

ABNORMAL FUSION OF THE SACROILIAC JOINT WITH COMPLETE OSSIFICATION OF THE ANTERIOR SACROILIAC LIGAMENT: A CONGENITAL ANOMALY

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ABSTRACT

INTRODUCTION:

Sacroiliac joints are formed by the sacrum articulating ¹ on either side of the innominate bones. Dorsal sacroiliac ligaments support the joint from the back and anterior sacroiliac ligaments from the front. The largest axial joint is the sacroiliac (SI) joint. There are two different kinds of articulating surfaces in this diarthroidal joint:

1. Antero-inferior synovial joint between the ilium and sacrum's auricular surface.
2. Postero-superior syndesmosis between the sacrum and ilium's interosseous surfaces.

⁹ The entire weight of the upper part of the body is supported by this powerful joint. The two bones interlock at this synovial plane joint because of its asymmetrical elevations and depressions.¹

¹**CASE REPORT:**

During osteology demonstration classes of first year MBBS students of Uttar Pradesh University of Medical Sciences, Saifai, Etawah, UP, India, author came across a dry male pelvis having abnormal fusion of the sacroiliac joint with complete ossification of anterior sacroiliac ligament connecting the sacrum and ilium in the right side.

¹**CONCLUSION:**

This case report brings out an unreported anatomical variant of a dry male pelvis having abnormal right SI joint with complete ossification of anterior sacroiliac ligament.

INTRODUCTION:

2

The articular surfaces between the sacral and iliac bones form the sacroiliac joint, also known as the SIJ. This is an axial joint of the greatest size in the body that is 17.5 cm long on average. This joint contains synovial fluid and is synovial (diarthrodial). Compared to later in life, it is more mobile in youth. In adulthood, the upper two-thirds of the joint develops fibrosis.² For the spine and legs to transfer load effectively, the SIJs are necessary. Through muscular, fascial, and ligamentous connections, the sacrum, pelvis, and spine, as well as the attachments to the arms, legs, and head, are functionally connected.³

2

The SIJ is distinct from other joints in that its iliac surface is covered with thick hyaline cartilage, whereas its sacral surface has fibrocartilage in it. The iliac surface is convex in shape, while the sacral articular surface is auricular and concave. Numerous ridges and depressions on the articular surfaces reduce movement and improve stability.²

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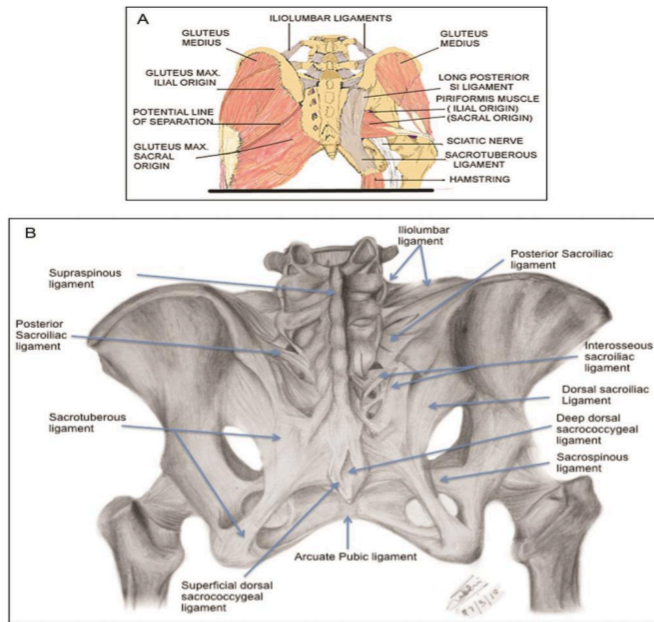
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The joint space is usually 0.5 to 4 mm. Several muscles such as gluteus maximus, piriformis and ligaments like anterior and posterior sacroiliac ligaments surrounding the joint influence the movement and stability of this joint. Ankylosis or fusion and ossification of adjacent ligaments may constrain the movement of the joint. The muscles and ligaments acting on SI Joint traverse the joint both in front and behind can be the cause of pain and inflammation if these joints are in dysfunction.³

5

The ligaments of the sacroiliac joint include the following:

- Fibrous Ligament
- Anterior sacroiliac ligament
- Interosseous sacroiliac ligament
- Posterior sacroiliac ligament
- Iliolumbar ligament
- Sacrotuberous ligament
- Sacrospinous ligament



1 CASE REPORT

During osteology demonstration class¹ of first year MBBS students in Department of Anatomy of my college, India, author came across¹ dry male pelvis having abnormal fusion of the sacroiliac joint with complete ossification of anterior sacroiliac ligament connecting the sacrum and ilium in right side.

The gross findings of the right pelvic bone are as follows:

- The right ilium bone, the iliac fossa and the iliac crest are underdeveloped. (Figure 1 and figure 6)
- The anterior superior iliac spine and the anterior inferior iliac spine are underdeveloped. (Figure 1 and figure 6)
- The greater sciatic notch and the lesser sciatic notch are underdeveloped. (Figure 1 and figure 6)
- The iliac tuberosity is irregular and shows a abrupt division for the ventral and dorsal segments of the iliac crest due to which the dorsal segment of the iliac crest hangs downwards and posterior than the ventral segment of the iliac crest. (Figure 1)

- The shape of the right Ala of sacrum is not properly visible and there is a foramen present on the superior surface of sacrum. This foramen is present as there may be a possibility for the passage of obturator nerve, iliolumbar artery, lumbosacral trunk and sympathetic trunk. (Figure 1)
- The right ischial spine is much more prominent with a blunt tip. (Figure 2)
- The lateral surface of the sacrum articulates with the auricular surface of the sacropelvic surface of the ileum. Along with this, it articulates deep with the arcuate line of ilium. This is how this abnormal sacroiliac joint is formed. (Figure 2)

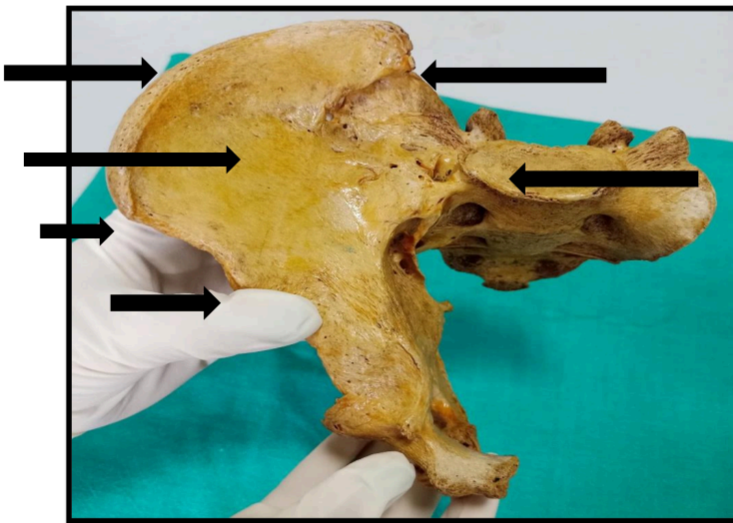


FIGURE 1

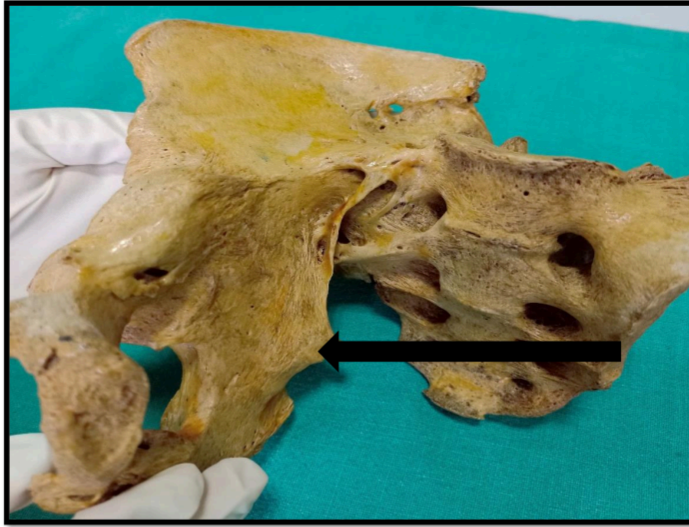


FIGURE 2

- The right anterior sacroiliac ligament is ossified anterior to the abnormal SI joint. (Figure 3)
- The linea terminalis is irregular not forming proper arcuate line.
- In the posterior side, the gluteal surface is irregular and on the gluteal surface there are three gluteal lines present which are irregular and extremely prominent. (Figure 4)
- The anterior gluteal line is much more prominent than the posterior and inferior gluteal lines. (Figure 4)
- As described, the posterior gluteal line should be 5 cm from PSIS. In my study bone, the area behind the posterior gluteal line is around 2-3 cm from PSIS. This shows that the area of the attachment of Gluteus Maximus muscle reduces. Numerous foramina near to anterior gluteal line can also be seen. (Figure 4)

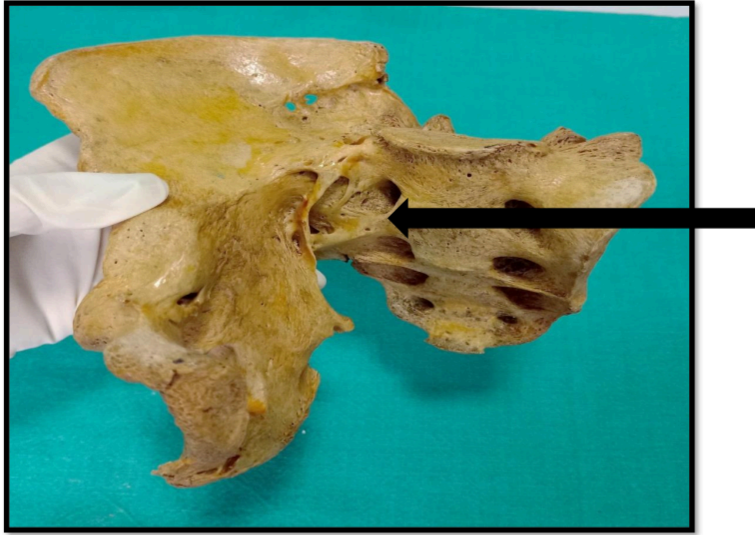


FIGURE 3

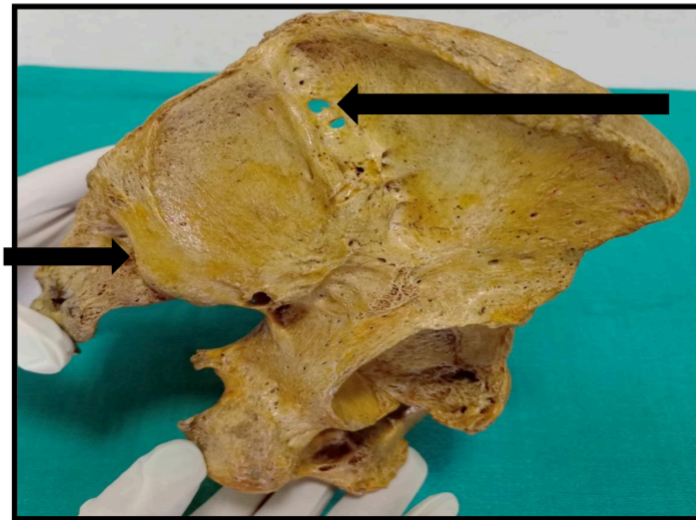


FIGURE 4

- The outer and inner surfaces of ischiopubic ramus are irregular and the fusion line of ischium and pubis is prominent because they are not in the same plane. (Figure 5)
- The margins of the obturator foramen are irregular. (Figure 5)
- The acetabulum seems to be deeper than the normal and anterior to the acetabular notch a bony hanging projection can be seen. (Figure 5)

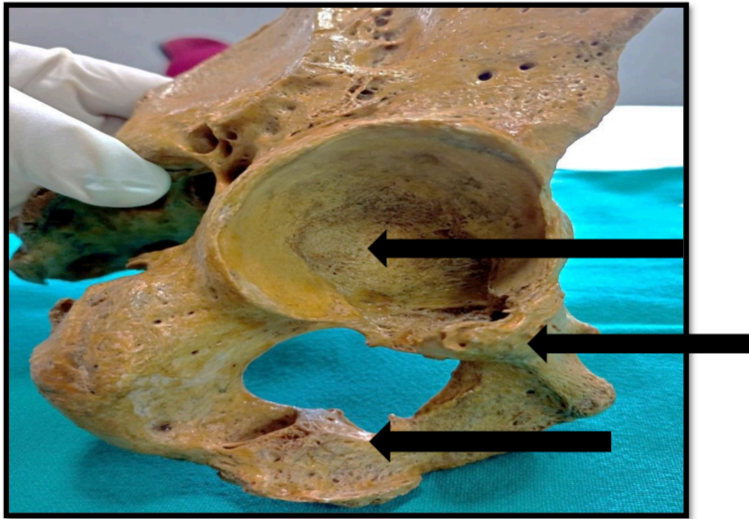


FIGURE 5



FIGURE 6

DISCUSSION

Sacroiliac Joint and Its Clinical Relevance

The sacroiliac (SI) joint is a true diarthrodial articulation with an average surface area of approximately 17.5 cm². Its primary role is to transmit the upper body weight to the lower limbs, functioning more as a stabilizing joint rather than a mobile one. This joint is reinforced by several ligaments that contribute to its strength and function.

Ligamentous support includes:

Intrinsic ligaments:

Anterior sacroiliac ligament (on the front)

Posterior sacroiliac and interosseous ligaments (on the back)

Extrinsic ligaments:

Sacrotuberous and sacrospinous ligaments

When standing, the body's weight places an anterior tilting force on the ¹ sacrum. This tendency is resisted by the posterior sacroiliac and sacrotuberous ligaments, acting like a natural locking mechanism or screw-home system, stabilizing the joint.

In certain cases, especially in males, bilateral fusion (ankylosis) of the SI joint and ossification of nearby ligaments have been noted. In females, especially during pregnancy and childbirth, the joint becomes more flexible, allowing for necessary movement and reducing the likelihood of ankylosis. This structural adaptability emphasizes a biological trade-off between mobility and stability in women.

- Importance of Hip Bone Anatomy in Surgery and Clinical Practice

A clear understanding of the hip bone's anatomy is vital across multiple medical and surgical procedures, especially those involving the pelvis and lower limb.

- Hip Replacement Surgery (Total Hip Arthroplasty)

Accurate orientation of the acetabular component reduces ⁶ the risk of dislocation and nerve injury, particularly to the sciatic nerve.

- Pelvic Fracture Management

Anatomical knowledge of fracture lines involving the acetabulum, pubic rami, and sacroiliac region guides surgical fixation and prevents damage to the obturator nerve and internal iliac vessels.

- Surgical Approaches (Stoppa and Ilioinguinal)

Safe access requires familiarity with the inguinal ligament, ASIS, and adjacent neurovascular structures.

- Bone Grafting

The iliac crest is frequently used as a donor site due to its accessibility and rich cancellous bone content.

- Nerve Protection

Understanding the path of the superior gluteal nerve helps avoid postoperative complications like numbness or weakness.

- Sciatic Nerve Identification

The greater sciatic notch serves as a key landmark during posterior surgical approaches, guiding safe dissection.

- Obstetric Relevance

Pelvic dimensions (inlet and outlet) are crucial for assessing the feasibility of vaginal delivery, particularly via clinical pelvimetry.

- General Surgery

In procedures like Pfannenstiel incisions, landmarks such as the ASIS and pubic tubercle are essential for orientation and organ protection.

CONCLUSION

⁴ In the present case, the author observed a rare anatomical variation involving the sacroiliac (SI) joint—specifically, a complete ossification of the anterior sacroiliac ligament on the right side of a male pelvis. This abnormality may be attributed to a lateral shift in the body's center of gravity, possibly of genetic origin. Such a shift would increase the mechanical load on the anterior sacroiliac ligament, potentially leading to its gradual ossification over time.

This finding represents an uncommon form of SI joint fusion caused by anterior ligament ossification. It emphasizes the importance of recognizing such variations, particularly for anatomists, orthopedic surgeons, and radiologists, as

these structural changes can impact both clinical diagnosis and surgical intervention strategies related to the pelvic region.

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