Non operative Spine Management

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Disclosures

• I, nor any family members, have any relevant financial relationships to be discussed, directly or indirectly, referred to or illustrated with or without recognition within the presentation.
Objectives

• Most Common Causes of Lumbar Radiculopathies
• Treatment Options for the Different Causes of Radiculopathies
• Indications for Spinal Injections in Treating Radiculopathies
Lumbar Radiculopathy - Dermatomes

Schematic demarcation of dermatomes shown as distinct segments. There is actually considerable overlap between any two adjacent dermatomes.
Lumbar Radiculopathy - Myotomes
Common Causes of Lumbar Radiculopathy

• Spinal Stenosis
• Degenerative Spondylolisthesis
• Disk Herniation
Spinal Stenosis
Spinal Stenosis
Degenerative Spondylolisthesis
Degenerative Spondylolisthesis
Degenerative Spondylolisthesis
Disk Herniation

Nucleus pulposus herniating into spinal canal
Disk Herniation

Homaecheverria, A  Lumbar MRI  
2011
Cause of Pain in Lumbar Radiculopathy

- Mechanical Compression or Inflammation
- Most likely Mechanical compression leads to Inflammation
- Nerve root compression commonly seen in asymptomatic patients
- Radiculopathy present without visible disk herniation, thought to be secondary to inflammatory mediators

Murata Y, Neuroscience 2005
Boden SD, JBJS 1990
Rhee JM, JBJS 2006
Treatment Decisions

• Surgical vs Nonoperative “Conservative Care”
Spinal Stenosis

- Spinal Stenosis is the most common reason for lumbar spine surgery in adults over the age of 65 years.
- Nonsurgical care may include:
  - Physical therapy
  - Epidural Injections
  - Anti-inflammatory drugs
  - Opioid Analgesics
S.P.O.R.T. – Spinal Stenosis Outcomes at 2 yrs

Weinstein et al., NEJM 2008
Degenerative Spondylolisthesis

• DS can result in spinal stenosis or neuroforaminal narrowing, thus patients may present with neurogenic claudication or radicular leg pain

• Surgical treatment – Decompressive Laminectomy with or without fusion

• Nonoperative care highly variable, similar to Spinal Stenosis
S.P.O.R.T. – Degenerative Spondylolisthesis
Outcomes at 4 yrs

Adjusted mean score

Observational - Bodily Pain

Observational - Physical Function

Observational - Oswestry

Error bars indicate the 95% confidence intervals

Weinstein, JBJS 2009
Disk Herniation

• Lumbar Diskectomy is the Most Common surgical procedure performed in the US for Pt’s with back and leg symptoms
S.P.O.R.T. - Disk Herniation

• Surgical vs Non operative outcomes

• Surgical – Open Diskectomy

• Non Operative
  – Education / Counseling
  – Physical Therapy
  – Epidural injections
  – Chiropractic therapy
  – Anti-inflammatory medications
  – Opioid analgesics
S.P.O.R.T. - Disk Herniation Outcomes at 2 yrs

Figure 2. Mean Scores Over Time for SF-36 Bodily Pain and Physical Function Scales and Oswestry Disability Index

Age- and sex-weighted population normative scores are plotted for Medical Outcomes Study 36-Item Short-Form Health Survey (SF-36) scales. To enhance readability, the plot symbols and error bars for the surgical group are slightly offset. Error bars indicate 95% confidence intervals.

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S.P.O.R.T. - Disk Herniation Outcomes at 2 yrs

Work Status

% Working

- Surgery
- Nonoperative Care

Global $P = .60$

Months From Baseline
S.P.O.R.T. - Disk Herniation

• Both Surgery and Non Operative treatment groups improved substantially over the first 2 years
• Differences between groups NOT statistically significant
Lumbar Radiculopathy Treatment Options

• Spinal Stenosis and Degenerative Spondylolisthesis
  – Should Consider Surgery as Primary Option

• Disk Herniation with Motor Function Deficit
  – Should Consider Surgery as Primary Option

• Disk Herniation without Motor Function Deficit
  – Should Consider “Conservative” Care options
“Conservative” Care Options

- Education / Counseling
- Physical Therapy
- Anti-inflammatory medications
- Opioid analgesics
  - Oral
  - Epidural Steroid Injection
Acute Treatment

- Oral Prednisone 60mg qd x5d
- Hydrocodone
- MRI without contrast standard protocol
- Consider Transforaminal Epidural Steroid Injection depending on response to Oral steroids and MRI findings
Sub acute Treatment

• PT – Isometric core strengthening, on the floor not on Swiss exercise ball initially
• NSAIDs – Diclofenac 75mg bid or Mobic 7.5mg qd-bid
• No heavy lifting
• Surgical intervention recommended with any progressive neurologic deficits
• Consider ESI for radiculopathy caused by herniated disk not responding to first line conservative treatment
• No neuro deficits
Factors Favoring Epidural Steroid Injection Treatment Efficacy

• Underlying pathophysiology
  – Herniated Disk vs Degen Spondy and Spinal stenosis
• MRI / CT imaging pathology and clinical exam dermatomal, myotomal findings correlate to the levels to be injected
• Type ESI Transforaminal > Interlaminar, Caudal
• Fluoroscopy guided
• Radiographic contrast confirming epidural space placement
Epidural Steroid Injection Efficacy

- Symptom duration: Acute > Chronic
- Not Workers’ Comp
- Occupation not requiring heavy lifting
- Younger than age 60
Absolute Contraindications for Epidural Steroid Injection

- Systemic Infection or local infection at site of injection
- Bleeding Disorder or fully anticoagulated
- Hx of allergic rxn to injected solutions
- Acute spinal cord compression, Cauda Equina syndrome
Relative Contraindications for Epidural Steroid Injection

- Pregnant patient
- Poorly controlled Diabetes
- Immunocompromised or Immunosuppressed
- Hx of Congestive Heart Failure
R L5 Transforaminal ESI
R L5 Transforaminal ESI
Review

- Spinal Stenosis and Degenerative Spondylolisthesis consider surgical referral
- Herniated Disk w/o neuro deficit consider conservative treatment
- Consider Epidural Steroid injection for radiculopathy caused by herniated disk recalcitrant to first line conservative treatment
Thank You
There are two kinds of people.
1) Those who can extrapolate from incomplete data.
I miss Kansas.

I miss the rains down in Africa.
SCIENCE
Because figuring things out is always better than making shit up
YOU'RE DOING IT WRONG.
Corticosteroids - Mechanism of Action

- Enter cells where they combine with steroid receptors in cytoplasm
- Promotes the formation of a protein that inhibits the enzyme phospholipase $A_2$, which is needed for the supply of arachidonic acid. Latter is essential for the formation of inflammatory mediators
Corticosteroid pharmacological effects which occur at higher doses, Treatment doses

- **CHO metabolism** - increased gluconeogenesis + peripheral glucose uptake may be decreased with resultant **hyperglycemia**
- **Protein metabolism** - anabolism is decreased but catabolism continues unabated, leading to **tissue atrophy**, muscle wasting and delay of healing and fibrosis
- Inhibition of phospholipase A$_2$ → arachidonic acid → inflammatory mediators and **inflammatory response**
- Antibody production reduced, Decreased eosinophils – **Immunosuppression**
- Euphoria or psychotic states? due to CNS electrolyte changes
- HPA axis suppression
HPA axis

Hypothalamus → CRH → Anterior Pituitary → ACTH → Adrenal Cortex → CORT

Corticostrogen Feedback

Corticotropin Releasing Hormone
Adrenocorticotropic Hormone
Corticosteroids - Mechanism of Action

Abbreviations: AA, arachidonic acid; PLA₂, phospholipase A₂; PLC, phospholipase C; COX, cyclooxygenase; NSAIDS, non-steroidal anti-inflammatory drugs; +, vasoconstriction; −, vasodilation.
Lumbar Radiculopathy Treatment Options

- The patient has chosen conservative care and does not have progressive neurologic deficits
- Has failed to improve with 6 weeks of conservative care including oral steroids
- Now considering Epidural Steroid Injection
Considering an ESI?
Do these work!
Considering an ESI?
Do these work!

• Almost all early studies included
  – Caudal and Interlaminar ESI’s
  – Performed blindly, without Fluoroscopy
  – Poor research methodology
  – Performed without radiographic contrast
  – Performed on all causes of radiculopathy
  – Performed without MRI confirmed level of pathology
  – Acute and chronic pain pt’s
Epidural Steroid Injection Efficacy

- 84% success rate (pt satisfaction scale 0-4 good or better) using fluoroscopically guided TF ESI for Disk Herniated (MRI confirmed) caused Lumbar Radiculopathy vs paraspinal muscle saline injection with average follow up at 16 months
  
  — Vad VB, Spine 2002
Epidural Steroid Injection Efficacy

- 23% vs 67% of patients receiving TF ESI with steroid vs TF ESI without steroid went on to undergo surgery for lumbar radiculopathy caused by disk herniation or spinal stenosis after not responding to 6 wk conservative care and considered to be surgical candidates, follow up was 2-3 years with difference statistically significant (p< 0.05)
  - Riew KD, JBJS 2000
Epidural Steroid Injection Efficacy

• Of the patients that avoided surgery for one year, 81% had avoided surgery at year 5 of follow up.
  – Riew KD, JBJS 2006