Exploring the Lumbosacral junction

Juan Barahona DO
Sports Medicine Fellow
Larkin Community Hospital
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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** F superior Band (red) are tightened; N neutral and E extension superior Bands are relaxed. Inferior bands is slacked during flexion and stretched during extension.
Lumbosacral Angle

1st sacral segment is inclined slightly anteriorly and inferiorly, forms an angle with horizontal: **lumbosacral angle**
Lumbosacral Angle

- Normal 30-45 degrees
- Hyperlordosis - >45, Hypolordosis <30
Intervertebral Disc

• 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

- **Nucleus pulposus**
  - Water: 77%
  - Proteoglycan: 14%
  - Collagen: 4%

- **Annulus fibrosus**
  - Water: 70%
  - Proteoglycan: 5%
  - Collagen: 15%

- **Cartilage endplate**
  - Water: 55%
  - Proteoglycan: 25%
Intervertebral Disc

Annulus:
- Concentric layers of fibers
- Fibers attached to vertebral body, and cartilaginous endplate and longitudinal ligaments
- Each at opposing 30 degrees helps maintain tension with different movements

Nucleus:
- Gelatinous mucoprotein and mucopolysaccharides
- Polysaccharides retain water
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

Vasculature at anulus periphery

NP

CEP

AF
Intervertebral Disc

- Forces on the disc
  - Load results in stress
  - Stress
    - Normal
      - Tension
      - Compression
      - Bending
      - Torque
    - Shear
      - Force parallel to the endplate
Lumbosacral Joint

- During loading a disc deforms and loses height. Remove load, restore shape
- Flexion results in posterior displacement of nucleus pulposus
- Extension results in anterior displacement of nucleus pulposus
- Normal Disc
- Degenerative Disc
- Bulging Disc
- Herniated Disc
- Thinning Disc
- Disc Degeneration with Osteophyte formation
Sacrum

• Anterior Surface
  - Piriformis
  - Iliacus
  - Coccygeus

• Posterior
  – Erector Spinae
  – Multifidus
  – Gluteus Maximus
Lumbosacral Musculature

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

Diagram showing the positions of various muscles and ligaments, including:
- Erector spinae
- Iliopsoas
- Rectus femoris
- External oblique muscle
- Rectus abdominis
- Gluteus maximus
- Hamstring muscle
- Iliofemoral ligament

These muscles and ligaments play a role in maintaining pelvic alignment and stability.
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
• LS Junction, not very mobile, main purpose is to transfer load
• Strength and stability depend on the health of the disc
• Musculature can influence pelvis orientation
• Strengthening core can strengthen and stabilize the joint, aide in better load transfer
• Drink your water and stay hydrated
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