

THE SACROILIAC JOINT ARTHROKINEMATICS

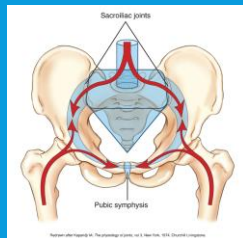
Dr Kate L Williams

BY THE END OF THIS SESSION YOU SHOULD FEEL COMFORTABLE...

- Describing the anatomy of the SIJ
- Discussing the arthrokinematics of the SIJ
- Applying normal arthrokinematics to clinical assessments and rehabilitation

SACROILIAC JOINTS (SIJ)

- The sacroiliac joints mark the transition between the caudal end of the axial skeleton and the lower appendicular skeleton
- Large, tight fitting joint
- Designed for stability
- Ensuring effective transfer of potentially large loads between the vertebral column, lower extremities and ground reaction forces

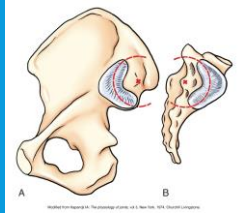


SIJ AS A CONTRIBUTOR TO LBP

- Cause of LBP is extremely difficult to diagnose
- Estimated SIJ source of pain in 15-30% of chronic back pain patients
 - Secondary to joint injury
 - Direct trauma (e.g. fall)
 - Indirect overload (repetitive, unilateral or unidirectional torsions)*
 - Postural abnormalities*
 - Surrounding periarticular connective tissue
 - Mechanism of painful SIJ/CLBP is often unclear

SIJ STRUCTURE

- Relatively rigid articulation between the auricular surface of the sacrum and matching auricular surface of the ilium
- Articulating surface is semi-circular, boomerang shape
- Open angle of boomerang faces posteriorly
- Modified synarthrodial joint
- Joint capsule becomes fibrotic
- Presence of osteophytes ~ 40s/50s
- Ligament ossification ~60s
- Hyaline cartilage thins and in 10% population joint ossify and fuse by ~80s



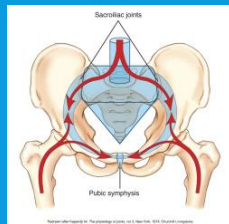
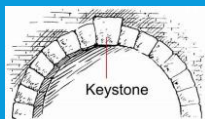
PELVIC RING 'THEORY'

- Components
 - Sacrum
 - 2 x SIJ
 - 2 x hemipelvis (ilium, ischium, pubis)
 - Pubic symphysis joint
- Transfer weight bidirectionally between trunk and femurs



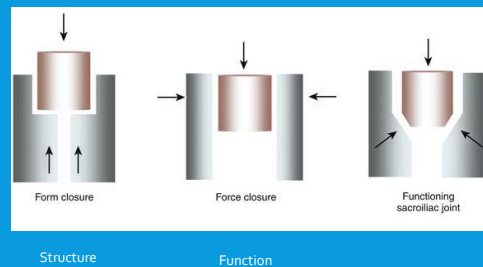
STRENGTH OF THE PELVIC RING

- Tight fit of the sacrum
 1. Wedges in to the V shaped gap in between each hemipelvis
 - Sacrum, anchored by two SIJ is the keystone to the pelvic ring
- Pubic symphysis joint
 - Anterior element of structural stability



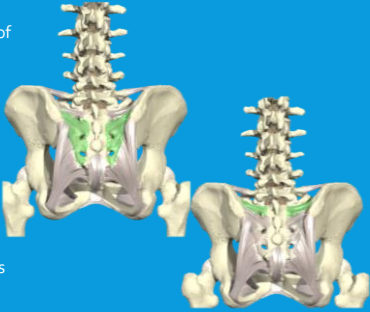
STRENGTH OF THE PELVIC RING

- Force versus form closure



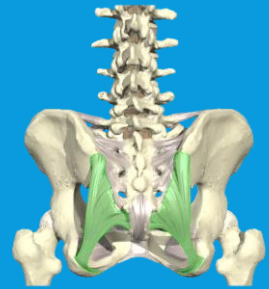
SHORT AND LONG POSTERIOR SACROILIAC LIGAMENT

- Reinforce posterior side of the sacroiliac joint
- Extensive but thin set of short ligaments (sacrum to ilium - iliac tuberosity and PSIS)
- Blend with deep interosseous ligament
- Long ligament fibres originate in S3/ S4 region and attach to PSIS
- Blend with sacrotuberous ligament



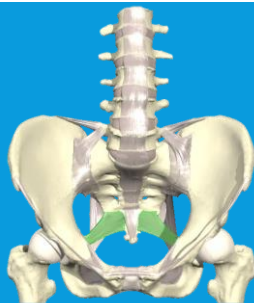
SACROTUBEROUS LIGAMENT

- Does not cross the SIJ but assists stability
- Large ligament
- PSIS, lateral sacrum and coccyx to ischial tuberosity
- Blends with the tendon of biceps femoris

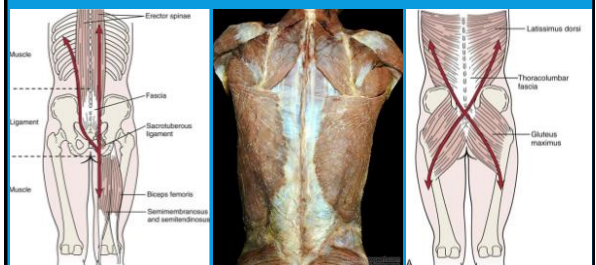


SACROSPINOUS LIGAMENT

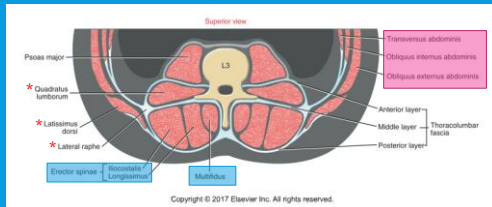
- Deep to sacrotuberous ligament
- From lateral margin of caudal end of sacrum and coccyx to ischial spine



FORCE CLOSURE AT THE SIJ

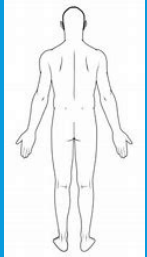


STRENGTH OF THE PELVIC RING



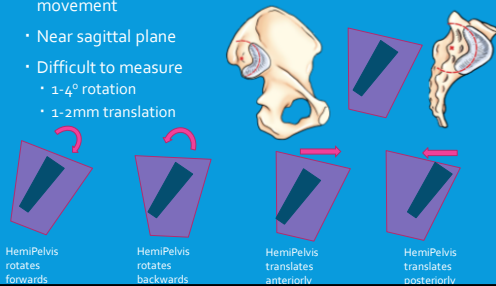
SIJ INNERVATION

- Innervated by sensory nerves
 - Capable of transmitting nociceptive information to CNS
- Unclear on exact spinal source
- Consistently
 - Dorsal rami of L₅ – S₃
- Less commonly
 - Ventral rami of L₄ – S₂
- Symptoms reported
 - Ipsilateral lower lumbar and medial buttock pain
 - Around PSIS
 - Less consistently
 - Pain and/or hyperaesthesia in lower extremity



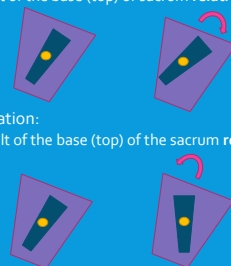
SIJ KINEMATICS

- Relatively small & poorly defined rotational and translational movement
- Near sagittal plane
- Difficult to measure
 - 1-4° rotation
 - 1-2mm translation



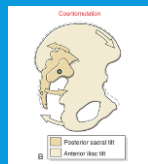
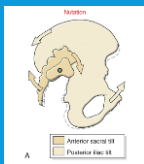
TERMINOLOGY OF MOVEMENT AT SIJ

- Nutation:- Nod
 - Anterior tilt of the base (top) of sacrum **relative** to ilium
- Counternutation:
 - Posterior tilt of the base (top) of the sacrum **relative** to the ilium

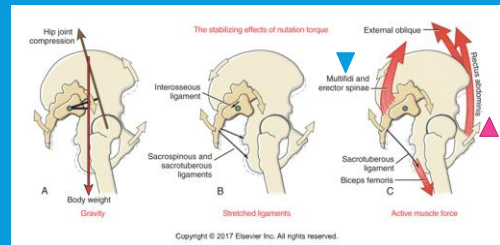


TERMINOLOGY OF MOVEMENT AT SIJ

- "Relative"
- Nutation
 - Anterior sacral tilt OR
 - Posterior iliac tilt OR
 - Both
- Counternutation
 - Posterior sacral tilt OR
 - Anterior iliac tilt OR
 - Both



FORCES THAT CREATE NUTATION TORQUE



SUMMARY

- SIJ is a synarthrodial joint
 - 1-4° rotation
 - Nutation & Counternutation
 - 1-2mm translation
- Stability provided by
 - Gravity
 - Ligaments
 - Muscles
- Implications for rehabilitation