Low Back Pain
From Evaluation to Pain Management and Treatment

Annual Review in Family Medicine
April 2008 UCSF CME Course

Kirsten Y. Day, MD
Associate Clinical Professor
Department of Family and Community Medicine
UCSF School of Medicine
UCSF/SFGH Family Medicine Residency Program

Low Back Pain
Objectives
- Review the Epidemiology of LBP in the US
- Review the Clinical Course of LBP
- Delineate the causes of LBP
  - Review their Evaluation
    - Clinical Features of History and Physical Exam
    - The Role of Studies
  - Evidence Based Treatment
    - Examine the evidence for various treatment modalities
    - Common Sense Approaches when Evidence isn’t Available

Low Back Pain
Format
- Epidemiology
- Clinical Course
- Causes
- Ominous and Non-Mechanical Causes
  - Review Categories and Conditions
  - Evaluation
    - History
    - Physical Examination
    - Labs
    - Imaging
- Mechanical LBP
  - Review Categories and Conditions
    - Clinical Features
    - History
    - Physical
    - Studies
  - Treatment
    - Evidence Based
    - Common Sense

Low Back Pain
Epidemiology
Prevalence
- Over 80% of Adults will have an episode of severe LBP
- 70–80% of Adults will have short-term impairment
- Leading cause of disability for adults under 45 yo
- Third leading cause of disability for adults 45–64 behind heart disease and arthritis
Low Back Pain

Epidemiology

Occupational Health

- Second leading cause of missed work behind the common cold
- Incidence rates are similar in light, medium and heavy duty jobs; Heavy Duty workers with higher proportion of incapacitation
- Occupational Risks
  - Repetitive lift with flexion and rotation
  - Vibration – heavy machinery or vehicles
  - Prolonged sitting or standing
  - Sudden maximal efforts
  - Boredom or dissatisfaction with job

Low Back Pain

Epidemiology

Associations

- Physical
  - Major skeletal abnormalities
  - No increased risk for moderate kyphosis, lordosis or scoliosis
  - Massive Obesity
- Trauma
  - Recreational activities of insignificant association
  - Precipitating event identified only 6–28% of cases
- Psychological
  - LBP pts with greater levels of psychopathology versus Extremity injured
  - Increased rates of alcoholism and divorce in patients disabled by LBP

Low Back Pain

Clinical Course

- Mechanical LBP – Remission and Recurrence
  - Acute LBP
    - Remission rates
      - 40% at 1 week
      - 50–85% within 3 weeks
      - 90% at 2 months
    - Work-Comp settings – 85–90% return to work within 12 weeks
    - 90% of those seeking medical attention have a recurrence that lasts longer than the initial attack
- Non–mechanical and systemic disease follows the course of the illness

Low Back Pain

Proviso

- LBP is a SYMPTOM, not a Diagnosis
  - Most of literature lumps multiple diagnoses together in evaluating treatments and outcomes
  - Reduce frustration by using Diagnoses versus Symptoms

4/7/2008
Low Back Pain
Non-Mechanical and Ominous Causes

- Account for less than 5% of LBP

Classifications
- Infections
- Neoplasia
- Metabolic Disease
- Inflammatory/ Rheumatologic Disease
- Referred Pain
- Other

Infections
- Epidural Abscess
- Vertebral Osteomyelitis
- Septic Diskitis
- Pott’s Disease
- Systemic Illness
  - Bacterial Endocarditis
  - Influenza

Neoplasia
- Metastatic Disease
  - Epidural
  - Vertebral
- Multiple Myeloma
- Lymphoma
- Primary Tumors
  - Epidural
  - Intradural

Inflammatory/ Rheumatologic Disease
- Ankylosing Spondylitis
- Reactive Arthritis / Spondyloarthritis
- Psoriatic Arthropathy
- Polymyalgia Rheumatica

Metabolic Disease
- Osteoporosis
- Osteomalacia
- Hemochromatosis
- Ochronosis (alkaptonuria)
Low Back Pain
Non-Mechanical and Ominous Causes

- Referred Pain
  - Visceral Processes – Abdomen, Pelvis and retroperitoneum
  - Retroperitoneal malignancy or vascular process
  - Herpes Zoster

- Other
  - Paget’s Disease
  - Primary Fibromyalgia
  - Psychogenic / Malingering

Low Back Pain
Non-Mechanical and Ominous Causes
Evaluation – History

- Cancer or Infection
  - Cancer History
  - Unexplained Weight Loss
  - Fever
  - Immunosuppression (Steroids, Transplant, DM, HIV)
  - IVDU
  - Duration over 1 month
  - Age over 50
  - Pain at rest, worse when supine
  - Signs/Sx Flu, Endocarditis, Zoster
  - Rash, Urethritis, Conjunctivitis
  - Spinal Point Tenderness
  - Signs/Sx Rheum Disorders (Stiffness, Red/hot joints)

Low Back Pain
Non-Mechanical and Ominous Causes
Evaluation – History

- Spinal Fracture
  - History of Significant Trauma
    - Major at any age
    - Minor if osteoporotic
  - Spinal Point Tenderness
  - Age over 70

- Cauda Equina Syndrome
  - Acute onset urinary retention/ overflow incontinence
  - Loss of Anal sphincter tone or fecal incontinence
  - Saddle anesthesia
  - Global or progressive LE weakness

Low Back Pain
Evaluation – Physical Examination

- Inspection
- Palpation
- Range of Motion
- Neurologic
  - Motor Strength
  - Sensation
  - Reflexes
Low Back Pain
Evaluation – Studies

- Lab
  - For Non-Mechanical
    - WBC with Diff
    - ESR
    - Blood Cultures
    - SPEP/UPEP
    - Rheumatologic Assays
  - For Mechanical – Not helpful

Low Back Pain
Evaluation – Imaging

- Plain Films
  - Delineation of bony deformities and alignment problems
  - Provisos
    - Abnormal in most over 50 yo
    - Common findings in pts with and without LBP
      - DJD, OA
      - Spina bifida occulta
      - Spondylolisthesis
  - Radionuclide Scans – Metastatic Lesions, Infectious Osteomyelitis and Abscesses

Low Back Pain
Non-Mechanical and Ominous Causes
Evaluation – Imaging

- CT
  - Very good for detection of
    - Herniated disks
    - Bony Abnormalities
    - Tumors and Vascular lesions
  - Significant abnormalities are seen in 25% of Asymptomatic patients
- MRI
  - Best for
    - Differentiating recurrent disk herniation, scar tissue in pts with prior surgery
    - Standard for evaluating Epidural abscess or Malignancy
  - Provisos
    - Substantial abnormalities in 30% of Asymptomatic patients
    - Almost all over 60 yo with disk bulge/herniation in at least one lumbosacral level

Low Back Pain
Mechanical LBP

- Ligamentous Strain, Muscle Strain/Spasm
- Facet Joint Disruption/Degeneration
- Disk Degeneration/Herniation
- Vertebral Compression Fractures and Endplate Microfractures
- Spondylolisthesis
- Spinal Stenosis (DJD)
- Myofascial Pain
- Diffuse Idiopathic Skeletal Hyperostosis
- Severe Scoliosis or Kyphoscoliosis
- Vertebral Epiphyseal Aseptic Necrosis (Scheuermann’s disease)
Low Back Pain
Mechanical LBP
Ligamentous and Muscular Strain/Spasm

Cases
- 37 yo healthy man helps relative move sofa. Felt a brief pulling sensation or twinge. Resolved after standing and stretching. Next day awoke with diffuse ache in lumbar area. Worse with twisting, and hyperextension. Better with heat and acetaminophen/NSAID.
- 26 yo woman is rear-ended at 15mph while applying mascara in rearview mirror on Bay Bridge Toll Plaza. Later in day with diffuse ache neck to lower back. Feels better lying flat. Diminished cervical and lumbar lordosis, prominent and firm paraspinals throughout spine.

Low Back Pain
Mechanical LBP
Ligamentous and Muscular Strain/Spasm

Clinical Features – Acute Injury
- History
  - Temporal relationship to new or unusual exertion
  - Minor injuries, pain is mild, then worsened with resulting spasm/secondary processes
  - Pain in back, buttocks or thigh
  - Absent history of major trauma, systemic infection or malignancy
  - Pain relief in supine position

Low Back Pain
Mechanical LBP
Ligamentous and Muscular Strain/Spasm

Clinical Features – Acute Injury
- Physical Exam
  - Normal,
  - Localized spasm,
  - Diffuse TTP over muscles (not spine),
  - Loss of lumbar lordosis or scoliosis
  - No neurologic abnormalities
  - No radicular radiation of pain
- Studies – None needed

Low Back Pain
Mechanical LBP
Facet Joint Disruption/Degeneration

32 yo woman with localized nagging discomfort and no history of trauma. Becomes focal sharp pain with an aching radiation around her trunk toward her groin. Pain is unilateral and worsened by twisting and lateral bending. She has no urinary symptoms.
**Low Back Pain**

**Mechanical LBP**

**Facet Joint Disruption/Degeneration**

- Zygapophyseal Joint (Z-Joint) Dysfunction
- Facet Subluxation

**Clinical Features**

- **History**
  - Pain is unilateral and focal
  - Maximal pain with extension from a fully flexed position and rotation toward affected side
  - May be associated radiation around trunk or into buttock and thigh
- **Physical**
  - Point tenderness over area between spinous and transverse processes
  - Normal dermatomal sensation, reflexes
  - Manual medicine physical exam techniques are more specific and sensitive than allopathic exam
- **Imaging** – Neither useful nor indicated

**Low Back Pain**

**Mechanical LBP**

**Disk Degeneration/Herniation**

36 yo man working at warehouse, lifts 50lb cement bag with feet apart and bending at waist and hips, swinging it into the truck bed. Abrupt onset of stabbing pain, and drops the bag. He feels some tingling into his legs. Feels best in his recliner, lying supine with his hips flexed and knees bent. Pain is worsened with sitting at the dinner table and with bending forward.
Low Back Pain
Mechanical LBP
Disk Degeneration/Herniation

Clinical Features – Hx
- Antecedent flexion strain injury or trauma
- Acutely pain is severe and lancinating, chronically is usually dull and may be confined to leg
- Sciatica or dermatomal symptoms
  - only present in 1% of all LBP, presence make disk herniation more likely
- 90–95% of disk herniations occur at L4-L5
- Relief with supine position with hip and knee flexed
- With massive disk prolapse bilateral weakness, bowel/bladder dysfunction

Low Back Pain
Mechanical LBP
Disk Degeneration/Herniation

Clinical Features – PE
- Striking Paravertebral tenderness and spasm with splinting in awkward postures
- Signs of radicular irritation and/or injury usual in acute setting.
  - SLR (Sens 80%, Spec 40%)
  - Crossed SLR (Sens 25%, Spec 90%)
- Neurological Exam
  - Deep Tendon Reflexes
  - Dermatomal Sensory Exam

Low Back Pain
Mechanical LBP
Disk Degeneration/Herniation

<table>
<thead>
<tr>
<th>Disk</th>
<th>Root</th>
<th>%</th>
<th>Pain</th>
<th>Sensory Deficit</th>
<th>Motor Deficit</th>
<th>Reflex</th>
</tr>
</thead>
<tbody>
<tr>
<td>L5-L1</td>
<td>S1</td>
<td>45-55</td>
<td>Post Thigh, Post-Lat Calf, Heel</td>
<td>Post Cal, Lateral Foot</td>
<td>Plantae Flexors</td>
<td>Ankle</td>
</tr>
<tr>
<td>L4-L5</td>
<td>L5</td>
<td>50-40</td>
<td>Lat Thigh, Ant Calf, Dorsum Foot</td>
<td>Ant Cal, Med Foot, Great Toe</td>
<td>Dorsiflexors</td>
<td>None</td>
</tr>
<tr>
<td>L3-L4</td>
<td>L4</td>
<td>2-12</td>
<td>Ant-Lat Thigh, Med Calf and Foot</td>
<td>Medial Cal and Foot, Great Toe</td>
<td>Quadriceps</td>
<td>Knee</td>
</tr>
<tr>
<td>Cauda Equina</td>
<td>Multiple</td>
<td>5-1</td>
<td>Bilateral, any Or all of above</td>
<td>Any or all of above</td>
<td>Bladder/Dysfet</td>
<td>Anal Wink and Creptas-teric</td>
</tr>
</tbody>
</table>

Low Back Pain
Mechanical LBP
Disk Degeneration/Herniation

Studies
- Plain films – usually not helpful, confirm indirect evidence of PE
- MRI or CT – to confirm anatomy associated with radicular findings
- EMG and/or NCV to confirm Radiculopathy
Low Back Pain
Mechanical LBP
Vertebral Compression Fractures

65 yo male with steroid dependent COPD has onset of LBP without inciting event. Pain is continuous and PE reveals point tenderness over L4 spinous process. Plain films confirm substantial loss of vertebral body height with wedging at L3 and L4.

Low Back Pain
Mechanical LBP
Vertebral Compression Fractures

Clinical Features
- Osteoporosis or severe axial load trauma
- Pain is not relieved in recumbency, but may be worsened
- PE
  - Point tenderness
  - Other stigmata of osteoporosis (kyphosis, etc.)
- Imaging – usually apparent with plain films, CT may also be useful if plain films are equivocal

Low Back Pain
Mechanical LBP
Spondylolisthesis

56 yo with prior disk herniation with lifting cement bag and history of episodic LBP exacerbations over past 15–20 years, has more persistent backache without radicular symptoms

Clinical Features and Findings – varied from asymptomatic to localized pain to radicular symptoms with compression

Studies
- Plain films will demonstrate spondylolisthesis
- CT/MRI for delineation of root impingement with radicular symptoms and findings

Low Back Pain
Mechanical LBP
Myofascial Pain

Myofascial Pain Syndrome
- Most common cause of LBP causing radiation to the leg
- A painful musculoskeletal disorder caused by Myofascial Trigger Points

Clinical Features
- Trigger Points (aka "Knots") – Discrete focal areas of hyperirritability in skeletal muscles that are painful on compression and cause referred pain, referred tenderness, motor dysfunction or autonomic phenomena
- Referred Pain is Myotomal, NOT Dermotomal

Physical Examination
- Palpation, palpation, palpation
  - Find a knot
  - Locate the area of maximal tenderness
  - Twitch response

Studies – None
Low Back Pain
Mechanical LBP
Myofascial Pain
Myotomal versus Dermatomal Radiation of Pain

Clinical Features
- Pain may be severe or absent
- Pseudo-claudication, frequently of L4
- Pain worsens during the day, and with standing
- Relief with rest
- Neurologic symptoms based on level of lesion

Studies
- Plain films - Extensive OA and DDD
- CT or MRI to confirm neurologic findings

Evidence for Treatment Options

Pharmacologic Analgesia
- Multiple classes are effective to reduce pain and increase function and quality of life in short term (65 RCT)
  - Acetaminophen, NSAIDS, Opiates
  - No evidence that any one NSAID is better than others or paracetamol
- The only method of treatment to date shown to be effective to reduce pain and increase functionality in patients with substance abuse issues and chronic LBP (acetaminophen, meperidine, Physical Therapy, Exercise)
- Evidence in meta-analysis is unclear for long-term use of opiates in chronic LBP (6 RCT; tramadol versus placebo, 1000 RCT versus opioid)

Antidepressants (10 RCT)
- No difference in pain relief versus placebo
- Conflicting evidence on pain relief in chronic LBP
Low Back Pain
Mechanical LBP
Evidence for Treatment Options

- Herbal Analgesia (10 RCT)
  - Harpagophyllum Procumbens orally (Devil’s Claw), Salix Alba orally (White Willow Bark) and Capsicum Frutescens topically (Cayenne) seem to reduce pain more than placebo.
  - Equivalent to 12.5 mg of rofecoxib

- Thermal therapy (8 RCT)
  - Evidence that heat provides short-term reduction in pain and disability in acute and sub-acute LBP
  - Insufficient evidence for the role of cold in LBP

- Insoles (4 RCT)
  - Not effective in prevention of LBP
  - Inconclusive evidence for use in treatment of LBP

Low Back Pain
Mechanical LBP
Evidence for Treatment Options

- Acupuncture and Dry needling (35 RCT)
  - Chronic LBP: Better pain relief and functional improvement vs no treatment or sham treatment. Effects are immediate and short-term
  - When added to conventional therapies, they relieve pain and improve function better than conventional treatments alone
  - Insufficient data for its role in acute LBP

- Spinal Manipulative Therapy (39 RCT)
  - Evidence that it is equivalent to other conventional therapies; Allopathic care (Primary Care or Orthopedist), Physiotherapy

- Thermal therapy (9 RCT)
  - Evidence that heat provides short-term reduction in pain and disability in acute and sub-acute LBP
  - Insufficient evidence for the role of cold in LBP

- Traction and Prolotherapy Injection (25 RCT, 5 RCT)
  - Each with inconclusive results use in patients with sciatica

- Insoles (6 RCT)
  - Not effective in prevention of LBP
  - Inconclusive evidence for use in treatment of LBP

Low Back Pain
Mechanical LBP
Evidence for Treatment Options

- Cognitive Behavioral Therapy (7 RCT)
  - Combined respondent–cognitive therapy and progressive relaxation therapy have positive effect on pain and behavioral outcomes in the short-term

- Patient Education (14 RCT)
  - 2.5 hour oral educational session is more effective on short-term and long-term return to work than no intervention in patients with acute and subacute LBP
  - Individual patient education is as effective as non-educational interventions on long-term pain and global improvement in subacute settings
  - Chronic LBP – individual education is less effective for back pain–specific function versus more intensive intervention
  - No significant differences between types of individual education

Low Back Pain
Mechanical LBP
Evidence for Treatment Options

- Exercise (61 RCT – 6390 participants)
  - Exercise Tx slightly effective at decreasing pain and improving function in adults with chronic LBP particularly in healthcare populations
  - Graded activity programs improve absenteeism in sub-acute LBP
  - Acute LBP – exercise = no rx = other conservative rx.

- Bedrest (11 trials – 1963 patients)
  - Acute LBP – Results in little more pain and little less functional recovery than advised to stay active. Bedrest = exercise
  - Sciatica – little to no difference in pain or functional status between bedrest and exercise or bedrest and PT
Low Back Pain
Mechanical LBP
Evidence for Treatment Options

- Pregnancy (8 RCT, 1305 participants)
  - Small benefits in back or pelvic pain relief when added to prenatal care versus usual prenatal care alone
    - Pregnancy-specific exercises
    - Acupuncture
    - Physiotherapy
  - Water gymnastics appear to help women stay at work
  - Most studies with high to moderate bias potential

So now, What do we do?...

Low Back Pain
Mechanical LBP
Facet Joint Disruption/Degeneration

Treatment
- Manual medicine techniques of spinal manipulation and/or mobilization targeted at the effected joint
  - Osteopathy
  - Chiropractic
  - Physiotherapy and Massage Therapy

Low Back Pain
Mechanical LBP
Ligamentous and Muscular Strain/Spasm

Treatment -
- EBM
  - Mild analgesics - acetaminophen, NSAID
  - Heat
  - Activity ad lib
- Common Sense
  - Stretches - gentle
  - Abdominals and Core Strengthening for frequent recurrences
  - Manual Medicine for exacerbations/recurrences
**Low Back Pain**

**Mechanical LBP**

**Facet Joint Disruption/Degeneration**

Allopathic treatments
- Non-specific
- Analgesia, heat
- PT for stretching, core strengthening
- Facet Injections – Blocks
  - Require injections of both superior and inferior dorsal root branches
  - Results best for those with minimal disease/limitations

**Low Back Pain**

**Mechanical LBP**

**Disk Degeneration/Herniation**

**Treatment**
- EBM
  - Analgesia
  - Rest 2–7d = Exercise = PT in acute
  - Exercise in Chronic phases
  - Common Sense
    - Neuromodulators
      - TCA's
      - Antiepileptics
      - Clonidine
    - Aerobic Exercise
    - Smoking Cessation

**Low Back Pain**

**Mechanical LBP**

**Vertebral Compression Fractures**

**Treatment**
- Analgesia
  - Combination acetaminophen – opioids
  - Opiates
  - Calcitonin
  - Bracing and mechanical Support
  - Treatment of underlying osteoporosis as indicated

**Low Back Pain**

**Mechanical LBP**

**Spinal Stenosis**

**Treatment**
- Analgesia
- Neuromodulators
  - TCA's
  - Antiepileptics
  - Clonidine
Low Back Pain
Mechanical LBP
Myofascial Pain

Treatment
- Drugs have a Minimal Role
- Requires Physical Modalities of Treatment
  - Manual Medicine – Tissue manipulation
  - Osteopathy
  - Massage Therapy
  - Acupuncture
  - Chiropractic
  - Allopathic – Trigger Point Injections
- Self-Treatment Methods
  - Thermal Treatments
  - Self massage and tissue manipulation

Low Back Pain
From Evaluation to Pain Management and Treatment

- Review the Epidemiology of LBP in the US
- Review the Clinical Course of LBP
- Delineate the causes of LBP
  - Review their Evaluation
    - Clinical Features of History and Physical Exam
    - The Role of Studies
  - Evidence Based Treatment
    - Examine the evidence for various treatment modalities
    - Common Sense Approaches when Evidence isn’t Available

Low Back Pain
From Evaluation to Pain Management and Treatment

Annual Review in Family Medicine
April 2008 UCSF CME Course
Kirsten Y. Day, MD
Associate Clinical Professor
Department of Family and Community Medicine
UCSF School of Medicine
UCSF/SFGH Family Medicine Residency Program