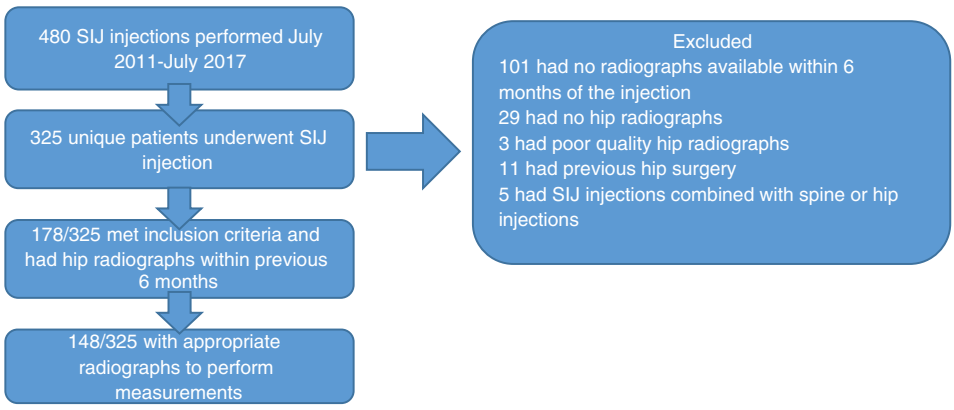

Figure 1. Patient study inclusion and exclusion pathway.

Table 3
Missing radiograph measurements for all patients with a minimum of two radiograph views available for assessment of the radiographic measurements

Radiographic Measurements	N	Number Missing	Mean	SD
Anterior coverage (Left)	29	119	32.42	10.23
Anterior coverage (Right)	33	115	29.92	10.64
Alpha angle (Left)	73	75	51.05	9.19
Alpha angle (Right)	88	60	49.29	8.68
Lateral center of edge angle (Left)	80	68	27.42	7.5
Lateral center of edge angle (Right)	102	46	26.38	9.35
Min joint space width (Left)	80	68	0.37	0.06
Min joint space width (Right)	104	44	0.36	0.06
Pelvic tilt	147	1	4.38	1.71
Tonnis measurements (Left)	80	68	4.11	6.6
Tonnis measurements (Right)	102	46	6.02	5.96

in only 3% of this patient cohort. Hip measurements consistent with FAI were found in 41% of hips, which is also similar to findings in asymptomatic people (14%-37%).[46] The most common component of hip deformity found in this patient cohort was acetabular retroversion found in 57% of the hips in patients being treated for SIJ pain. This prevalence is much higher than rates reported in normal asymptomatic populations (5%-15%).[47-50]

In a previous retrospective review of pain distributions in patients undergoing hip arthroscopy for treatment of an acetabular labral tear with and without femoral osteotomies, 20% of patients were found to present with posterior pelvic pain in addition to groin and or lateral hip pain.[13] Although all but 16% of patients reported satisfactory pain and functional improvement following hip arthroscopy, 58.3% of patients presenting with posterior pelvic pain as part of their symptom complex continued to have low-grade pain (average 1.4 numeric pain score) after hip arthroscopy. The authors concluded that patients with posterior pelvic pain in this setting were a subset of patients with intra-articular hip disorders without the presence of arthritis and that adaptive changes in hip motion and stability across the pelvic girdle may have contributed to this group of patients' overall symptom complex. Our hypothesis was constructed from this concept in that a greater percentage patients with posterior pelvic pain may have hip deformity as compared to asymptomatic people. This patient cohort did not have a higher percentage of FAI findings as compared to asymptomatic people. However, the high percentage of acetabular retroversion, which can be present in both FAI and acetabular hip dysplasia, suggests acetabular retroversion may be a link between the hip and pelvis in a subgroup of people with posterior pelvic pain.

Acetabular retroversion is described as the alignment of the opening of the acetabulum facing posterolaterally as opposed to the usual anterolateral orientation. The sensitivity and specificity of the crossover sign to detect acetabular retroversion has been reported to be 96% and 95%, respectively.[51] More recently, the effect of pelvic tilt on the crossover sign has been better established. Anterior pelvic tilt present on an AP pelvis radiograph may give the appearance of apparent acetabular retroversion despite a normal underlying acetabular version.[52] The role of functional pelvic tilt on the occurrence of hip impingement has only begun to be better defined.[53] This retroverted acetabular alignment may occur in isolation as a form of FAI or can also be a component of complex acetabular dysplasia. Patients with acetabular dysplasia and acetabular retroversion have been found to have earlier onset of symptoms of pain and instability.[54] Further, acetabular retroversion may contribute to impingement between the anterior acetabular edge and femoral neck.[45] Giori and Trousdale described a significant

Table 4
Hip radiographic measurements of patients with posterior pelvic pain treated with an SIJ injection (N = 148)

Normal	**Prearthritic hip disorder***		**Osteoarthritis†**
25/148,	123/148,		(Tonnis grade ≥ 2)
17% [95% CI: 11 to 24]	83% [95% CI: 76 to 89]		0/148, 0%
	Femoroacetabular impingement	**Acetabular hip dysplasia**	**Acetabular retroversion**
	61/148, 41%	49/148, 33%	85/148, 57%
	Pincer type:		
	LCEA >40^0	LCEA <20^0	Crossover sign
	4/147, 3%	30/147, 20%	63/148, 43%
	AI <0^0	AI >10^0	PRIS
	26/147, 18%‡	38/147, 26%‡	58/148, 39%
	ACEA >40^0	ACEA <20^0	
	11/57, 7%‡	7/57, 5%‡	
	Cam type:		
	Alpha angle >55^0		
	35/132, 24%‡		

Prevalence of each radiographic measure is presented as, "N, % [95% CI]." LCEA = Lateral center edge angle; AI = Acetabular inclination; PRIS = Prominent ischial spine sign; ACEA = Anterior center edge angle.
*Patient categorized if either side met the stated criteria.
†Patient categorized based on the maximum grade for either side.
‡Proportions are calculated out of 148.

association between radiographic acetabular retroversion and hip OA exists.[48] Collectively, this literature suggests that acetabular retroversion can be a component of both hip deformity and hip OA. Theoretically, a retroverted acetabulum adversely affects load transmission across the hip, which may contribute to change in loading in the hip[47] and, subsequently, the posterior pelvic girdle. The question remains, in a subgroup of people is there a link to posterior pelvic pain?

Mens et al described the form and force closure of the SIJ being important for joint stability.[55] Force closures results from a combination of ligament integrity, muscle activation and strength, fascial integrity. Many of the important myofascial components share a role in stability of the hip, pelvic girdle, and spine. If acetabular retroversion contributes to a shift in greater posterior load, could this then contribute to a shift and the need for the soft tissues to provide appropriate force closure across the posterior pelvic girdle? Inappropriate adaptions to the need for increased force closure theoretically could lead to pelvic girdle dysfunction and ultimately pain that includes the SIJ. This may be a link between posterior pelvic girdle pain and hip structural orientation. These questions need further investigation but may be helpful in answering clinical questions of etiology for pain and provide information to drive treatment recommendations.

Our study demonstrates a link in pain presentations consistent with SIJ pain and apparent acetabular retroversion on pelvic radiographs. Further research is needed to more clearly define this association. The presence of hip structural variations can be a source of posterior pelvic pain. Studies have shown the incidence of hip OA is high in the presence of acetabular retroversion[47,48,56] and thereby suggesting posterior pelvic pain can be associated with intra-articular hip disease.[13] When walking at heel strike, there is a low-level brief posterior joint reaction force.[57-59] In the normal hip, that force is directed into bony structures but with acetabular retroversion, the force would be partially distributed into tissues such as the labrum. Acetabular retroversion and FAI are known to be associated with traumatic posterior hip dislocation in athletes, indicating that during activity there can be posteriorly directed forces.[60-63] Finite element analysis of basic mobility activities in people with acetabular retroversion indicated that during chair rise there is greater posterior hip joint reaction force than in the normal hip where the force is distributed over a wider area of the acetabulum.[57] Performance of any type of squatting would certainly increase the posterior hip joint force in the hip with acetabular retroversion. The study also indicated that in the acetabular retroverted hip the greatest joint reaction force is in the superior-anterior area of the acetabulum.[57] This suggests that gluteal muscle activation would be greater in the normal hip and a source of stress for posterior tissues. Studies have also shown that with FAI, when the hip is flexed and medially rotated, there is a levering force on the femoral head that can stress the ligamentum teres and be associated with stress on posterior structures.[64] With acetabular retroversion, hip flexion in neutral rotation is limited but with lateral rotation and abduction the flexion range of motion is notably increased. Lateral rotation of the hip joint has been shown to cause posterior impingement of the femoral neck against the posterior acetabulum, another possible source of posterior hip pain.[65] Studies have shown that people with acetabular retroversion walk with slow gait and smaller steps as a way of reducing hip joint forces.[57,59] This is associated with hip muscle weakness.[59] Muscle weakness associated with normal activity has the potential of causing muscle strain if the individual increases the demands on the hip by initiating fitness activities, such as running or hiking. Thus a variety of daily activities involving periodic increases in the demands of muscular activity and in range of motion in hips with structural variations, particularly acetabular retroversion, dysplasia, and FAI can be sources of posterior hip pain, arising from the posterior acetabulum, soft tissues, and muscles. In this study, acetabular retroversion was present in a greater number of people than is found in asymptomatic people. Acetabular hip dysplasia and FAI were not present in greater number of people than in asymptomatic people. What is not known about most people is the role of daily and fitness activities as the cause of hip pain in hips with structural abnormalities. As indicated, activities that require increased hip flexion and lateral rotation combined with muscle weakness needs to be considered as a contributing factor. Also, if an increase in anterior pelvic tilt is present in this patient population, the radiographically apparent acetabular retroversion could be noted on radiographs without true acetabular retroversion. This altered anterior pelvic tilt could potentially be a cause of SIJ pain or a secondary effect of SIJ pain. Further research is warranted to better define this association.

This study has several limitations. First, the retrospective design of this study completed in a clinical setting did not allow us to secure hip radiographs completed with appropriate positioning for valid measurements in every patient. All of the patients undergoing an SIJ injection in this study had some form of imaging (radiograph, CT scan, or MRI) of the lumbosacral spine and/or pelvis within the 2 years preceding the injection. We used the available hip radiographs performed within 6 months of the evaluation by the physiatrist so as to make an accurate assessment of radiographic OA close to the time of the injection. Thirty of 178 (17%) patients had suboptimal hip radiographs related to patient positioning despite the radiologic technicians expertise in performing these radiographs at a tertiary university orthopedic center. These findings are similar to our previously published studies using clinical radiograph data.[38] Second, 83% of the patients were female and therefore our results cannot be applied to the general population. We utilized records from seven physiatrists with practices at six different sites across a metropolitan region attempting to provide data

that best represented a broad patient group. Recruitment of men in a prospective design would allow for gender comparisons. We do not have long-term follow-up data regarding the response to the injection, which would be the next step in associating hip acetabular retroversion and intra-articular SIJ pain. However, this would not define the link to periarticular pain. Our goal was to assess if posterior pelvic pain patients had hip deformity without hip OA at a greater rate than the asymptomatic people. Finding this association will open the options for further investigation of the links and potentially affect healthcare providers' decision making when evaluating and recommending treatment options for this subgroup of patients.

Conclusion

Approximately 57% of adult patients age 40 and under with posterior pelvic pain and signs and symptoms of SIJ pain were found to have radiographic acetabular retroversion. This is a higher percentage than the 5%-15% found in asymptomatic people in the current literature. Acetabular retroversion affects load transmission across the hip and pelvis, which may provide a link to posterior pelvic pain and the hip not previously realized. Further study is needed to assess links between hip structure, hip motion, and links to posterior pelvic pain including peri- and intra-articular SIJ pain.

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Disclosure

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