Sacroiliitis

Essay
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*First, thanks are all due to **Allah** for Blessing this work until it has reached its end, as a part of his generous help throughout our life.*

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To all who shared in a way or another to make the dream of conducting such a study comes true, thank you.

Karamany Hamed Ahmed

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List of Abbreviations

AAOS	American Academy of Orthopedic Surgeons
ANA	Antinuclear antibody
AS	Ankylosing Spondylitis
CBC	Complete blood count
CPPD	Calcium pyrophosphate deposition disease
CRP	C- reactive protein
CT	Computed Tomography
DMARD	Disease Modifying Anti-Rheumatic Drugs
ESR	Erythrocyte sedimentation rate
ESSG	European Spondylarthropathy Study Group
FABER	Forced abduction and external rotation
HLA-B27	Human leukocyte antigen-B27
IASP	International Association for the Study of Pain
IBD	Inflammatory Bowel Disease
LBB	Lateral branch blocks
LBP	Low Back Pain
MRI	Magnetic Resonance Imaging
NSAIDs	Nonsteroidal Anti-Inflammatory Drugs
PSA	Prostate Specific Antigen
PSIS	Posterior Superior Iliac Spine
RF	Rheumatoid Factor
RFD	Radiofrequency denervation
SAPHO	Synovitis, acne, pustulosis, hyperostosis and osteitis
SIJ	Sacroiliac Joint
SIJS	Sacroiliac Joint Syndrome
SpA	Spondyloarthropathies
TB	Tuberculous Bacilli
Tc-99	Technetium-99
TNF	Tumors Necrosis Factor
USG	Ultrasonography
WBC	White blood cell

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Introduction

The sacroiliac joint is the largest axial joint in the body, with an average surface area of 17.5 cm^2.[1] There is wide variability in the adult sacroiliac joint, encompassing size, shape, and surface contour. Large disparities may even exist within the same individual.[2, 3] The sacroiliac joint is most often characterized as a large, auricular-shaped, diarthrodial synovial joint. In reality, only the anterior third of the interface between the sacrum and ilium is a true synovial joint; the rest of the junction is comprised of an intricate set of ligamentous connections. Because of an absent or rudimentary posterior capsule, the sacroiliac ligamentous structure is more extensive dorsally, functioning as a connecting band between the sacrum and ilia.[4]

The sacroiliac joints are designed primarily for stability. Their functions include the transmission and dissipation of truncal loads to the lower extremities, limiting x-axis rotation, and facilitating parturition. Compared to the lumbar spine, the sacroiliac joints can withstand a medially directed force 6 times greater but only half the torsion and $1/20^{th}$ of the axial compression load.[5] These last 2 motions may preferentially strain and injure the weaker anterior joint capsule.[6]

The sacroiliac joints are frequent sites of lumbar pain commonly seen in the clinical daily practice, a non-infectious inflammatory process — sacroiliitis — being the most frequent cause of disease in this topography.[7]

The sacroiliac joints can be affected by a variety of pathological processes. Inflammatory disorders such as the seronegative spondyloarthropathies are well recognized causes of sacroiliitis. Crystal arthropathies, such as gout.[8] and pseudogout, [9] occasionally involve the sacroiliac joint. Other systemic conditions reported to cause inflammatory changes in

the sacroiliac joints include rheumatoid arthritis, familial Mediterranean fever, hyperparathyroidism, Behcet's disease, relapsing polychondritis, and Whipple's disease. Traumatic lesions of the sacroiliac joint are seen most commonly after violent injuries. Metastatic carcinoma.[10] or sarcoma[11] may rarely mimic inflammatory sacroiliitis. Degenerative changes of the sacroiliac joint have been associated with aging.[12]

Sacroiliitis is an inflammatory involvement of one or both sacroiliac joints and is the key symptom of all spondylo-arthropathies.[13]

Sacroiliitis has been linked to a group of diseases called spondyloarthropathies, which cause inflammatory arthritis of the spine. Seronegative spondyloarthropathies are basically subdivided and differentiated by their clinical features, and are classified into five different entities: ankylosing spondylitis, reactive arthritis, psoriatic arthritis, arthritis related with chronic inflammatory disease and undifferentiated spondylo-arthropathy. The inflammatory involvement of sacroiliac joints is a criterion for diagnosis of these diseases.[14, 15]

Infectious agents may affect the sacroiliac joint in the form of reactive or immune-mediated arthritis, or by hematogenous seeding or locally acquired penetration of organisms into the joint. Septic sacroiliac joint arthritis may be caused by a wide range of infectious agents. Sacroiliac joint involvement has been reported in almost 10% of patients with skeletal tuberculosis. Low back pain is a common feature of systemic brucellosis, and up to 11% of patients with this condition have sacroiliitis. Fungal sacroiliitis caused by *Cryptococcus neoformans* has been reported in an immnnosuppressed patient.[16]

Most of times, the clinical diagnosis of sacroiliitis is difficult, depending substantially on the confirmation of radiological findings, where conventional X-ray, and currently,

computerized tomography and magnetic resonance imaging assume essential role.[17–19]

Conservative treatment should include cold application, anti-inflammatory medication, and relative rest in the acute stages. Once pain has subsided, further efforts should be employed to restore normal mechanics, including: manual medicine techniques.[20] If this treatment fails, sacroiliac joint intra- articular injections should be considered not only as a therapeutic intervention but also to confirm the diagnosis.[21] Cryotherapy is another potential treatment for sacroiliac joint dysfunction. The lateral branches of the sacroiliac joint are exposed to liquid or gas nitrogen.[22] Arthrodesis of the sacroiliac joint for chronic, non-traumatic, painful dysfunction is controversial but may be considered if all non-surgical treatments have failed. [23]

Aim of The Work

The aim of this work is to review the anatomic and pathophysiologic criteria that implicate the sacroiliac joint as a possible cause of low back pain. From this knowledge we provide a basis for treatment of patients who might be suffering from sacroiliitis.

Anatomy

The sacroiliac joint (SIJ) is a synovial articulation between the sacral and iliac articular surfaces (Fig.1).[24]

The sacroiliac (SI) joint is the largest axial joint in the body, with an average surface area of 17.5 cm^2. [1]

There is wide variability in the adult sacroiliac joint, encompassing size, shape, and surface contour. Large disparities may even exist within the same individual.[2, 3]

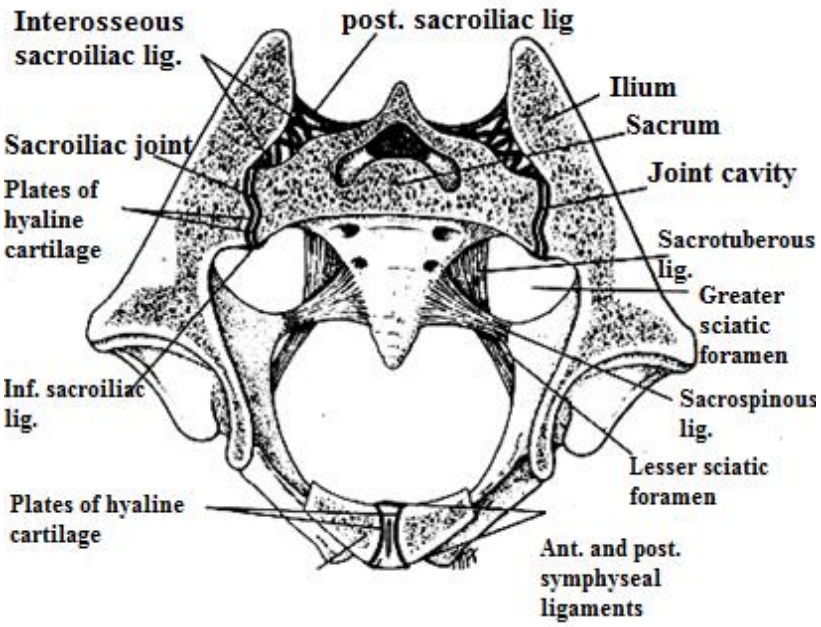

Fig. (1): Horizontal section through the pelvis showing the sacroiliac joint.[24]

Generally, the sacral surfaces are longer and narrower than the iliac surfaces. The articular surface spans from the S1 to S3 levels in both men and women, sometimes extending to S4. The joint surfaces at the S1 level are the largest, while at the S3 surfaces are smallest (Fig.2, 3).[25]

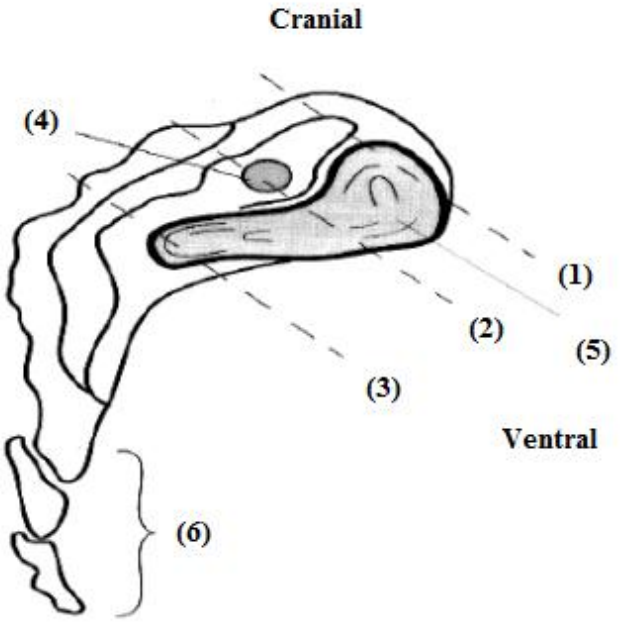

Fig. (2): Lateral view of the sacrum. (1) S1 level; (2) S2 level; (3) S3 level; (4) Location of the axial joint; (5) Sacral articular surface of the sacroiliac Joint; Note the inverted auricular shape; (6) Coccyx.[25]

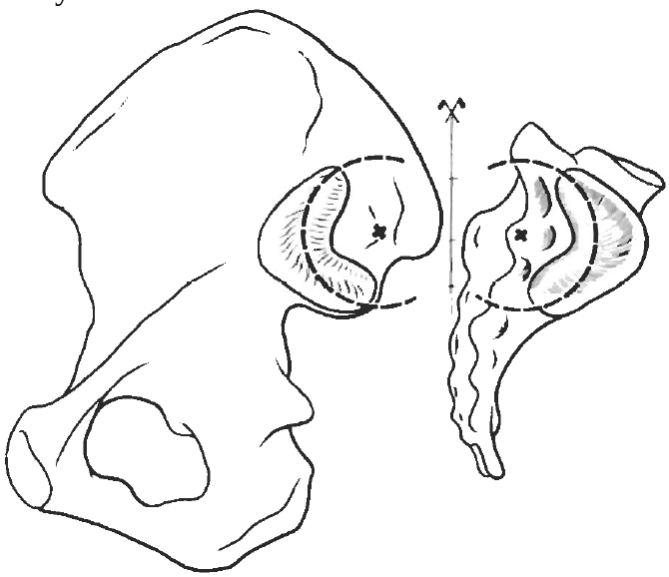

Fig. (3): Articular surfaces of sacroiliac joint.[26]

The SI joint is most often characterized as a large, auricular or C-shaped, diarthrodial synovial joint. In reality, only the anterior third of the interface between the sacrum and ilium is a true synovial joint; the rest of the junction is comprised of an intricate set of ligamentous connections. Because of an absent or rudimentary posterior capsule, the SI ligamentous structure is more extensive dorsally, functioning as a connecting band between the sacrum and ilia.[4]

The main function of this ligamentous system is to limit motion in all planes of movement. In women the ligaments are weaker, allowing the mobility necessary for parturition.[27]

The SI joint is also supported by a network of muscles that help to deliver regional muscular forces to the pelvic bones. Some of these muscles, such as the gluteus maximus, piriformis and biceps femoris, are functionally connected to SI joint ligaments, so their actions can affect joint mobility. The potential for vertical shearing is present in approximately 30% of SI joints, owing to the more acute angulation of the short, horizontal articular component.[27]

Age-related changes :

Age-related changes in the SI joint begin in puberty and continue throughout life. During adolescence, the iliac surface becomes rougher, duller, and coated in some areas with fibrous plaques. These senescent changes accelerate during the third and fourth decades of life and are manifested by surface irregularities, crevice formation, fibrillation and the clumping of chondrocytes. Degenerative changes on the sacral side generally lag 10–20 yr behind those affecting the iliac surface. In the sixth decade, motion at the joint may become markedly restricted as the capsule becomes increasingly collagenous and fibrous ankylosis occurs. By the eighth decade of life, erosions and plaque formation are inevitable and ubiquitous.[4]

Ligaments of sacroiliac joint :

There are 5 Ligaments affecting stability of the joint including the intraarticular, periarticular, and accessory ligaments.[24]

1-The anterior sacroiliac ligament:

The anterior sacroiliac ligament consists of numerous thin bands, which connect the anterior surface of the lateral part of the sacrum to the margin of the auricular surface of the ilium and to the preauricular sulcus (Fig.4). It restraints the external rotation of the hemipelvis.[28]

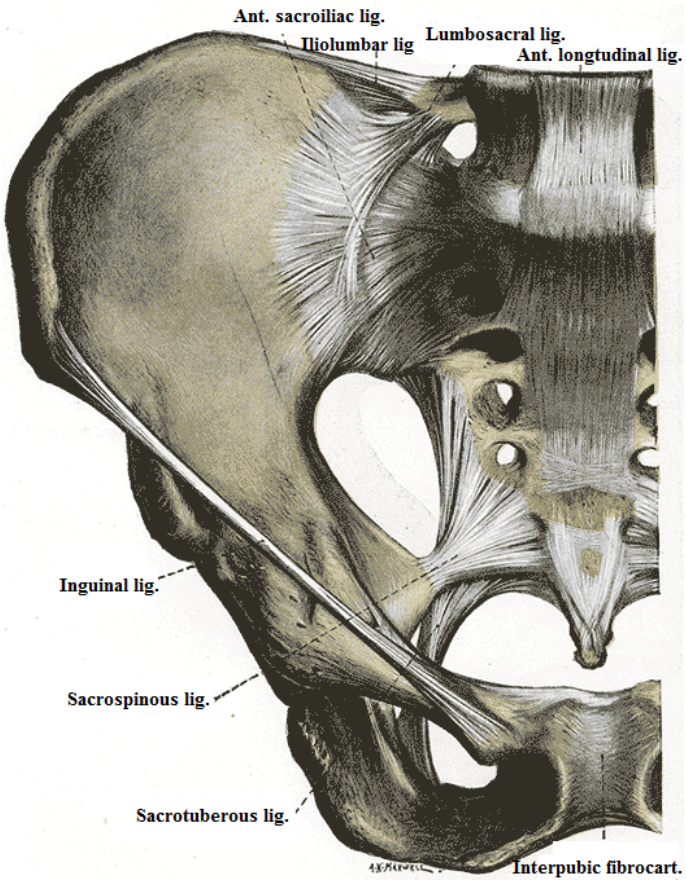

Fig. (4): Ligaments of sacroiliac joint. Anterior view.[28]