Some of the notes and highlights of the paper below with a few added explanations and notes.

The sacroiliac joint: an overview of its anatomy, function and potential clinical implications

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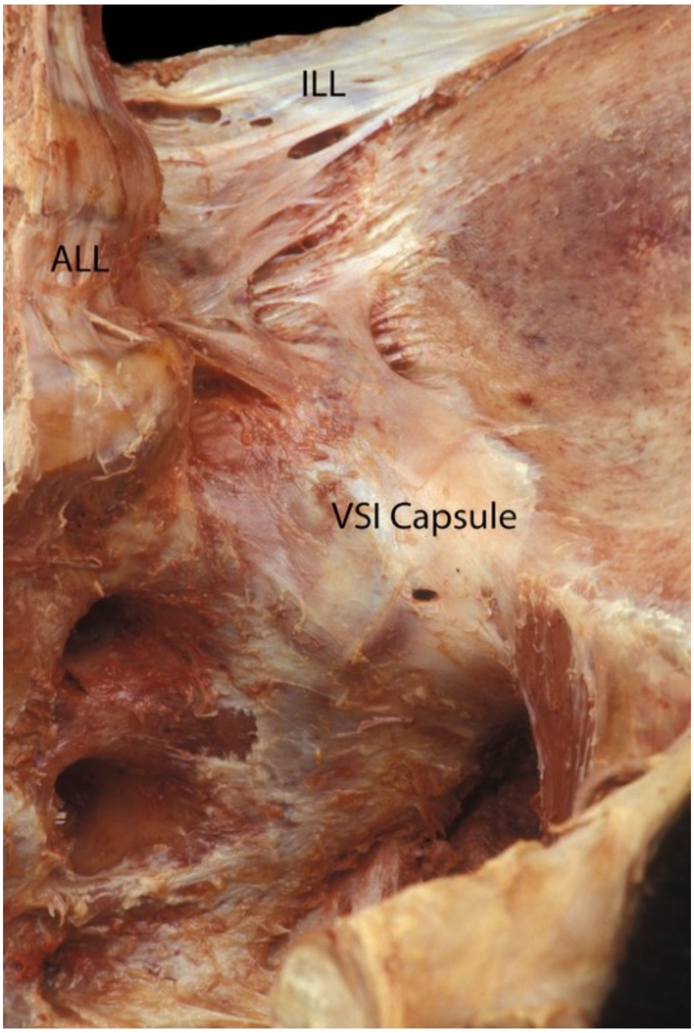
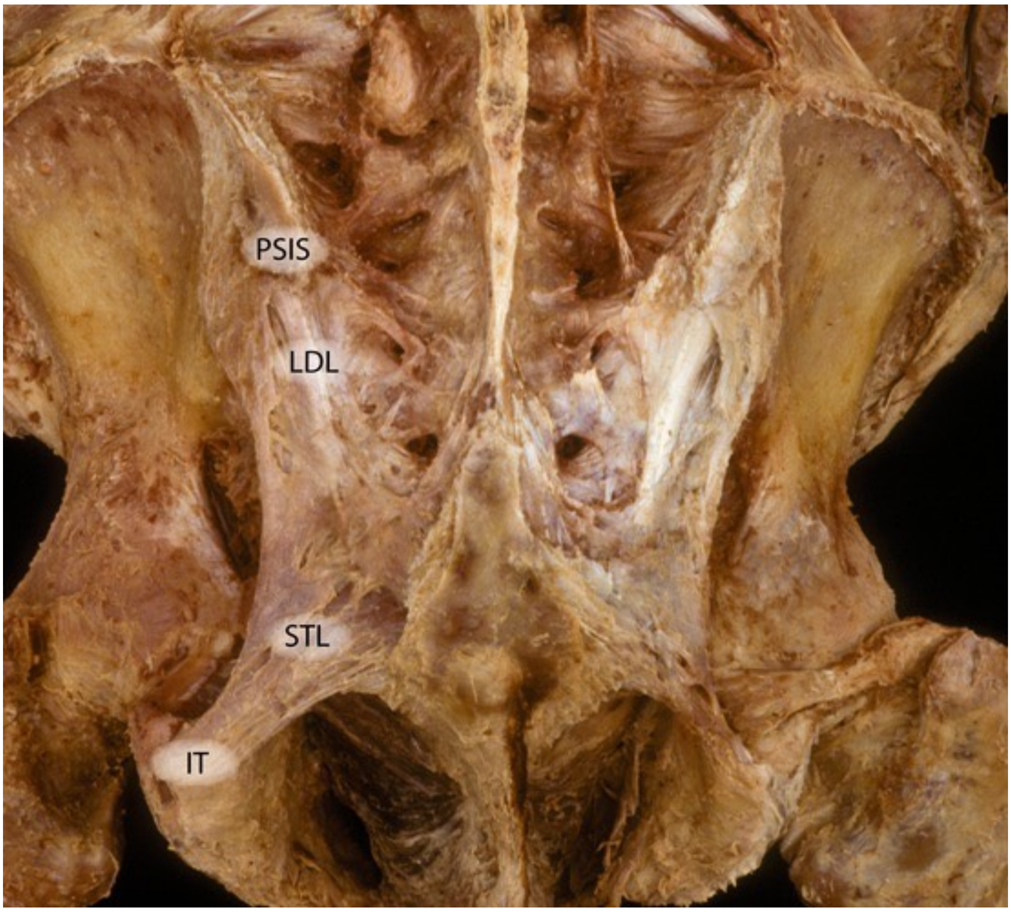
https://www.ncbi.nlm.nih.gov/pmc/articles/PMC3512279/



<u>Above:</u> Ventral view of the thin anterior capsule of the SIJ (VSI). The iliolumbar ligaments are clearly visible (ILL), also the anterior long spinal ligament (ALL).



<u>Above:</u> **Dorsal overview of the lumbosacral spine. The multifidus are removed. The posterior superior spine is indicated (PSIS). The long dorsal ligament is indicated (LDL). The ischial tuberosity is visible (IT) and the sacrotuberous diverges craniomedially.**

No anatomical structure functions in isolation, and the mechanical load encountered anywhere in the body is distributed through a continuous network of fascia, ligaments and muscles supporting the entire skeleton.

Evolutionary wise: Lower lumbar multifidi, piriformis and coccygeus and glute max have changed so that they originate in part from the sacrum and ST ligaments. **(Sacrotuberous ligaments)**

Therefore, the sacrum, pelvis and spine, and the connections to the arms, legs and head are functionally interrelated through muscular, fascial and ligamentous interconnections.

Likewise, efficient motor control does not provide a solution for individual joints, but orchestrates efficient reaction forces to integrate and stabilize the kinematics of our body.

Focusing on singular anatomical structures to comprehend lumbopelvic pain, rather than considering the spine and pelvis as an integrated, interdependent and dynamic biological structure, might 'blind' the observer to the larger picture (Vora et al. 2010).

…functional anatomy should present the necessary information to comprehend the complex interrelationships between muscle, its internal fascial skeleton and the surrounding external fascial network into which it is integrated. Such an approach can be easily missed in traditional anatomical dissection, yet can be achieved by dissecting the continuity of connective tissue as an integrating matrix (Van der Wal, 2009).

While palpating the upper part of the sacrum lateral of the spinous processes, this composite of structures can give the impression of feeling hard bone. This could mistakenly suggest that it is the sacrum itself that can be directly felt, instead of the tight fascial and tendinous composite enclosing the multifidus and sacrospinalis muscles.

Given evidence of a small amount of SIJ -(**Sacroiliac Joint)** movement, Kopsch (1940) suggested that the SIJ is an intermediate joint between a synarthrosis and a diathrosis, and Gray proposed the term 'amphiarthrosis', thus implying the SIJ permits only minimal movement (Gray, 1938).

Note
synarthrosis - an immovably fixed joint between bones connected by fibrous tissue (for example, the sutures of the skull).

diarthrosis
A synovial joint which joins bones with a fibrous joint capsule that is continuous with the periosteum of the joined bones, constitutes the outer boundary of a synovial cavity, and surrounds the bones' articulating surfaces. The synovial cavity/joint is filled with synovial fluid.

The SIJs are highly specialized joints that permit stable (yet flexible) support to the upper body. In bipeds, the pelvis serves as a basic platform with three large levers acting on it (the spine and two legs). Both the tightness of the well-developed fibrous apparatus and the specific architecture of the SIJ result in limited mobility.

Sacral movement involves the SIJ, and also directly influences the discs and most likely the higher lumbar joints as well. For example, forward and backward tilting of the sacrum between the iliac bones affects the joints between L5–S1, as well as most likely influencing joints at the higher spinal levels (Vleeming & Stoeckart, 2007).

Accordingly, the thick anterior longitudinal ligament spans the ventral aspect of L5 and S1, buttressing against excessive extension.

Analysis of gait mechanics demonstrates that the SIJs provide sufficient flexibility for the intra-pelvic forces to be transferred effectively to and from the lumbar spine and lower extremities (Lee & Vleeming, 2007).

More recently, finite element modeling estimates that a l**eg-length discrepancy as small as 1 cm increases the load across the SIJ fivefold** (Kiapour et al. 2012).

To allow bipedal gait in humans, evolutionary adaptations of the pelvis have been necessary. For example, the ilia flare outward in the sagittal plane to provide a more optimal lateral attachment site for the gluteus medius (an important muscle for hip pelvic stability). Also, a dramatically increased attachment site for the gluteus maximus muscle has changed this muscle – a relatively minor muscle in the chimpanzee – into one of the largest muscles of the human body. Thus, the bipedal human pelvis has evolved quite differently to that of the quadrapedal chimpanzee (Lovejoy, 1988, 2007).

Evolutionary wise: Lower lumbar multifidi, piriformis and coccygeus and glute max have changed so that they originate in part from the sacrum and ST ligaments.

The erector spinae and gluteus maximus are functionally interdependent as controlling forces that are mutually exerted on the ilium and the sacrum. The erector spinae and multifidi muscles assist in pulling the sacrum into nutation, while parts of these muscles also attach to the medial iliac crest. The gluteus maximus with attachments to the sacrum pulls the sacrum laterally into the ilium (Fig. 6; Vleeming, 1990).

The gluteus maximus is also strongly connected and fused to the STLs **(sacrotuberous ligaments)** and SSLs, **(sacrospinous ligaments)**. Only after removing the muscle do these ligaments become visible (Vleeming et al. 1989a).

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Integration of research and therapy

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