CC: Low Back Pain

UNM Family and Community Medicine
Grand Rounds 6/1/2011

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UNM Sports Medicine
Learning Objectives

- Define subacute and acute low back pain
- Review anatomy of the back and spine
- Perform a physical examination of the back
- Review differential diagnosis of LBP, know when to image and when to refer
Learning Objectives, Cont’d

- To review the diagnosis and management of pediatric back problems including:
  - Spondylolysis
  - Scoliosis
  - Hyperlordosis
  - Ankylosing Spondylitis
Defining Time …

- Acute LBP lasts for < 6 weeks
- Sub-acute LBP lasts for 6-12 weeks
- Chronic LBP lasts for > 12 weeks

- Acute & Sub-acute account for 90% of LBP
Epidemiology

- Affects 1 in 5 adults each year
- Lifetime prevalence of 60-70%
- #1 cause of activity limitation in people <45 years old
- #5 reason for doctor’s visit
- Most common reason for work-related disability
- Health care costs of $20 billion annually
- FM doctors treat as many pts with LBP as orthopedists and neurosurgeons combined
Differential Diagnosis

- Mechanical Spine – 97%
  - Lumbar strain or sprain – 77%
  - Degenerative Disk Disease – 10%
  - Herniated Disk – 4%
  - Compression Fracture – 4%
  - Spinal Stenosis – 3%
  - Spondylolisthesis – 2%
Differential Diagnosis Cont’d

- **Non-Mechanical Spinal – 1%**
  - Cancer - 0.7%
  - Infection 0.01%

- **Non-Spinal – 2%**
  - pelvic inflammatory disease
  - prostatitis
  - endometriosis
  - pyelonephritis
  - aortic aneurysm
  - pancreatitis
  - cholecystitis
  - peptic ulcer disease
  - shingles
Pathology Review

- Sprain – torn or detached ligament
- Strain – torn muscle
- Radiculopathy – pain & neurological deficit caused by injury to a nerve root (radix=root)
- Sciatica – pain that radiates down posterior or lateral leg; a type of radiculopathy
Pathology Review

- **Spinal Stenosis** – narrowing of the spinal column resulting in compression of the nerve root; often resulting in pain or numbness in legs.

![Diagram of normal and stenotic vertebrae](Spinal_stenosis_is_a_narrowing_of_the_spinal_canal)
Degenerative Disk Disease – gradual degeneration of the disk between vertebrae, due to loss of fluid and tiny cracks, part of normal aging process
Pathology Review

- Compression Fracture – fracture that collapses a vertebrae
Pathology Review

- **Spondylolysis** - a fracture in the pars interarticularis of the vertebra
- **Spondylolisthesis** - occurs when this fracture widens and the vertebral body slides anterior or posterior on the one below it
- (We’ll talk more about this later when we get to kids)
Pathology Review

- Herniated Disk – an abnormal bulge or breaking open of a spinal disk
History and Physical Exam

- Obtain a thorough history
- Perform an appropriate physical exam
- Identify “Red Flags”
- Identify “Yellow Flags”
- Obtain Imaging if appropriate
History

- LOCATES (Location, onset, character, alleviating/aggravating factors, timing, and severity)
- Associated symptoms such as weakness, numbness or tingling
- Previous accidents or injuries to the back and response to treatment
Additional History

- Occupational History
- Exercise History
- Disability Claims or Pending Litigation
"Red flags" for a potentially serious underlying cause for low back pain

<table>
<thead>
<tr>
<th>Condition</th>
</tr>
</thead>
<tbody>
<tr>
<td>Recent significant trauma, or milder trauma age &gt;50</td>
</tr>
<tr>
<td>Unexplained weight loss</td>
</tr>
<tr>
<td>Unexplained fever</td>
</tr>
<tr>
<td>Immunosuppression</td>
</tr>
<tr>
<td>History of cancer</td>
</tr>
<tr>
<td>Intravenous (IV) drug use</td>
</tr>
<tr>
<td>Osteoporosis, prolonged use of glucocorticoids</td>
</tr>
<tr>
<td>Age &gt;70</td>
</tr>
<tr>
<td>Focal neurologic deficit progressive or disabling symptoms</td>
</tr>
<tr>
<td>Duration greater than 6 weeks</td>
</tr>
</tbody>
</table>

Red Flags Review

- History of cancer, unexplained weight loss, age > 50 with trauma or >70 without trauma, resting or night pain → consider new or metastasized cancer
- Most common primary bone cancer is multiple myeloma
- Cancers that metastasize to the bone – “lead kettle” (pb ktl):
  - P = prostate, B = breast
  - K = kidney, T = thyroid, L = lung
Fever, IV Drug Use, or recent infection → consider spinal (vertebral or disk) infection

- Uncommon, occurs 1/100,000-250,000 people/year but is increasing
  - Can cause paralysis, significant deformity or death
  - Most spinal infections start in a lumbar disk
  - LBP is the most common presenting symptom of spinal infection
Red Flags Review

- History of osteoporosis, use of steroids, age > 50 or recent trauma → consider vertebral compression fracture
  - Mortality is rare but morbidity is high
  - Osteoporosis softens the bone so that even a minor fall on the tailbone can cause a compression fracture
  - RF’s for osteoporosis include menopause, smoking, physical inactivity, poor nutrition, and low testosterone in men
Red Flags Review

- Substantial weakness (3/5) → consider significant disk herniation
- Abdominal pulsating mass → consider abdominal aneurysm
- Anticoagulation → spinal hematoma (spontaneous or trauma induced)
Red Flags Review

- Urinary retention, fecal incontinence or saddle anesthesia → consider cauda equina syndrome
  - Rare
  - Compression of cauda equina nerve roots leading to disruption of motor & sensory function in legs, bladder & bowel dysfunction
  - Usually due to massive disk herniation
Cauda Equina Syndrome
Psychosocial factors that can be strong predictors of chronicity and poor patient outcomes – suggest significant psychosocial stress, but not necessarily malingering

Poor work history or job dissatisfaction
- History of substance abuse
- Depression or Anxiety
- History of Physical or Sexual Abuse
- Passive attitude towards rehabilitation
Physical Exam

- **Inspection**
  - Look for infection such as herpes zoster
  - Check posture – possible scoliosis
  - Look for antalgic gait
  - Check muscle symmetry – measure the calf and thigh muscle, > 2cm difference signifies possible muscle atrophy
  - Check leg length symmetry
Palpation

- Attempt to localize the pain
  - Palpate the vertebrae for possible fractures or bone infections
    - Vertebral tenderness is sensitive, but not specific finding for spinal infection
  - Palpate the paraspinal muscles for tenderness
- Check for muscle spasms – compare one side to the other
- Palpate the sciatic notch for possible sciatica
Range of Motion

- Check forward flexion
  - limited flexion NOT sensitive or specific for Dx AS
- Check extension
- Check lateral flexion bilaterally
- Check lateral rotation

- ROM does not reliably distinguish among pathologic causes but provides baseline to use as index of therapeutic response
Motor/Strength

- Toe Walk tests calf muscle (S1)
- Heel Walk tests ankle and toe dorsiflexion (L4, L5)
- Single squat and rise (L4)
Reflexes

- Ankle Jerk (S1)
- Knee Jerk (L4)

- Absence of ankle reflexes common in elderly, should be symmetric
Sensory

- Light touch on
  - Medial foot (L4)
  - Dorsal foot (L5)
  - Lateral Foot (S1)
Straight Leg Raise

- Patient supine
- Hold the ankle dorsiflexed and gently lift affected leg up to 60°-70°
- Considered positive if sciatica is reproduced b/w 10-60 degrees elevation
Straight Leg Raise

- Suggestive of radiculopathy, sensitive but not specific for herniated disk
- Crossed straight leg raise (elevation of unaffected leg when pt. supine causes sciatica b/w 10-60 deg)
- Non-radiating pain is NOT a positive test – this is often just tightness of the quad muscle
Stork Test

- Pt. standing
- Examiner stands behind patient for support
- Patient balances on one leg and hyperextends back
- Positive if pain at affected lumbar vertebrae
<table>
<thead>
<tr>
<th>Finding</th>
<th>Sensitivity, percent</th>
<th>Specificity, percent</th>
<th>Positive LR</th>
<th>Negative LR</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Motor examination</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>Weak ankle dorsiflexion</td>
<td>54</td>
<td>89</td>
<td>4.9</td>
<td>0.5</td>
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<tr>
<td>Ipsilateral calf wasting</td>
<td>29</td>
<td>94</td>
<td>5.2</td>
<td>0.8</td>
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<tr>
<td><strong>Sensory examination</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>Leg sensation abnormal</td>
<td>16</td>
<td>86</td>
<td>NS</td>
<td>NS</td>
</tr>
<tr>
<td><strong>Reflex examination</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Abnormal ankle jerk</td>
<td>48</td>
<td>89</td>
<td>4.3</td>
<td>0.6</td>
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<tr>
<td><strong>Other tests</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>Straight-leg raising maneuver</td>
<td>73-98</td>
<td>11-61</td>
<td>NS</td>
<td>0.2</td>
</tr>
<tr>
<td>Crossed straight-leg raising maneuver</td>
<td>23-43</td>
<td>88-98</td>
<td>4.3</td>
<td>0.8</td>
</tr>
</tbody>
</table>

NS = NOT significant
Other PE to consider …

- Abdominal exam if any complaints of nausea or vomiting or abdominal pain
- Palpate the abdominal aorta
- Rectal exam in men > 50
- Pelvic exam if any menstrual abnormalities or vaginal discharge
- CVAT if suspicious for pyelonephritis
Diagnostic Imaging

- Generally NOT recommended in first 4-6 weeks
- Etiology of LBP is frequently not determined & Xrays don’t usually change management
- In asymptomatic pts, disk herniations, spinal stenosis & disk degeneration are common findings
- Key is to educate the patient about the appropriate role of imaging
20% of asymptomatic pt’s <40 y.o. will have abnormality on imaging

50% of asymptomatic pt’s >41 y.o. will have abnormality on imaging
Flowchart for managing low back pain:

1. **Low back pain**
2. **Presence of sciatica?** (occasionally without back pain)
   - **No**
     - **Simple back pain** (60 percent)
       - Age under 50
       - No signs of sx or systematic disease
       - No hx of cancer
       - (Likelihood of musculoskeletal cause ~0.99)
     - Improved
       - STOP
     - Not improved
       - Plain film and ESR*
         - If either abnormal, consider CT or MRI
         - Have high clinical suspicion in patient with known cancer and new back pain; or patient with IDU, fever and back pain
         - Close follow-up is warranted
   - **Complicated back pain without radiculopathy** (37 percent)
     - Age over 50
     - Systemic signs, sx, or risk factors: fever, weight loss, hx of prior cancer, hematuria, adenopathy, injection drug use
     - (Probability of systemic disease is 1 to 10 percent, depending on the findings. Most patients still have musculoligamentous pain [95 percent].)
     - Improved
     - Not improved
       - Plain film and ESR*
         - If normal, conservative care for 4 to 6 weeks unless neurologic deficit is progressive
         - Improved
           - STOP
         - Not improved
           - Noncontrast CT or MRI, choice depends on local availability
           - If 12 week failure, meets criteria for subacute low back pain
   - **Radiculopathy** (3 percent)
     - Signs and sx of radiculopathy, w/o bladder or bilateral findings
     - May also have systemic signs, sx, or risk factors noted in complicated back pain
     - Plain film
     - ESR* if risks for osteomyelitis
     - If normal, conservative care for 4 to 6 weeks unless neurologic deficit is progressive
   - **Urgent situations** (<1 percent)
     - Acute radiculopathy with urinary retention, saddle anesthesia, bilateral neurologic sx or bilateral exam findings
     - Progressive motor weakness
     - May have systemic signs, sx, or risk factors.
     - Urgent consultation and CT or MRI to evaluate for cord or cauda equina compression

   STOP
Diagnostic Imaging Indications

- Consider in all ages if any trauma
- Consider in older adults with any falls
- If there is a history of chronic steroid use or osteoporosis
- If there are any “Red Flags” and suspicion for cauda equina, infection, cancer
Scheduled oral NSAIDS are recommended; there is strong evidence that they significantly reduce pain.

- For NSAIDs – remember ease of use and cost – none more effective than another.

- Tylenol avoids the GI and renal issues found with NSAIDS, however some studies found it less effective for pain than NSAIDS.

- May need opioids for severe pain; side effects include drowsiness and addiction; administer for 1-2 weeks only.
Treatment Options for Mechanical LBP

- Strong evidence that muscle relaxants such as Flexeril, Soma or Skelaxin are helpful
  - Most beneficial in first one to two weeks of treatment
  - Most effective when combined with NSAIDS
  - Side effects include drowsiness and dizziness – evaluate risks vs. benefit
Superficial heat therapy has been helpful in reducing LBP – provides muscle relaxation and analgesia

Evidence to support use of ice is inconclusive

Physical Therapy appears to be helpful in sub-acute LBP
- 2-6 sessions
- Beneficial for patient education and activating exercise programs
Treatment Options for Mechanical LBP

- Epidural steroid injections may be helpful in patients with radiculopathy who do not respond to 6 weeks of conservative treatment
  - should be preceded by MRI or CT
  - recommendation is 1-3 injections
  - most effective when combined with medication and physical therapy
Treatment Options for Mechanical LBP

- Bedrest is not recommended, there is strong evidence to stay active, however activity may need to be modified.
- If bedrest is necessary for severe pain, it should not last longer than 2-3 days.
- There is insufficient evidence to support massage.
- There is mixed evidence on efficacy of acupuncture.
Treatment Options for Mechanical LBP

- Some evidence that spinal manipulation results in short-term improvement in pain but is less effective than usual methods (analgesics, muscle relaxants, PT)
- “Back schools” one study shows effective
  - Available at UNM
- Lumbar supports, traction and ultrasound have not been shown to be effective
Despite the high rate of spinal surgery, evidence shows only a small number of patients have improvement.
UNM Ortho Spine Surgeon’s Radicular LBP Tx Regimen

- Prednisone 60 mg po daily x 5
- Indocin SR 75 mg po daily x 14d

- ?? Evidence ??? – None
- “I operate a lot less because of this cocktail.”

- Note: Use caution → GI side effects
Prognosis

- In one month, 35% have no symptoms
- In 3 months, 85% have no symptoms
- In 6 months, 95% have no symptoms
- Remember, the etiology of LBP is usually not identified (85%) but almost all patients get better!
Summary (AAFP Recs)

Focused history and physical examination should help categorize patients into 1 of 3 broad groups: nonspecific low back pain, back pain potentially associated with radiculopathy or spinal stenosis, or back pain potentially associated with another specific spinal cause. Evaluation of psychosocial risk factors is essential during history taking because these predict the risk for chronic disabling low back pain.

Strong recommendation; moderate-quality evidence (SORT B)
For patients with nonspecific low back pain, clinicians should not routinely perform imaging studies, including radiographs, CT scans, and MRI, or other diagnostic tests

Strong recommendation; moderate-quality evidence (SORT B)
Summary (AAFP Recs)

Patients with severe or progressive neurologic deficits, or in whom history and physical examination suggest cancer, infection, or other underlying condition as the cause of their low back pain, should undergo imaging studies and other appropriate diagnostic tests.

Strong recommendation; moderate-quality evidence (SORT B)
Patients with persistent low back pain and signs or symptoms of radiculopathy or spinal stenosis should undergo MRI or CT only if positive results would potentially lead to surgery or epidural steroid injection for suspected radiculopathy. In choosing an imaging procedure, MRI is preferred to CT.

Strong recommendation; moderate-quality evidence (SORT C)
Patient education by clinicians should include provision of evidence-based information on low back pain. Topics that should be covered include expected course and effective self-care options. Clinicians should also counsel their patients to stay physically active.

Strong recommendation; moderate-quality evidence (SORT C)
When pharmacotherapy is considered, NSAIDS or acetaminophen are preferred first-line drugs for most patients. They should be used together with self-care and back care education. Physicians should review the risk-benefit ratio of specific medications before prescribing them.

Strong recommendation; moderate-quality evidence (SORT A)

Summary (AAFP Recs)
PEDIATRIC BACK PROBLEMS
Pediatric Back Problems

- Occur with much lower frequency than adults
  - De Inocencio, *Pediatrics* 1998
    - 1000 consecutive visits for MSK pain, only 6% for back

- Different etiologies than adult patients
    - 48% of adult back pain was discogenic (HNP, DDD)
    - 47% of children with back pain had Spondylolysis, 25% hyperlordosis
Pediatric Back Pain

- **History**
  - Quality, duration, timing, trauma
  - Red flags: bowel/bladder, fever, night pain
  - Aggravating/alleviating factors
  - FHx

- **PE**
  - Inspection, palpation, ROM, special tests
  - Gait
  - Complete neurologic exam
Spondylolysis and Spondylolysthesis
Spondylolysis

- Pars interarticularis defect leading to low back pain
- Commonly the result of repetitive hyperextension activities
- Gymnasts, football lineman and linebackers, dancers, figure skaters
- Incidence 4.4% at age 6, rising to 6% by age 14

Frederickson, BE et al. JBJS, 1984:699-707
Spondylolysis: Pars Interarticularis Defect

- Most commonly affects L5 (90%)
- L4 next most common
Spondylolysis

- **History:**
  - Insidious onset, low back pain
  - May radiate to buttock
  - Increased pain with activity, especially with hyperextension activities (back handsprings, etc)
  - May produce radicular pain
Spondylolysis

- **PE:**
  - Normal gait, normal neurovascular exam
  - Rare to have TTP.
  - ROM: full flexion, painful ext.
  - + stork test (one-legged hyperextension test)
Stork Test

- Masci L 2006: Neither sensitive nor specific for the detection of active spondylolysis

Imaging: Plain Film

- Plain film may reveal +Scotty dog sign on standing lumbosacral
Spondylolysis: Advanced Imaging

- Bone scan: may demonstrate increased uptake in the pars
- SPECT scan: most sensitive method of detecting spondylolysis
- MRI scan: may be useful in demonstrating Pars defect in acute setting
- CT Scan provides best bony detail
Diagnosis:
- AP and Lateral weight-bearing Plain XR
- SPECT scan L/S spine
- Thin cut CT through area of concern on SPECT
- F/U imaging with lateral XR if pt not improving to assess for development of listhesis

Combined information from SPECT and CT will help determine if there is potential for bony union or if the lesion is chronic/terminal
Spondylolisthesis

- Essential lesion: **bilateral** pars interarticularis defects, allows anterior slip of vertebral body
Spondylolisthesis

- **History:** similar to spondylolysis

- **PE:**
  - Gait is usually abnormal, with short stride and stiff legs, along with tight hamstrings

- **DX:** Xray
  - Severity graded on degree of slip
    - Grade 1: 0-25%
    - 2: 25-50%
    - 3: 50-75%
    - 4: >75%
Spondylolisthesis
Treatment of Spondylolysis

- Rest, no activity over baseline daily activity
  - 3 months for acute spondy
  - Until asymptomatic for chronic/terminal spondy
- Then begin rehabilitation
  - PT focused on spinal stabilization, core strength
- Consider use of Boston brace (anti-lordotic TLSO) for 23/24 hours a day until bony union is demonstrated on CT (typically 2-4 months)
Boston Brace
Anti-Lordotic TLSO Bracing

- Steiner ME, Micheli LJ. *Spine*: 1985
  - 67 pts, avg age 16, braced x 3 months
  - 78% with good-excellent CLINICAL results and return to full activity

- Morita T, et al. *JBJS(Br)* 1995
  - 185 pts, braced with TLSO x 3-6 mos
  - 73% rate of RADIOGRAPHIC bony union in early lesions
  - 0% union in late lesions
Non-Operative Tx of Spondylolysis and Low-Grade Listhesis

- Klein G, Mehlman CT, McCarty M. *JBJS(Br)*, 2009.
  - Meta-analysis of 15 observational studies of spondylolysis and low-grade spondylolisthesis
  - 665 patients, ages 11-18 yo
  - 137 treated without brace, 334 with bracing
Non-Operative Tx of Spondylolysis and Low-Grade Listhesis

FIGURE 2. Effect of nonoperative treatment on clinical outcome. There were 83.9% of subjects that had a successful clinical outcome after a minimum of 1-year follow-up. Asterisk (*) represents no success rate displayed because there were less than 20 subjects included.
Non-Operative Tx of Spondylolysis and Low-Grade Listhesis

<table>
<thead>
<tr>
<th>Study</th>
<th>Subgroup within study</th>
<th>Successful Outcomes / Total Subjects</th>
<th>Event Rate and 95% CI</th>
</tr>
</thead>
<tbody>
<tr>
<td>Anderson, 2000, n=33</td>
<td>Brace</td>
<td>30 / 33</td>
<td>0.91</td>
</tr>
<tr>
<td>Blanda, 1993, n=62</td>
<td>Brace</td>
<td>60 / 62</td>
<td>0.97</td>
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<tr>
<td>Debnath, 2007, n=42</td>
<td>Brace</td>
<td>34 / 42</td>
<td>0.81</td>
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<td>d'Hemecourt, 2002, n=73</td>
<td>Brace</td>
<td>56 / 73</td>
<td>0.77</td>
</tr>
<tr>
<td>El Rassi, 2005, n=57</td>
<td>Brace</td>
<td>37 / 40</td>
<td>0.93</td>
</tr>
<tr>
<td>Frennered, 1991, n=47</td>
<td>Brace</td>
<td>5 / 5</td>
<td>*</td>
</tr>
<tr>
<td>Letts, 1986, n=12</td>
<td>Brace</td>
<td>11 / 12</td>
<td>*</td>
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<tr>
<td>Miller, 2004, n=32</td>
<td>Brace</td>
<td>29 / 32</td>
<td>0.91</td>
</tr>
<tr>
<td>Seitsalo, 1990, n=72</td>
<td>Brace</td>
<td>5 / 5</td>
<td>*</td>
</tr>
<tr>
<td>Takemitsu, 2006, n=21</td>
<td>Brace</td>
<td>13 / 13</td>
<td>*</td>
</tr>
<tr>
<td>Sys, 2001, n=18</td>
<td>Brace</td>
<td>17 / 18</td>
<td>*</td>
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<tr>
<td>Pooled Estimate of Treatment Including Bracing</td>
<td>296 / 334</td>
<td>0.890</td>
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<tr>
<td>El Rassi, 2005, n=57</td>
<td>No Brace</td>
<td>14 / 17</td>
<td>*</td>
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<td>Frennered, 1991, n=43</td>
<td>No Brace</td>
<td>22 / 27</td>
<td>0.82</td>
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<td>Seitsalo, 1990, n=72</td>
<td>No Brace</td>
<td>58 / 67</td>
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<td>8 / 8</td>
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<td>Turner, 1971, n=46</td>
<td>No Brace</td>
<td>18 / 18</td>
<td>*</td>
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<tr>
<td>Pooled Estimate of Treatment Without Bracing</td>
<td>120 / 137</td>
<td>0.858</td>
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FIGURE 3. Effect of nonoperative treatment with and without bracing on clinical outcome. In a subgroup analysis, 89.0% of subjects treated with a brace had a successful clinical outcome compared with 85.8% of subjects treated without a brace (no significant difference, P = 0.75). Asterisk (*) represents no success rate displayed because there were less than 20 subjects included.
Non-Operative Tx of Spondylolysis and Low-Grade Listhesis

FIGURE 6. Healing of acute versus progressive versus terminal defects. In a subgroup analysis, acute defects healed at a rate of 68.1%, significantly more than progressive defects (28.3%, $P < 0.0001$) and terminal defects (1.8%, $P < 0.0001$). Asterisk (*) represents no success rate displayed because there were less than 20 subjects included.
Spondylolysis

“The Pleacher” approach:

- **Evaluation:** Hx and PE, XR including obliques, then SPECT + CT
- **Treatment:**
  - Acute Spondys – Rest x 3 mo, PT, +/- TLSO for comfort
  - Chronic Spondys – Rest until sx resolve, then PT, no brace
- **Follow Up:**
  - Re-XR (AP/Lat) to observe for spondylolisthesis
  - CT at 3 months for acute lesions to evaluate for healing
Spondylolisthesis: Treatment

- Grades 1 and 2: treat as for symptomatic spondylolysis
- Grade 3 and higher: referral to spine surgeon
Scoliosis
Scoliosis

- Many causes for scoliosis
  - 25% Congenital, 10% Neuromuscular
- We are going to focus ONLY on Adolescent Idiopathic Scoliosis (AIS = 65% Scoliosis)
- Present in 2-4% of pts 10-16 yrs old
- Severe scoliosis more commonly affects girls
- Curve progression risk is increased with early onset of scoliosis (Tanner 2 or 3)
Scoliosis

- **History**
  - Typically not painful. No neuro complaints or red flag symptoms

- **Physical Exam**
  - Inspection
  - Adams forward bend test
Scoliosis: Imaging

- Standing PA films on long cassette
- Allows for measurement of Cobb Angle
Risser Index

- The degree of ossification of the iliac crest apophysis helps grade risk of progression

Risk of Curve Progression

- **Cobb Angle**  
  - *10 to 19*  
    - Growth potential (Risser grade): Limited (2 to 4)  
    - Risk For Progression: Low  
  - 10 to 19  
    - Growth potential (Risser grade): High (0 to 1)  
    - Risk For Progression: Moderate  
  - 20 to 29  
    - Growth potential (Risser grade): Limited (2 to 4)  
    - Risk For Progression: Low/moderate  
  - 20 to 29  
    - Growth potential (Risser grade): High (0 to 1)  
    - Risk For Progression: High  
  - >29  
    - Growth potential (Risser grade): Limited (2 to 4)  
    - Risk For Progression: High  
  - >29  
    - Growth potential (Risser grade): High (0 to 1)  
    - Risk For Progression: Very high
# Scoliosis: Treatment and Follow-up

- **Treatment and Referral Guidelines for Patients with Scoliosis**

<table>
<thead>
<tr>
<th>Curve (degrees)</th>
<th>Risser grade</th>
<th>X-ray/refer</th>
<th>Treatment</th>
</tr>
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<tbody>
<tr>
<td>10 to 19</td>
<td>0 to 1</td>
<td>Every 6 months/no</td>
<td>Observe</td>
</tr>
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<td>10 to 19</td>
<td>2 to 4</td>
<td>Every 6 months/no</td>
<td>Observe or brace</td>
</tr>
<tr>
<td>20 to 29</td>
<td>0 to 1</td>
<td>Every 6 months/yes</td>
<td>Brace</td>
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<tr>
<td>20 to 29</td>
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<td>Every 6 months/yes</td>
<td>Observe or brace</td>
</tr>
<tr>
<td>29 to 40</td>
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<tr>
<td>&gt;40</td>
<td>0 to 4</td>
<td>Refer</td>
<td>Surgery</td>
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Scoliosis: Treatments
Hyperlordosis
Hyperlordosis

- Second most common cause for adolescent back pain according to Micheli
- Due to tightening of the thoracolumbar fascia as the axial skeleton lengthens
Hyperlordosis

- **History:**
  - Activity related low back pain
  - Pain with forward flexion

- **Physical exam:**
  - Hyperlordosis
  - Tight hamstrings
Backpacks and Backpain???

- Question as to whether heavy backpacks may contribute to back pain and hyperlordosis
- Wiersema *Pediatrics* 2003: most backpack related injuries are due to tripping over the pack or being hit with it
Hyperlordosis

- Diagnosis of exclusion – be sure to evaluate for spondylolysis

- Treatment of Hyperlordosis:
  - PT to improve hamstring flexibility, back flexibility
  - Relative rest
  - Rarely may require brief period of antilordotic bracing
Ankylosing Spondylitis
Ankylosing Spondylitis

- Chronic inflammatory disorder
  - Affects SI joints and spine
- May be a primary disorder (Primary AS)
- May be a secondary disorder associated with
  - Reiter’s
  - Psoriasis
  - Crohn’s / UC
- More common in men (3:1 M:F ratio)
- HLA B27 haplotype associated
Ankylosing Spondylitis

- **History:**
  - 75% of pts present with low back and buttock pain, localized to SI joints, described as dull/achy
  - Morning stiffness
  - Insidious onset
  - No associated neuro findings or red flag symptoms
  - Juvenile onset associated with enthesitis (inflammation at tendon insertions)
Ankylosing Spondylitis

- Physical Exam:
  - Tenderness over SI joints
  - Restricted flexion and extension
  - Positive FABER sign (Patrick’s test)
Ankylosing Spondylitis: Imaging
Ankylosing Spondylitis
Ankylosing Spondylitis

- **Evaluation**
  - Xrays of SI joints, LS Spine
  - HLA B27 testing
  - CRP likely to be elevated, CBC – mild anemia

- **Treatment**
  - Referral to rheumatology
  - NSAIDS
  - Biologicals:
    - Etanercept (Enbrel) – anti-TNF ab
    - Infliximab (Remicade) – anti-TNF ab
Pediatric Summary

- Back problems less common in kids than adults
- Disc disease is rare in kids
- Spondylolysis and Hyperlordosis lead the list
- Ask about red flag symptoms
- Close follow-up; if not responding in expected manner, re-evaluate!
References

3. “Neuroimaging in Low Back Pain”, S. Craig Humphries, Jason C. Eck, Scott D. Hodges, American Family Physician, June 1, 2002
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   2. Peter A Nigrovic, MD “Back pain in children and adolescents: Overview of causes”
   3. Stephanie G Wheeler, MD “Approach to the diagnosis and evaluation of low back pain in adults”
   4. Roger Chou, MD “Subacute and chronic low back pain: Pharmacologic and noninterventional treatment.”
Questions?