EVALUATION AND MANAGEMENT OF BACK PAIN
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November 14, 2009

OBJECTIVES
- Review the pathophysiology of back pain
- Review the differential diagnosis for back pain
- Review pertinent history and exam for back pain
- Review criteria for obtaining imaging & work-up
- Review current therapies for treating back pain, including limitations and mechanisms
- Choosing when and whom to refer back pain patients

OUTLINE
- Introduction
- Epidemiology
- Anatomy
- Patient Evaluation
- Differential Diagnosis
- Diagnostic Tests
- Treatments
- Referrals

DISCLOSURE
- None
**Primary Pain Location**
- Head = 32%
- Leg(s) = 23%
- Shoulder(s) = 13%
- Arm(s) = 11%
- Hand(s) = 6%
- Neck = 4%

**Secondary Pain Location**
- Head = 22%
- Low back = 16%
- Face = 14%
- Hand(s) = 14%
- Leg(s) = 12%
- Neck = 10%
- Abdomen = 10%

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**118 patients**
**Average Pain Rating = 5.3**

**Primary Pain Locations**
- Low back 41.0%
- Knee 20.0%
- Shoulder 11.0%
- Head 6.0%
- Neck 4.0%
- Ankle / Foot 4.0%
- Hand / Wrist 2.0%
- Other 12.0%

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**EPIDEMIOLOGY**
- Lifetime prevalence: 60-85%
- Annual rate: 5%
- Point prevalence: 30%
- #1 cause of worker absenteeism in US
- 12.5% of all sick days in UK
- Highest incidence of LBP
  - in manual labor
  - decreased job satisfaction
  - poor workplace social support

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Some causes of underreporting LBP:
- Scheduling (full-time employment)
- Survivor guilt (undeserving of care)
- Anger with the military
- Reluctance to undergo procedures
- Reluctance to take medications
**EPIDEMIOLOGY**
- Leading cause of expenditures for workers comp
- Financial cost = 100 billion dollars per year
- Male = Female
- Younger patients tend to be male
- Older patients (> 60 years) tend to be female
- Incidence increases with age
- Genetic cause postulated

**EPIDEMIOLOGY**
- In the first month, only 15% will have an identifiable source of pain:
  - 5% disk herniation
  - 5% spinal stenosis
  - 4% vertebral compression fracture
  - 1% primary metastasis or osteomyelitis
  - <1% AAA, renal, gyn, or visceral pain

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**NATIONAL LOW BACK PAIN STUDY**

<table>
<thead>
<tr>
<th>Diagnosis</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Herniated disc</td>
<td>36.7%</td>
</tr>
<tr>
<td>2. Myofascial pain</td>
<td>19.6%</td>
</tr>
<tr>
<td>3. Spinal Stenosis</td>
<td>14.0%</td>
</tr>
<tr>
<td>4. Lumbar Spondylosis</td>
<td>12.2%</td>
</tr>
<tr>
<td>5. DDD</td>
<td>8.7%</td>
</tr>
</tbody>
</table>

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**RISK FACTORS**
- Obesity
- Tobacco
- Decreased physical activity
- Decreased strength
- Decreased flexibility
- ??? Height
- Family history
ANATOMY
LBP – pain occurring between the costal margin and gluteal folds

ANATOMY
- Vertebrae
- Facets
- Disc

ANATOMY
- Ligaments
  - ALL
  - PLL
  - LF

ANATOMY
- Nerves
  - 8 Cervical
  - 12 Thoracic
  - 5 Lumbar
  - 5 Sacral
  - 1 Coccygeal
ANATOMY
- Muscle

ANATOMY
- Muscle

HISTORY AND PHYSICAL
- HPI
  - VAS
  - Traumatic
  - Non-traumatic
  - Location
  - Duration
  - Quality
  - Influencing factors

HISTORY AND PHYSICAL
- HPI
  - Age
  - Medical history related to LBP
  - Psychology (Anxiety/Depression)
  - Social
  - Legal
  - Economic factors
HISTORY AND PHYSICAL

- PHYSICAL EXAM
  - Inspection
  - Palpation
  - Range of motion
  - Neurologic exam
  - Special testing

- INSPECTION
  - Posture
  - Alignment
  - Atrophy
  - Masses
  - Scars
  - Skin Lesions

- NEUROLOGICAL EXAM
  - Muscle testing
  - Reflexes
  - Sensation

- SPECIAL TESTS
  - SLR
  - Facet loading
  - Gaenslen
  - Fabere
  - Piriformis stretch

DIFFERENTIAL DIAGNOSIS

- Annulus fibrosis tear (IDD)
- Facet joint
- Spondylosis
- Spondylolisthesis
- Compression Fracture
- Ligament sprain
- Muscular strain
- Sacroiliac joint
- Radiculopathy
- Spinal stenosis
MUSCLE STRAIN AND SPRAIN

- Strain vs Sprain
  - Strain: overstretch of muscle causing injury
  - Sprain: injury of the ligaments
- Symptoms
  - Reproducible with movement/contraction/palpation of the muscle
  - Sharp to deep aching quality
- Diagnosis
  - Both are diagnosed by physical exam
  - Imaging studies are not useful except to exclude other pathology
- Treatment
  - Heat, Cold, Rest, Stretching

SPONDYLOSIS

- Degenerative Joint Disease (Arthritis)
  - Narrowing of Joint Space
  - Degeneration of cartilage
  - Degeneration of Disc
  - Presence of osteophytes
- Etiology
  - Normal aging process
  - Trauma (Accelerated with injuries)
- Symptoms
  - Asymptomatic if mild
  - Painful if severe or mobile
- Diagnosis
  - X-rays
- Treatment
  - PT, aerobic exercise, stretching, modalities, TENS

SPONDYLOLYSIS

- Pars Defect
  - Trauma (Common in Gymnasts)
  - Degenerative changes
  - Congenital defect
  - May cause spondylolisthesis if bilateral
- Clinical Presentation
  - Back pain
  - Leg pain
  - May have spinal instability
- Diagnosis
  - X-rays
  - CT scan
- Treatment
  - If stable: PT, aerobic exercise, pain medications

SPONDYLOLYSIS

- Fracture of pars interarticularis
SPONDYLOLISTHESIS

- **SLIPPAGE** —
  - Graded I-IV (worst)
  - Common at L4-5 or L5-S1 segments
  - More common in older individual (avg = 60 yrs)
  - Commonly due to ligament laxity from degenerative disc disease or trauma
  - May be caused by bilateral pars defect (spondylolysis)
- **Symptoms**
  - Local back pain worse with bending
  - Sensation of abnormal slippage in the back
  - Pain traveling down the legs/buttock area
- **Diagnosis**
  - X-rays - Flexion/extension views of spine
- **Treatment**
  - Surgery

COMPRESSION FRACTURE

- **Fracture of the vertebral body**
  - Collapse of the bone (changes in height)
- **Etiology**
  - Trauma
  - Osteopenia/osteoporosis
  - Hormone deficiencies (early menopause)
  - Medication side effects (steroids, etc.)
  - Other secondary causes (Tumor, infection, etc.)
- **Symptoms**
  - Asymptomatic
  - Local Pain over affected area
  - Worse with weight bearing
- **Diagnosis**
  - X-rays
  - Bone scan
  - MRI
- **Treatment**
  - Pain medications
  - Bisphosphonates
  - Bracing
  - Vertebroplasty
  - Kyphoplasty
  - Avoidance of flexion based exercises
Facet Pain
- Prevalence: 15-40%
- Inferior articular process of cephalad vertebrae paired with the superior articular process of the vertebrae below
- Medial branch of the dorsal ramus of the affected level and the level above

Symptoms
- Radiating pain to low back, sometimes to thighs and buttocks
- Exacerbated by extension & rotation of the back
- Elicited by palpation over facets

Diagnosis
- Physical exam
- X-ray

Treatment
- Intraarticular facet joint injections
- Dorsal ramus medial branch block
- Radiofrequency ablation of the involved medial branches
- Surgery rarely indicated
RADICULOPATHY

- Definition: nerve injury
  - Inflammation at the root level
  - Mechanical compression at the root level
- Cause
  - Narrowed neuroforamen
    - Arthritis
    - Disc herniation – compression, chemical irritation
    - Mechanical narrowing due to instability
    - Mass
  - Trauma
  - Infection/Inflammation
- Diagnosis
  - MRI
  - Electrodagnosis
  - Clinical history and exam

RADICULOPATHY

- Treatment
  - Relative rest
  - Physical therapy
  - Pain control
  - Epidural steroid injections
  - Most recover in 3 months

SPINAL STENOSIS

- Spinal Stenosis
- Cause
  - The vertebral canal may narrow in a concentric fashion by OA and DDD
  - May produce impingement upon the cauda equina and the spinal cord at higher levels
- Symptoms
  - Compression of nerve roots → neurogenic claudication → bilateral lower extremity (often to ankles) w/ walking → RELIEVED immediately w/ stopping walking
  - Sxs improved w/ forward flexion of the vertebral column
SPINAL STENOSIS

- Diagnosis
  - Confirmed by imaging (MRI)
  - Pulses should be normal
  - Often only with history
- Treatment
  - Epidural steroid injections
  - Surgery
  - Physical therapy

IMAGING

- Diagnostic Tools
- Imaging
  - Plain Radiographs
  - MRI
  - CT
  - Bone scan
- Electrodiagnostics
- Diagnostic Injections

IMAGING

- Static Radiographs
  - no direct information regarding the primary degenerative disc elements or other vital soft tissue structures such as the flavum or the facet capsules.
  - no information on the dynamic motion of the spine.
- Dynamic Radiographs
  - May help identify listhesis or instability
  - May provide a measure of curvature
  - Static at the extreme end of motion
  - Increased radiation exposure
IMAGING

- MRI
  - Soft tissues
  - Nerve impingement
  - Disc pathology
  - Osseous structure
  - Ligaments

MRI

INDICATIONS:
- Major or progressive neurologic deficit
- Cauda Equina Syndrome
- Progressive severe pain and debility despite conservative therapy
- Severe or incapacitating back or leg pain
- Suspicion for neoplasm or infection
- Trauma
- Low back or radicular pain, unresponsive to conservative therapy, with indications for surgery or procedure related to pain

ADVANTAGES:
- Better visualization of soft tissue and neurologic structures
- Improved sensitivity to cord pathology, intrathecal mass, infection and neoplasm
- Lack of radiation
- Safer in pregnancy in the first trimester
IMAGING CT
- CT
  - Bone structure
  - Quick to sit through
  - Fractures
  - Bleed
  - Metal implants ok

IMAGING
- Bone Scan
  - Screening tool
  - Tumor
  - Infection
  - Occult fracture

ELECTRODIAGNOSTICS
- Electromyography
  - Needle examination of muscle
  - Denervation and Reinnervation

- Nerve Conduction Studies
  - Conduction velocity of nerves
  - Entrapment of nerves
  - Nerve (peripheral) pathology

ELECTRODIAGNOSTICS
- SENSITIVITY/SPECIFICITY
  - False negative
  - Operator dependent

- LIMITATIONS
  - Expensive
  - May be negative for 3 weeks minimally

- USEFUL IF DIAGNOSIS IS UNCLEAR
  - Peripheral neuropathy
  - Lumbar plexus injuries
  - Lumbar radiculopathy
TREATMENTS
- Physical therapy
- Medications
- Psychological treatment
- Interventional blocks
- Trigger point injections
- Acupuncture
- Surgery
- Intrathecal drug delivery
- Spinal cord stimulation

SUMMARY
- Restore Function
- Restore Independence
- Restore Dignity
- Prevent Impairment
- Return to Productivity