Indiscriminate ossification of ligaments in a dry adult human male pelvis– A rarity

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Abstract
Introduction: Human pelvis exhibits sacrotuberous, sacrospinous and transverse acetabular ligament performing the function of stabilisation of pelvis and hip joint respectively. The ossification of this ligaments has been reported solitary and rarely in composite.

Materials and Methods: During undergraduate osteology teaching authors noticed a dry human male pelvis demonstrating compounded ossification of ligaments and bony distortions.

Case Report: The left sacrotuberous ligament was partially ossified and demonstrated triangular anteroinferior and posteroinferior segments. The transverse acetabular ligament of right side was totally ossified and left was partially ossified. A bony mass was observed at the left ala of sacrum with fusion of pedicle and left lower part of body of fifth lumbar vertebra and ala of sacrum. Bilateral sharp bony spicules at iliopectineal lines and exostosis at bilateral iliac tuberosity was noticed.

Conclusion: This exhibit brings out an unreported rare anatomical variant of bony pelvis, the knowledge of which will be of paramount importance to radiologists and orthopaedic surgeons.

Keywords: Sacrotuberous ligament, Transverse acetabular ligament, Ossification, Sacralisation, Bony spicule.

Introduction

Human bony pelvis is a bridge transmitting the weight from lower extremity to axial skeleton which is aided by the sacrotuberous, sacrospinous and transverse acetabular ligaments. These ligaments are tough, flexible and pliant fibrous band connecting bones, but also create foramina’s allowing passage to Neuro-vascular structures and attachments to muscles. The Sacrotuberous ligament (STL) is a connection between the sacrum and the ischial tuberosity. It is hour glass shaped narrow in middle and expanded at both ends. At one end it is attached to the posterior superior iliac spine, adjoining ligaments, transverse sacral tubercles and the lateral margins of the lower sacrum and upper coccyx; while the other end to the medial margin of the ischial tuberosity. The Sacrospinous ligament (SSL) extends from ischial spine to the sacrum. The two ends of the acetabular notch give attachment to the transverse acetabular ligament.1 STL stabilizes the pelvis and locking the sacroiliac joint, by counterbalancing its rotation, therefore limiting the movement of the lower portion of sacrum.2

Abnormal Osseo-tendinous behaviour in pelvic ligaments either calcification, ossification, bony outgrowths (enthosphytes and osteophytes) are solitary reported in radiological and anatomical literature but data about soft tissue at pelvic brim is negligible. Ossification of STL, SSL & TAL may compress associated Neuro-vascular vascular structures leading to perineal pain and limitations of hip movements.

Lumbosacral transitional vertebra (LSTV) is a common congenital anomaly of lumbosacral region which may include sacralisation and lumbarisation. Sacralisation is a congenital condition in which usually the fifth lumbar vertebra fuses completely or partially with sacrum unilaterally or bilaterally. The prevalence rate of LSTV varies from 4% to 35.9% based on diagnostic criteria, imaging techniques and on the clinical presentation of the patient.3 LSTV may pose neurological, disc related or midwifery situations.

Authors report a very rare presentation of ossified left sacrotuberous ligament, bilateral transverse acetabular ligaments, anterior longitudinal ligament with sacralisation of fifth lumbar vertebra and bony spurs at both iliopectineal lines in a human pelvis.

Case Report

During routine demonstration authors were attracted towards a male articulated pelvis. It was supplied by independent vendor to the institute and had some interesting features as described below. Digital Vernier calliper with a reading sensitivity of 0.01mm was used to measure the dimensions.

1. The outlet showed partially ossified left sacrotuberous ligament (STL). It had a broad-based origin at the ischial tuberosity and exhibited a characteristic tapering end crano-medially. It demonstrated characteristic spiralling along its longitudinal axis, which divided the ossified STL into triangular antero-inferior (AI) and slate pencil like postero-superior (PS) segments. From the
prominent inner margin of ischial tuberosity to the tip the length of the ossified STL was 54.0 mms with AI segment measuring 27.9 mm and PS measuring 26.1 mm. The AI segment was continuous with ossified falciform process and had two surfaces where in its inferior surface was more irregular than the superior surface. The PS also exhibited two surfaces lateral and medial wherein the lateral surface was more irregular. The apex of this ossified STL threw multiple small bony protuberances with intervening groove. The contralateral STL was not ossified but the medial side of ischial tuberosity was very rough and marginally elevated continuous with ossified falciform process. The ischial spines were prominent (Fig. 1).

2. The inlet showed fifth lumbar vertebrae having a rounded bony mass encroaching the medial two third of left ala and forming a narrow tunnel along the medial aspect of the left sacroiliac joint. The mass was continuous with left lower part of body and pedicle of fifth lumbar vertebra (Fig. 2). The transverse process and articular facets of fifth and first sacral vertebra were separate. The uncal process, facets and the rim of body showed osteophytes. The anterior surface of body of vertebra showed ossified bony process of 22.7 mm in middle extending vertically from lower rim to cross upper rim. Authors conclude this as ossified anterior longitudinal ligament.

3. On pelvic brim authors noticed equimorphic bilateral bony spicules beginning medial to ilio-pubic eminence and ending with a sharp pointed end on pectinate line. Right and left bony spicule were 22.6 mm and 30.1 mm in length and were at 26.5 and 26.7 mm from medial end of pubic crest respectively (Fig. 2).

4. Coming to anterolateral portion of pelvis, both the transverse acetabular ligaments (TAL) were ossified. The right ligament was complete and left side was incomplete measuring 31.2 mm X 5.6 mm and 15.8 mm X 4.9 mm (length X breadth) respectively (Fig. 3 and 4).

5. Both the iliac tubercles were more prominent than usual and showed beak like exostosis. The region above the acetabulum was more robust and showed tubercles. Authors assume this as a hint to attempt to ossify the ITT. The sacroiliac joints and sacral spines were normal (Fig. 1).

![Fig. 1: Photograph of outlet of pelvis showing ossified left Sacrotuberous ligament, bilateral prominent iliac tuberosities and ossified right falciform margin of Sacrotuberous ligament](image-url)
Fig. 2: Photograph of inlet of pelvis showing bilateral variant ossification of transverse acetabular ligaments, fusion of body of L5 vertebra with ala of sacrum and bilateral bony spicules at iliopectineal lines

Fig. 3: Photograph of right anterolateral part of pelvis showing totally ossified right transverse acetabular ligament

Fig. 4: Photograph of left anterolateral part of pelvis showing partially ossified left transverse acetabular ligament
Discussion

Calcification or ossification of STL is reported in radiological literature as a unilateral, incidental acquired and not epigenetic. It is seen mostly in men and is inconclusive about occupational or special stress. Fibroblasts cells are present in large number in ligamentous tissue and are reported to be linked with heterotopic ossification in ligaments. However, the proper mechanism by which fibroblasts mediate this remains uncertain. Due to external stimulus like repetitive strain on these structures causes lifting of periosteum exposing the osteogenic layer containing osteocytes which in turn form the bony out growth. This may be indicative of spinal Diffuse Idiopathic Skeletal Hyperostosis (DISH) or any seronegative spondyloarthropathy.

The pudendal nerve enters the pudendal canal which is formed by duplication of the obturator fascia, inferior to falciform process and insertion of STL into the ischial tuberosity. An ossified STL may act as a lobster claw and with a restricted anatomical space may compress the pudendal nerve clinically producing the entrapment effect in pelvic ligaments and soft tissue which may present with neurovascular symptoms and if unnoticed operative hazards.

Conflict of Interest: The Authors declare that there is no conflict of interest.

References