Lumbar Radiculopathy

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Outline

• Lumbar Radiculopathy
  – Normal Anatomy
  – Diagnostic Tools
  – Clinical Characteristics
  – Other Sources of LE Pain
  – Therapeutic Options
Normal Anatomy
Normal Anatomy
Normal Anatomy

Schematic demarcation of dermatomes shown as distinct segments. There is actually considerable overlap between any two adjacent dermatomes.
## Normal Anatomy

<table>
<thead>
<tr>
<th>Lumbar Root</th>
<th>Action (Muscle)</th>
</tr>
</thead>
<tbody>
<tr>
<td>L2</td>
<td>Hip Flexion (iliopsoas)</td>
</tr>
<tr>
<td>L3</td>
<td>Hip Flexion (iliopsoas)</td>
</tr>
<tr>
<td></td>
<td><strong>Knee Extension</strong> (quadriceps)</td>
</tr>
<tr>
<td>L4</td>
<td><strong>Knee Extension</strong> (quadriceps)</td>
</tr>
<tr>
<td></td>
<td><strong>Ankle Dorsiflexion</strong> (tibialis anterior)</td>
</tr>
<tr>
<td>L5</td>
<td>Ankle Dorsiflexion (tibialis anterior)</td>
</tr>
<tr>
<td></td>
<td><strong>Great toe extension</strong> (EHL)</td>
</tr>
<tr>
<td>S1</td>
<td>Foot Plantar Flexion (gastroc and soleus)</td>
</tr>
</tbody>
</table>
Outline

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Diagnostic Tools

- History
- Physical Exam
- Imaging
  - Plain Films
  - MRI
  - Plain/CT Myelography
- Electrophysiology
  - EMG
  - Nerve Conduction Studies
Outline

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Lumbar Radiculopathy: Clinical Characteristics

• History
  – Initial back pain ("pull", "pop", "twinge")
  – Buttock and hip pain with distal radiation
  – Worse with valsalva
  – Pain related to position, r/b recumbency
  – Dermatomal pain, paresthesias
    – L3 anterior thigh, to knee
    – L4 lateral thigh to anterior leg
    – L5 posterolateral thigh to lateral leg
    – S1 posterior thigh and leg
• Physical Exam
  – Straight leg raising, crossed SLR
  – Good pedal pulses
  – No tenderness to joint palpation/ROM
  – Myotomal weakness (usually partial)
  – Dermatomal sensory loss (partial)
    – L3 anterior thigh
    – L4 anterior leg/medial malleolus
    – L5 1st web space
    – S1 lateral foot and sole
Lumbar Radiculopathy: Clinical Characteristics

• Diagnostic Studies
  – Plain films
    • Pars defect and/or spondylolisthesis
  – MRI
    • Disc material or osteophyte causing nerve root compression
  – Myelogram
    • Much better detail
    • Can often help avoid or limit surgery
  – EMG
    • Myotomal pattern *(with paraspinal denervation)*
  – NCS
    • Less useful than in UE
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Peripheral Nerve

• **Most Common**
  - Lateral femoral cutaneous nerve
  - Femoral nerve
  - Common peroneal nerve
  - Tarsal tunnel syndrome

• **History**
  - Rarely low back pain
  - Distal pain (often centered around hip/knee/ankle)
  - Paresthesias in nerve distribution > pain/sensory loss

• **Physical Exam**
  - Sensory and motor findings c/w single peripheral nerve
  - Pain/tenderness/Tinel at site of entrapment
Peripheral Nerve

- **Diagnostic Studies**
  - NCS
    - Conduction delay at site of nerve compression
  - EMG
    - Lack of denervation in paraspinals
  - MRI
    - +/- depending on patient age (high false positive)
Musculoskeletal Pain

• History
  – Worse with LE motion/use
  – Groin pain for hip arthralgia (consider also L5 radiculopathy)
  – No low back pain or mild
  – No paresthesias/sensory complaints

• Physical Exam
  – No focal sensory/motor deficit (differentiate weakness and limited motion from pain)
  – Negative straight leg raising
  – Tender to palpation and significant increase with ROM

• Diagnostic Studies
  – MRI of specific joint or other imaging as directed. Careful with false positives on lumbar MRI.
Arterial Disease

• History
  – LE pain worse with LE use.
  – **Relieved if stop walking but remain standing.**
  – No low back pain, or mild.
  – Not relieved by forward flexion.
  – Older patient with history of other arterial disease.

• Physical Exam
  – No focal sensory/motor deficit.
  – Negative straight leg raising.
  – Weak/absent pulses and poor capillary refill.

• Diagnostic Studies
  – Arterial dopplers of LE and/or vascular referral.
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Therapeutic Options

• Treatment Options
  – Non-Surgical
    • Time and rest
    • NSAIDS and/or narcotics
    • Oral steroids
    • Lumbar traction (more difficult/costly vs. cervical)
    • Epidural steroid injections
    • Chiropractic ?
    • PM&RT ?
Therapeutic Options

• Surgical Indications – 2 Parts
  Part I: Surgeon Determined

  – Clear structural lesion on imaging studies

  – Symptoms that correlate very well with imaging findings

  – Signs that correlate very well with imaging findings

  • However, surgery still reasonable with just pain and concordant imaging but no sensory/motor exam findings
Therapeutic Options

• Surgical Indications – 2 Parts

Part II: Patient Determined

– Not getting better with non surgical care

– Symptomatic for more than 4-8 weeks (?)
  • Depends on nature and degree of symptoms/signs and structural lesion on imaging studies
  • Can be longer but, in general, prefer <3 months

– Frequent symptoms with patient’s routine activity
Lumbar Radiculopathy

• **Summary**
  – Initial low back pain but cc buttock/hip and distal LE pain
  – Dermatomal pain related to position, r/b recumbency
  – Pain worse with valsalva
  – Positive SLR, CSLR
  – Dermatomal paresthesias
  – Myotomal weakness
Lumbar Radiculopathy

• Summary (cont’d)
  – MRI initial study of choice
    • Careful with false positives
    • For now, avoid open MRI
  – EMG/NCS
    • Wait 4-6 weeks to avoid false negative EMG
    • NCS helps rule out entrapment neuropathy
  – Treatment
    • Time, rest, and oral steroids often helpful
    • Lumbar discectomy is surgical gold standard
Minimally Invasive Micro-Lumbar Discectomy
The Physicians

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