Exploring the Lumbosacral Junction

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- Mechanics
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The Keystone
The Keystone

- 5 fused segments
- 4 articulations
Lumbosacral Joint

- A disc lies between the L5 vertebrae and sacral apex. Two zygapophysial joints posteriorly. Iliolumbar ligaments extend from transverse process of L4/L5.

- Iliolumbar ligaments
- Zygapophyseal joint
1. Superior band to L4
2. Inferior band to L5 attaches to ant iliac crest

The motion of L4 and L5 cannot be separated from the motion of the SIJ. Asymmetry of motion of the SIJ will cause direct asymmetric motion of the L4 and L5 motion segments.

During **Lateral Flexion** the iliolumbar ligaments become taut contralaterally and slack ipsilaterally. They allow only an 8 degree movement of L4 relative to the sacrum.

During **Flexion-extension** the superior Band (red) are tightened. N neutral and E extension superior Bands are relaxed. Inferior bands is slacked during flexion. Stretched during extension.
Lumbosacral Joint

1\textsuperscript{st} sacral segment is inclined slightly anteriorly and inferiorly, forms an angle with horizontal: \textbf{lumbosacral angle}
Lumbosacral Joint

- Increase in angle: increase in lumbar lordosis
- Increase shearing stress at lumbosacral joint
Lumbo-sacral Joint

- The strength and stability of this joint depend on the intervertebral disc, longitudinal spinal ligaments, the ligamentum flava and the articular processes.
- The disc is made of a fibroelastic mesh surrounding a colloidal gel.
- It absorbs the load and distributes the forces applied to the vertebral column.
Intervertebral Disc

Diagram showing the structure of an intervertebral disc with annotations for the nucleus and annulus laminates.
Lumbosacral Joint

• Forces on the disc
  – Load
  – Stress
    • Strain
    • Shear
  – Tension
  – Compression
  – Bending
  – Torsion

Shear force: a force parallel to the endplate
Lumbosacral Joint

• During loading a disc deforms and loses height. Remove load, restore shape
• If load is retained, disc continues to lose height: “creep”
• This “creep” or loss of height is due to continuous pressure which alters the contents of a disc and can change its mechanical properties
Intervertebral disc
Cigarette smoke containing nicotine and 4000+ other chemicals

Reduced nutrient supply in vasculature

Carried through the bloodstream to the IVD

Transport of toxic chemicals into disc

Capillary bed in vertebrae

Vascularity at anulus periphery

NP

CEP

AF
- Normal Disc
- Degenerative Disc
- Bulging Disc
- Herniated Disc
- Thinning Disc
- Disc Degeneration with Osteophyte formation
Lumbosacral Joint

- Anterior Surface
  - Piriformis
  - Iliacus
  - Coccygeus

- Posterior
  - Multifidus
  - Erector Spinae
  - Gluteus Maximus
Lumbosacral Musculature

- Muscular support of the joint is lacking anteriorly
- Psoas major laterally T12-L5 TP
- Erector spinae and multifidus posteriorly
Muscles That Control Pelvic Tilt

1) Abdominals
   - Rectus Abdominis
   - External Oblique

2) Hip Flexors
   - T.f. latae
   - Rectus Femoris (A quadriceps muscle)
   - Sartorius (not shown)

3) Low Back Extensors

4) Hip Extensors
   - Gluteus Maximus & Hamstrings
Lumbosacral Junction

• OMT approach:
  – Balance the pelvis
  – L5 Dysfunction
  – Myofascial techniques
  – Muscle energy
  – HVLA
  – May need to repeat treatment weekly to break myofascial patterns and restore balance and alignment
References

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