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Case Report

Bilateral ankylosis of sacro-iliac joint with ossified sacrospinous, sacrotuberous and transverse acetabular ligaments

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ABSTRACT

The sacroiliac joint (SIJ) has gained its importance towards anatomical and radiological studies in relation to the treating aspects in ankylosis and other degenerative diseases of the joint. This complex joint shows numerous structural variations with the increase of age. The present case describes a pelvic bone showing the ankylosis of SIJ and the ossification of sacrospinous (SSL), sacrotuberous (STL) and transverse acetabular ligaments (TAL). The postero-superior interosseous part of the SIJ was completely fused, and the anterior and posterior sacroiliac ligaments were ossified. The SSL of the right side was completely ossified. Left SSL and both right and left STL were partially ossified. The TAL of both sides were also completely ossified. These ossified structure as found in our case may impede the movements of the joints of pelvic bone and results in the pain. The ossification of SSL and STL is of clinically significant because, it may compress the pudendal neurovascular bundle passing in between these structures. Anatomical and radiological knowledge of ankylosis of SIJ and ossification of the ligaments as found in the present case may be helpful for clinicians, radiologists and surgeons for differential diagnosis and can be implicated in the development of innovative treatments of sacroiliac and perineal pains. © **IJAV. 2011; 4: 123–127.**

Key words [ankylosis] [sacroiliac joint] [sacrotuberous ligament] [sacrospinous ligament] [pudendal nerve entrapment]

Introduction

Sacro-iliac joint (SIJ) is the largest axial joint and is considered as a bottom joint of spinal column relating to the hip bones. It is a diarthroidial joint consisting of two types of articulation: (1) an antero-inferior synovial joint between the C-shaped auricular surfaces of the sacrum and ilium and (2) a postero-superior syndesmosis situated between the interosseous surfaces of the ilium and sacrum.

The joint surfaces are irregular with ridges and depressions that are reciprocal and are greater in males. These irregular articular surfaces restrict the movements and contribute to the strength of the joint and enhance the stability rather mobility during the transmission of the weight from the vertebral column to the lower limbs.

Eventhough the irregular surface of the joint help to maintain more in the stability, slight antero-posterior rotation occurs around a transverse axis of the joint. These movements are increased in pregnant women than in men and normal women [1].

Several muscles such as gluteus maximus, piriformis, biceps femoris and ligaments such as anterior and posterior sacroiliac, sacrotuberous and sacrospinous ligaments surrounding the joint influence the movement and stability of this joint [2].

Ankylosis or fusion of the joint and ossification of the adjacent ligaments can decrease the mobility of the joint. The muscles and ligaments acting on this joint, traverses the SIJ both in front and back and can be the causes of pain and inflammation if these joints are in dysfunction [3].

Sacrotuberous (STL) and sacrospinous (SSL) ligaments are the two important structural components of the pelvic cavity because they connect the pelvic bones to vertebral column (sacrum). STL is a strong ligament provides support and stabilizes the sacroiliac region by compensating its rotation, therefore limiting the movement of the lower portion of sacrum [4]. The pudendal neurovascular bundle passes around the SSL close to its attachment to the ischial spine [5].

An ossified STL or SSL may crush or lesion the pudendal nerve when passing through the intraligamentous space of these ligaments resulting in the pudendal nerve entrapment syndrome [6].

In the present case, we describe a pelvic bone with bilateral ankylosis of the SIJ and ossification of STL, SSL and transverse acetabular ligament (TAL).

Case Report

During routine osteology teaching program for undergraduate medical students of Narayana Medical College, Nellore,

one of the male pelves showed bilateral ankylosis of SIJ and ossified SSL, STL and TAL. The specimen was photographed and was studied in detail.

The bony pelvis showed bilateral ankylosis of SIJ. The antero-inferior synovial part was partially fused with numerous osteophytes whereas the postero-superior interosseous part was completely fused. The anterior and posterior sacroiliac ligaments of both the sacroiliac joints were ossified. The posterior superior iliac spine showed numerous osteophytic extensions of ossified ligaments attached to it.

The SSL of right side was completely ossified with a length of 4.4 cm, extending between the ischial spine and the fifth piece of the sacrum. On the left side, lateral 2/3rd of this ligament was ossified with 3.4 cm in its length and it was not fused with sacrum. The sacrotuberous ligaments on both sides were partially ossified; the lengths of ossified ligaments were 2.8 cm on the right and 2.9 cm on the left side. The falciform process of the sacrotuberous ligaments on both sides were ossified forming a groove-like structure on the medial side of the ischial tuberosities which extended up to the ischial rami.

The TAL on both sides were ossified, which transformed the acetabular fossa into a complete cup shaped structure leaving back an oval foramina for the passage of vessels and nerve to the hip joint. The length of the TAL extending between the acetabular notches was 3.6 cm on the right and 3.5 cm on the left side. The maximum width of the ligament was 1.4 cm on the right and 2.1 cm on the left side.

Discussion

SIJ is a true diarthroidial joint having a larger surface area with an average of 17.5 cm^2 [7]. This joint is designed primarily for stability, and its main function is to transmit the truncal weight to the lower extremities. Stability of joint is provided

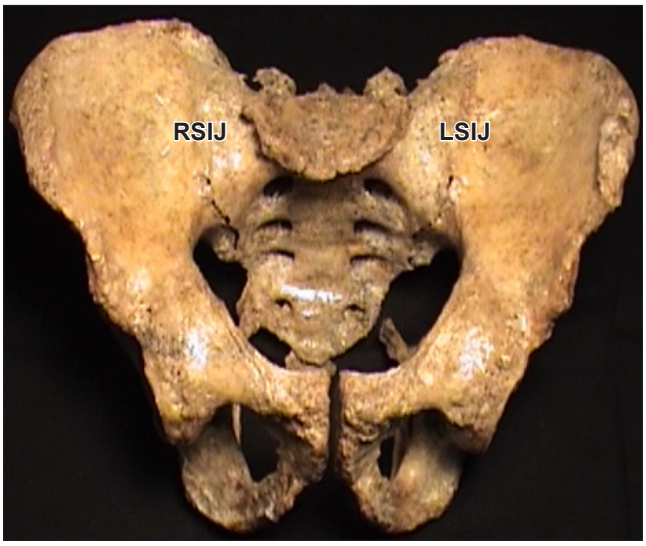

Figure 1. Anterior view of bony pelvis showing the bilateral ankylosis of sacroiliac joints. *(**RSIJ**: right sacroiliac joint; **LSIJ**: left sacroiliac joint)*

Figure 2. Posterior view of bony pelvis showing the ossified sacrospinous ligaments. *(**RSSL**: right sacrospinous ligament; **LSSL**: left sacrospinous ligament)*

Figure 3. Lateral view of the pelvic bone showing the complete ossification of the *right sacrospinous ligament (**RSSL**)* and partial ossification of the *right sacrotuberous ligament (**RSTL**).*

Figure 4. Lateral view of the pelvic bone showing the partial ossifications of the *left sacrospinous ligament* (***LSSL***) and the *left sacrotuberous ligament* (***LSTL***).

Figure 5. Acetabular cavity of right side showing ossified *right transverse acetabular ligament* (***RTAL***).

Figure 6. Acetabular cavity of left side showing ossified *left transverse acetabular ligament* (***LTAL***).

by the intrinsic ligaments i.e., anterior sacro-iliac ligament in the ventral region, posterior and interosseous ligaments in the dorsal region, and by the extrinsic sacrotuberous and sacrospinous ligaments [8].

In standing, the body weight transmitted on to the sacrum may cause anterior tilt of the sacrum. This is prevented by the stretch in the posterior sacroiliac ligament along with STL which acts an automatic locking device or screw home mechanism [9].

Ankylosis of the SIJ is a condition due to the fibrous adhesions in SIJ and decrease in size of the synovial cavity [1]. It is estimated that in 15- 25% of cases the low back pain is originated in the SIJ due to ankylosis of the joint.

The hallmark sign of ankylosis in almost all the cases is sacroiliitis, eventhough it includes other joints and has been showed in previous radiographic studies [10, 11]. The basic histopathological changes are the inflammation of the joint with the erosion usually on the iliac bone followed by the gradual ossification of the joint resulting in ankylosis. This takes place in both the synovial joint and anterior and posterior sacroiliac ligaments which may be unilateral or bilateral. The ossification also extends to the adjacent ligaments, the STL and SSL [12]. SIJ ankylosis seems to be more common in men than in women [13]. The para-articular osteophytosis are more seen in the ankylosis, a feature of degenerative sacroiliac disease and is more common in men than in women. The sacroiliac ankylosis is strictly confined to the males, with the advanced age and the causes of childbirth in women make them less prone for the sacroiliac ankylosis. The strength and stability are sacrificed for the

increased mobility after puberty and during pregnancy in women [14].

The STL extend with its broad base from the posterior superior iliac spine, lower sacral tubercles, lateral margins of the sacrum and coccyx to the medial margin of the ischial tuberosity. This attachment spreads along the ischial ramus as the falciform process which blends with the fascial sheath of pudendal or Alcock's canal containing internal pudendal vessels and pudendal nerve. The ligament is pierced by coccygeal branches of inferior gluteal artery and perforating cutaneous branches of the coccygeal plexus. The ligament also gives attachment to the lowest fibers of the gluteus maximus.

The SSL extends from ischial spine to the sacrum. Both the ligaments together convert the greater and lesser sciatic notches into their corresponding foramina [1].

The pudendal nerve accompanied by its artery traverses the greater sciatic foramen and then winds around the SSL to enter into the lesser sciatic foramen, where it is situated between the STL and SSL. In some rare cases the pudendal nerve may travel through the layers of the SSL [6].

Ossification of ligaments is a well known phenomenon in various pathological conditions. Under radiographs, the calcified ligaments between sacrum and ilium look like ribs or digits [15]. When seen within the pelvis or abdomen these anomalies are known as pelvic or sacral ribs or digits [16].

The SSL in the present case was completely ossified on the right side and 3/4 on the left side. Partial ossification of the STL was observed on both the sides in which the sharp concave border of the falciform process of the ligament was reasonably high reaching the pudendal canal.

The ossified SSL and STL may compress or lesion the pudendal nerve which may occur at different levels of the course of the nerve. In a recent study, the three possible sites for the nerve and vessel entrapment were, as it winds and passes through the fibers of SSL, between the STL and SSL, and along the falciform process of the STL [6, 17].

The pudendal nerve is the principle sensory supply for the perineal region and external genitalia. Its entrapment results in pain or loss of sensation in the perineal region or even lead to the fecal incontinence [18]. The cocygeal branches of the inferior gluteal artery pierce the STL and supply the gluteus maximus. Ossification of STL may lead to the compression of the vessel and subsequently result in ischemia of the area supplied by it.

The ossified STL or SSL may restrict the anatomical space of lesser or greater sciatic foramen which lies between STL and SSL. This leads into potential site for compression of neurovascular structures passing through lesser sciatic foramen which produces undiagnosed chronic perineal pain or may cause pudendal nerve entrapment syndrome [6, 19].

The complete ossification of the SSL and the partial ossification of the STL, as found in our case, may compress the structures passing through the greater and lesser sciatic foramina, such as mainly the pudendal nerve, internal pudendal vessels, nerve to obturator internus and sciatic nerve. The sciatic nerve passing below the piriformis when compressed may lead to sciatica, radiating to the lower limb. Other structures such as nerve to obturator internus and pudendal nerve compression may lead to the muscle weakening and chronic perineal pain.

The calcification of the TAL was also observed in our case. This ligament increases the cup size of the acetabulum and deepens the socket along with its labrum and thereby the cavity of hip joint. It contains no cartilage cells. The TAL and the ligament of the head of the femur help to maintain the stability of the hip joint [1]. Eventhough the actual function of this ligament is unknown, the calcification of the ligament may lead to the restricted movements of the hip joint and yet to be clinically revealed.

Knowledge of this type of variations such as ossification of the SIJ, STL and SSL occurring as a single entity would be of great value clinically and surgically. It is important to have adequate anatomical and radiological information of SIJ for the diagnosis and further treatment as SIJ ankylosis leads to pain and decreased mobility of the joint.

The study of ossified STL and SSL are of great significance in clinical and surgical diagnostic purposes. Because these ligamentous structures when ossified lead to the compression of the pudendal nerve, resulting in the chronic perineal pain. Proper anatomical knowledge and radiological studies from MRI and CT can be interpreted for the accurate diagnosis and treatment of the neurovascular compression syndromes, also during the reconstructive procedures of the pelvic floor.

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