ORTHOPEDIC PRIMARY CARE
Disorders of the Lumbar Spine: Assessment, Diagnosis, and Treatment
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We hereby certify that, to the best of our knowledge, no aspect of our current personal or professional situation might reasonably be expected to affect significantly our views on the subject on which we are presenting.
OBJECTIVES

- List mechanical contributors to lumbar spine pain
- Discuss differential diagnoses for non-radiating low back pain
- Design and implement comprehensive evidence-based treatment plans for patients with lumbar spine disorders
OBJECTIVES (cont.)

- Describe the use and effects of the following pharmaceutical types: acetaminophen, anticonvulsants, tramadol, antidepressants, NSAIDs, opioids, skeletal muscle relaxants, and/or topical anesthetics.

- Generate and document appropriate inter-disciplinary referral plans for lumbar spine follow up care.
DISORDERS OF THE LUMBAR SPINE

- Anatomy
- Mechanical contributors
- Physical assessment
- Diagnosis & treatment
- Inter-disciplinary care
- Case studies/Q&A
Lumbar Spine Anatomy Video

https://youtu.be/0qR-Yfw9fOI (5:31)

[Randale C. Sechrest, M.D., eOrthoPOD.t.v]
LUMBAR SPINE PAIN

- Number 2 cause of visits to a health care provider
- 50-80% of Americans will experience at least one significant episode
LUMBAR SPINE PAIN

- Recurrence very common
- Slightly higher incidence in women
- No ethnic predominance
- Lower prevalence in 20-35 y/o
LUMBAR SPINE PAIN: RISK FACTORS

- Family History
- Stress/Psychiatric Comorbidities
- Increasing age (up to 60-65)
- Female
- Heavy physical & occupational activities
- Tobacco use
- Obesity
Causes of Lumbar Spine Pain

- Soft tissue strain
- Mechanical
- Fracture
- Red Flag Dxs: Cancer, infection, Cauda Equina
- Non-spinal: Abd aortic aneurysm tear, retroperitoneal disease, vascular insuff. of extremity, pelvic pathology
• Adult Acute and Subacute Low Back Pain
Institute for Clinical Systems Improvement (www.icsi.org)

Three Algorithms:

1) Core Treatment of Non-Specific Low Back Pain
2) Red Flags
3) Radicular Pain
BACK PAIN: CLINICAL GUIDELINES

Health Care Guideline:
Adult Acute and Subacute Low Back Pain
Core Treatment of Non-Specific Low Back Pain Algorithm

Note: Ankylosing Spondylitis (AS) is an uncommon cause of low back pain whose diagnosis is often delayed but for which specific and effective therapy exists. Ankylosing spondylitis may be suggested by the following clinical features: insidious onset of chronic (>three months) low back pain; age of onset less than 40; pain improves with activity but worsens with rest and at night. Consideration of this should be noted.

[Diagram of the algorithm is shown, depicting patient evaluation and decision-making steps for treatment.

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www.jacksonortho.org
• Acute pain = 6 weeks or less
• Subacute = 6-12 weeks
• Chronic = longer than 12 weeks*

*National Institute of Neurological Disorders and Stroke
Suggested Approach to the Patient with Chronic Low Back Pain

1. Chronic low back pain
2. Red flags for cauda equina syndrome? (Table 2)
   - Yes: Immediate workup and/or emergency department referral
   - No:
     - Fracture suspected? (trauma, osteoporosis)
       - Yes: Plain-film radiography
       - No:
         - Progressive neurologic symptoms or risk factors for pathologic fracture?
           - Yes: Magnetic resonance imaging or computed tomography
           - No:
2. Trial of conservative care, multimodal treatment
   - Pharmacotherapy (Table 3)
   - Cognitive behavior therapy and education
   - Spinal manipulation therapy
   - Weight loss, structured exercise, and stretching
3. Surgical evaluation*

*—In the absence of red flags, patients should have a full trial of medical therapy before being considered for referral for surgical evaluation; surgery is most proven for patients with spinal stenosis and radicular leg pain.
Mechanical Contributors to Lumbar Spine Disorders

- Spondylosis
- Spinal stenosis
- Degenerative disc disease
- Spondylolisthesis
- Herniated Nucleus Pulposus (HNP)
Mechanical Contributors to Lumbar Spine Disorders

- Spondylosis
- Spinal stenosis
- Degenerative disc disease
- Spondylolisthesis
- HNP
LUMBAR SPONDYLOSIS

Lumbar spondylosis = Arthritis of the lumbar spine

More than 85% of people >60 are affected
Lumbar Spondylosis

**Definition:** arthritis of the lumbar spine caused by slow degeneration.

Degeneration of the spinal column, especially that resulting in abnormal fusion and immobilization of the vertebral bones.
Lumbar Spondylosis
Lumbar Spondylosis
Lumbar Spondylosis

Symptoms

- Low back pain & stiffness
- Numbness, tingling, weakness in legs & feet
- Trouble walking or loss of balance
Lumbar Spondylosis

Symptoms (cont.)

- Muscle spasms in low back and legs
- Leg cramps
- Grinding & popping sound/feeling in low back w/ movement
Mechanical Contributors to Lumbar Spine Disorders

- Spondylosis
- Spinal stenosis
- Degenerative disc disease
- Spondylolisthesis
- HNP
Lumbar Spinal Stenosis

Definition: Narrowing of the spinal canal that produces compression of neural elements before their exit from the neural foramen
Lumbar Spinal Stenosis
Lumbar Spinal Stenosis

- Etiology: congenital vs. acquired (degenerative)
- Incidence is 1.7% to 8%
- Symptoms typically develop in 5th or 6th decade of life, with the onset of osteoarthritis of the spine
- No gender predominance
- Lumbar region most common
- Also called neurogenic claudication
Lumbar Spinal Stenosis

3 typical canal shapes:

- Round
- Ovoid
- Trefoil - most narrow
Neurogenic Claudication

- Must be distinguished from vascular claudication (poor peripheral circulation)
  - Check peripheral pulses
  - Check for trophic skin changes (vascular)
- Aching is buttock, thighs or calves worse with standing and walking
  - Vascular claudication usually not aggravated by standing alone
Lumbar Spinal Stenosis

Symptoms

- Stiffness, pain, numbness, or weakness in the lower back, legs, or feet
- Balance/coordination problems; shuffling or tripping while walking
- Loss of bowel or bladder control
Lumbar Spinal Stenosis

SYMPTOMS

- Relieved by forward flexion of spine or sitting
- “Shopping cart sign” – increased walking tolerance when pushing shopping cart
Mechanical Contributors to Lumbar Spine Disorders

- Spondylosis
- Spinal stenosis
- **Degenerative disc disease**
- Spondylolisthesis
- Herniated Nucleus Pulposus (HNP)
Degenerative Disc Disease

Definition: damaged vertebral disc causes chronic pain ~ either low back pain, and/or leg pain/sciatica ~ in the lumbar spine

Can also create excessive micro-motion instability at the adjacent vertebrae because the disc cannot hold the vertebral segment together as well as it used to.
Degenerative Disc Disease
Degenerative Disc Disease

- M > F; Not Always Elderly
- ↓ water content in disc
- Annular ligament fiber failure
- Hx: back pain w/ activities for a while
- May have radicular symptoms
Mechanical Contributors to Lumbar Spine Disorders

- Spondylosis
- Spinal stenosis
- Degenerative disc disease
- Spondylolisthesis
- Herniated Nucleus Pulposus (HNP)
Lumbar Spondylolisthesis

Definition - forward slippage of one vertebrae relative to adjacent vertebrae.

May contribute to spinal stenosis.
Lumbar Spondylolisthesis

- L4/5 – most common
- Associated with stenosis
- Facet degeneration
Lumbar Spondylolisthesis

L5 on S1 with associated pars fracture/spondylolysis
Lumbar Spondylolisthesis
Lumbar Spondylolisthesis

- Wiltse Classification
  - Congenital
  - Isthmic
  - Degenerative
  - Traumatic
  - Pathological
  - Post-operative
Lumbar Spondylolisthesis

Degenerative Spondylolisthesis

- No definable defect of the posterior arch
- Facet degeneration → instability
- L4-5 most common
- Overall incidence of 8.7% (Asia)
- Typically individuals over 50 yo
- Women > Men, AA>Caucasians
Lumbar Spondylolisthesis

Severity is graded by the Myerding Classification

- Grade I 0-25%
- Grade II 25-50%
- Grade III 50-75%
- Grade IV 75-100%
- Grade V >100%
  (spondyloptosis)
Lumbar Spondylolisthesis

Symptoms

• Chronic or acute LBP
• Often radicular in nature
• Exam
  – spasms + SLR
  – tight hamstrings
Lumbar Spondylolisthesis

- Symptoms in a specific dermatomal distribution
- Sharp pain, burning or tingling
- Associated weakness or numbness
- Most commonly L5
Mechanical Contributors to Lumbar Spine Disorders

- Spondylosis
- Spinal stenosis
- Degenerative disc disease
- Spondylolisthesis
- Herniated Nucleus Pulposus (HNP)
Definition: the condition in which the gel-like inner material of an intervertebral disc – the nucleus pulposus – pushes through the thick, outer disc wall and extrudes into the spinal canal.
Herniated Nucleus Pulposus

- M > F; 20-45yrs
- Etiology
  - degeneration
  - abnormal body mechanics
  - deconditioned - poor muscle tone
  - trauma
Herniated Nucleus Pulposus

CLINICAL S&S:

• Sciatica
• + SLR
• Back and leg pain
  – Numbness and/or dysesthesias
  – Muscle weakness-nerve distribution
  – ^ with sitting/sneezing, coughing
  – Worse with Valsalva
Herniated Nucleus Pulposus

A free fragment occurs when disk material separates from and moves outside of the outer rings through a tear. The fragment may irritate a nearby nerve.
Herniated Nucleus Pulposus

- Annular Bulge
- Herniation
  - Protrusion
    - Intact annulus
  - Extrusion
    - Torn annulus
  - Sequestration
Differential Diagnosis

- Sometimes difficult to separate causes:
  - Hip?
  - Leg?
  - Lumbar spine?
Potentially Serious Spinal Conditions

- **Spinal tumor** – unexplained wt. loss, cancer history, night pain
- **Cauda Equina syndrome** - Urinary retention, bladder or bowel incontinence, saddle anesthesia, severe and progressive weakness of lower extremities
Potentially Serious Spinal Conditions (cont.)

- Fracture (compression) – history of trauma, long-term steroid use, known osteoporosis hx

- Infection (disc space; tb) – fever, parenteral drug abuse, hx of tb or +tb test
Case Study: Mr. IT

- 68 y/o, healthy IT manager with chronic low back pain
- LBP X 20 years, off and on; started after lifting something heavy; described as “achy”, sometimes dull

- Pain occasionally radiates into right groin; never down leg past knees; worse with lifting; relieved by rest.

- Denies numbness, tingling, weakness, bowel or bladder issues. Pain currently rated 9/10. “Can’t stand it now”
- Has not had PT or acupuncture; had chiro. through the years; recently “not as effective”
<table>
<thead>
<tr>
<th>O.L.D. C.A.R.T.S.</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Onset</strong></td>
</tr>
<tr>
<td><strong>Location</strong></td>
</tr>
<tr>
<td><strong>Duration</strong></td>
</tr>
<tr>
<td><strong>Character</strong></td>
</tr>
<tr>
<td><strong>Aggravates/Alleviates</strong></td>
</tr>
<tr>
<td><strong>Radiation</strong></td>
</tr>
<tr>
<td><strong>Timing</strong></td>
</tr>
<tr>
<td><strong>Severity</strong></td>
</tr>
</tbody>
</table>
# Subjective Complaints: Mr. IT

<table>
<thead>
<tr>
<th>Subjective Complaints</th>
<th>Details</th>
</tr>
</thead>
<tbody>
<tr>
<td>Onset</td>
<td>20 years ago</td>
</tr>
<tr>
<td>Location</td>
<td>Low back</td>
</tr>
<tr>
<td>Duration</td>
<td>Off and on; chronic</td>
</tr>
<tr>
<td>Character</td>
<td>Achy; dull</td>
</tr>
<tr>
<td>Aggravators/Alleviators</td>
<td>Lifting/Rest; chiro (until recently)</td>
</tr>
<tr>
<td>Radiation</td>
<td>Groin</td>
</tr>
<tr>
<td>Timing</td>
<td>After lifting heavy item</td>
</tr>
<tr>
<td>Severity</td>
<td>9/10</td>
</tr>
</tbody>
</table>
Physical Examination

- Inspection
- Palpation
- Percussion
- Range of Motion (ROM)
- Sensation
- Circulation
- Muscle Testing
- Special Tests
Physical Examination: Lumbar Spine

**Inspection**

- **skin**: rashes, abrasions, scars, color, swelling, masses
- **Posture, alignment, curves**: lordosis; scoliosis; “military” spine; Gait

**Palpation**

- **skin**: temperature, swelling, tenderness
- **paraspinal muscles**: tenderness, spasm
- **spinous processes**: tenderness, step off
- **muscle strength**: graded 0 - 5
Physical Examination

Percussion

Reflexes: Patellar (L3, L4)  Achilles (S1)

- Graded 0 – 4+
- 2+ = Normal/Average*

*Use reinforcement or distraction if reflexes absent or diminished
Physical Examination

Range of Motion (ROM)

- Flexion/Hyperextension
- Lateral bend
- Rotation
# Physical Exam: Mr. IT

<table>
<thead>
<tr>
<th>GENERAL</th>
</tr>
</thead>
<tbody>
<tr>
<td>Alert, oriented X 3, in no or minimal distress &amp; breathing comfortably during the exam</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Inspection</th>
</tr>
</thead>
<tbody>
<tr>
<td>skin: intact, w/o rashes, abrasions, or scars. No significant spinal deformity. Overall coronal and sagittal alignment is WNL. Gait is normal.</td>
</tr>
<tr>
<td>Physical Exam (cont.)</td>
</tr>
<tr>
<td>-----------------------</td>
</tr>
<tr>
<td><strong>Palpation</strong></td>
</tr>
<tr>
<td><strong>Range of Motion</strong></td>
</tr>
<tr>
<td><strong>Strength</strong></td>
</tr>
<tr>
<td><strong>Sensation</strong></td>
</tr>
</tbody>
</table>

- Midline TTP, lumbar region
- Flexion -> ankles w/ some tightness; Extension w/o pain; lateral bend & rot. FROM w/o pain.
- Motor: R/L – 5/5 iliopsoas; 5/5 quad; 5/5 tibialis anterior; 5/5 EHL, 5/5 Gastroc
- Grossly intact to light touch throughout lower extremities
Physical Exam (cont.)

- Circulation

  - Dorsalis pedis artery pulses 2+ and equal bilaterally.
  - Posterior tibialis artery pulses 2+ and equal bilaterally.
Special Tests

- Special Phys Exam
- Negative bilateral straight leg raise
- Negative bilateral FABER test
- Negative Gaenslen’s test
FABER

Evaluates pathology of hip joint or sacroiliac joint.

Pain on ipsilateral side anteriorly suggests hip joint disorder on the same side.

Pain on contralateral side posteriorly around the sacroiliac joint suggests pain mediated by dysfunction in that joint.
GAENSLEN’S

Evaluates pathology of BOTH sacroiliac joints simultaneously
Imaging/Diagnostics

- X-ray?
- MRI?
- Other?
Diagnosis

- Probable
- Possible
- Rule Out
- Unlikely
ICSI Core Treatment Plan

Reassure
Educate
Consider acetaminophen & NSAIDs
Rare use of opioids may be considered
Heat
Encourage activity; bed rest not recommended
Address fear-avoidance beliefs (fear of activity)
Return-to-work assessment
No imaging
Treatment

- Physical Modalities
- DME
- IEP
- Pharmacologic
- Injections
- Referral
- Other
# Pharmacologic Treatment

## Table 3. Pharmacologic Treatment Options for Chronic Low Back Pain

<table>
<thead>
<tr>
<th>Class or drug</th>
<th>Key considerations</th>
</tr>
</thead>
<tbody>
<tr>
<td>Acetaminophen</td>
<td>No evidence to suggest that acetaminophen is better than placebo. Opioid-sparing or synergistic effects may justify use despite lack of high-quality evidence.</td>
</tr>
<tr>
<td>Anticonvulsants</td>
<td>Gabapentin (Neurontin) is more effective than naproxen in the short term for failed back surgery syndrome. Topiramate (Topamax) appears more effective than placebo for improvement in pain severity or functioning.</td>
</tr>
<tr>
<td>Antidepressants</td>
<td>Antidepressants do not appear more effective than placebo for nonspecific low back pain without radicular symptoms. Duloxetine (Cymbalta) appeared to reduce pain severity in one randomized controlled trial.</td>
</tr>
<tr>
<td>NSAIDs</td>
<td>Effective for short-term relief in chronic low back pain without radiculopathy. No difference between NSAIDs and placebo for radicular symptoms. No difference between NSAIDs and other commonly used pharmacotherapies, including acetaminophen, opioids, and muscle relaxants in chronic use. Adverse effects include dyspepsia, upper gastrointestinal bleed, increased risk of cardiovascular events, and acute renal azotemia.</td>
</tr>
<tr>
<td>OnabotulinumtoxinA (Botox)</td>
<td>OnabotulinumtoxinA injections improved pain and/or function in chronic low back pain with radiculopathy. Low quality of evidence to support use.</td>
</tr>
<tr>
<td>Opioids</td>
<td>Short-term effectiveness for pain relief and functioning. No head-to-head comparisons between opioids and other nonopioid analgesics. Long-term effectiveness and safety of opioids for chronic low back pain remain unclear. Increased risk of misuse, abuse, and diversion. Although tolerance may develop to respiratory depressant effects, concurrent sleep-disordered breathing or simultaneous use of respiratory depressant drugs may increase the likelihood of obstructive, central, or mixed sleep apneas.</td>
</tr>
<tr>
<td>Skeletal muscle relaxants</td>
<td>Few studies have assessed long-term treatment. Short-term effectiveness in chronic nonspecific low back pain has been reported; however, adverse effects are common. Sedation is recognized with most agents. Carisoprodol (Soma) has higher risk of misuse, abuse, and diversion. Tizanidine (Zanaflex) may transiently lower blood pressure. Cyclobenzaprine (Flexeril) increases the risk of serotonin syndrome.</td>
</tr>
<tr>
<td>Topical anesthetics</td>
<td>Lidocaine topical patch appears no more effective than placebo.</td>
</tr>
</tbody>
</table>

NSAIDs = nonsteroidal anti-inflammatory drugs.  
Information from references 21 through 26, and 28 through 30.
Referrals

- Type of Therapy
- Body part
- Diagnosis
- Frequency
- Duration
- Objectives
Summary/Conclusions

• Assessment of patients with LBP should focus on history, physical & neurological exam, and ordering diagnostic testing only when potentially serious spinal pathology or specific causes of LBP are suspected

• Management of LBP should focus mostly on education, with short term use of acetaminophen, NSAIDs, or SMT for symptomatic relief of acute LBP, with judicious addition of opioid analgesics, back exercises, behavioral therapy, or acupuncture for additional symptomatic relief of chronic LBP


Acknowledgements

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OrthoPrimaryCare.Info