

## Epidemiology and Assessment of Low Back Pain

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## Overview

- Historical Perspective on Low Back Pain
- Epidemiology & Risk Factors
- Economic Impact
- Etiology

## Overview (cont.)

- Acute low back pain - basic approach
- Physical examination
- Role of diagnostic imaging studies

## Historical Perspective

- Imhoptep 2686-2613 BC
- astronomer, priest, magician, architect and physician
- thought to have written first treatises on surgery
- described sprains, vertebral subluxations & dislocations

## Mixter and Barr, MGH 1932

- Operated on patient with sciatica, who improved
- 1933- reported on their observations of surgical treatment of 'ruptured intervertebral disk'

## Other Seminal Events

- 1933 - First report of successful interbody fusion ( anterior )
- 1944 - First report of posterior lumbar interbody fusion

## Low Back Pain is a Symptom, not a Diagnosis !

- Generally, a self-limited condition - ~ 90 % of acute symptoms resolve completely within 6 - 12 weeks ( 85 % within 2 weeks )

## Low Back Pain

- Leading cause of disability in people < 45yo
- 3rd leading cause in people > 45yo
- Lifetime incidence estimated between 60% and 90% with 5% annual incidence

## Epidemiology

- 2nd most frequent reason for physician visits
- 3rd ranking reason for surgical procedures

## Epidemiology ( cont. )

- Lifetime prevalence estimated at 60 - 80 %
- Point prevalence 15 - 30 %
- U.S. prevalence for LBP > 2 week duration ~ 15 %
- Peak prevalence between ages 35 - 55
- Gender makes little difference, although possibly slightly increased prevalence after menopause

## Epidemiology (cont. )

- 1% of U.S. population is chronically disabled due to LBP
- 1% temporarily disabled

## Risk Factors for LBP - difficult to research because :

- Exposure usually uncertain
- injury mechanisms are unclear
- healthy worker effect
- disability influenced by work, individual, legal and social factors

## Risk Factors - Occupational

- Heavy physical work, lifting
- static work postures
- bending & twisting
- vibration

## Risk Factors ( cont. )

- Posture - only when extremely abnormal
- No strong correlation between height, weight, body build and LBP
- physical fitness NOT a predictor of risk of acute LBP (ALBP) , but the physically fit do have decreased risk of chronic LBP (CLBP) and recover faster

## Risk factors (cont.)

- Psychological:
- Work dissatisfaction
- Poor relationship to co-workers
- Job monotony

## Costs

- Annual direct medical costs estimated at \$ 33 billion
- total costs greater than \$ 100 billion
- One study estimated 10 % of LBP patients account for 90 % of cost
- Fourteen-fold increase in LBP- related disability between 1970 and 1981

## Anatomic / Physiologic Origins of LBP

- LBP may arise from several structures, including:
- ligaments ( e.g. ALL, PLL )
- annulus fibrosus
- facet joints
- vertebral periosteum
- paravertebral m.m. & fascia

- Blood vessels
- spinal nerve roots

### Causes include:

- musculoligamentous injury
- degenerative changes - disks, facet joints
- herniation of the nucleus causing irritation of adjacent nerve root
- spinal stenosis
- fractures
- anatomic anomalies, e.g. scoliosis, spondylolisthesis, usually only when severe

- Systemic disease, e.g.,
- primary or secondary cancer
- spinal infections
- ankylosing spondylitis and other seronegative spondyloarthropathies
- Visceral disease, e.g., kidneys, GI, aorta, etc.

### Benign, self-limited condition for most

- Therefore, specific diagnosis is usually unnecessary
- we assume many of these cases are related to musculoligamentous injury or degenerative changes

### Indahl, et. al., Spine 1995

- Study designed to determine the effect of treating LBP as a benign, self-limiting condition by light normal activity
- Concluded that above approach resulted in highly statistically significant ( $p = 0.000$ ) reduction in sickness leave at 200 days, as compared to control group ( "conventional" medical treatment )

### Malmivaari, et. al. NEJM 1995

- Individuals with acute, non-specific LBP randomly assigned to 1 of 3 treatments:
- bedrest for two days
- back- mobilizing exercises
- or continuation of ordinary activities as tolerated
- Latter group had better recovery than other two after 3 and 12 weeks

### Evaluation of patient with LBP

- Instead of seeking specific diagnosis, consider following three basic questions:
- Is there a serious systemic disease causing the pain?
- Is there neurologic compromise that may require surgical evaluation?
- Is there social or psychological distress that may amplify or prolong the pain?

- What Can the History and Physical Examination Tell US About Low Back Pain  
Deyo, et.al. JAMA 1992 Vol. 268 No. 6

## Diagnostic Studies

- Not required for majority of patients
- no tests typically required during first 4 weeks

## Diagnostic Imaging Studies

- Plain radiographs
- CT w/ or w/o myelogram
- MRI
- Scintiscanning ( including SPECT )
- Discogram

## Estimates of inappropriate neurodiagnostic imaging

- Schroth, et.al., J Gen Int Med '92 - 66%
- Boden PM&R Clinic of NA '98 - 68%

- These tests should be used to confirm diagnosis based on history & physical findings when non-operative treatment has failed and the imaging study will affect next phase of treatment.

## Discordance between presence of degenerative changes and symptoms, increases with age

- Frymoyer, et.al. JBJS 1984
- Wiesel, et.al. Spine 1984
- Jensen, et.al. NEJM 1994

## Low Back Pain

- Diagnostic imaging studies fail to demonstrate etiology of symptoms in majority of cases

## Acute Low Back Pain

- Generally considered to be less than 4 months duration

## Management of Acute LBP

- Reassurance
- Rest, restriction of activity ( limit bedrest to 1-2 days, maximum )
- Analgesics ( acetaminophen, OTC NSAID's, narcotics for more severe sx's )
- Gradual return to activity

## Chronic LBP

- Greater than 4 months duration
- Much more complex in nature
- 20% of patients account for 80% of the costs

## Evaluation of patient with LBP

- Always starts with a history and physical examination
- History-onset, ? Trauma?
- Pain localization, distribution, pattern, quality, intensity
- Duration of episode
- Temporal association with severity
- Relieving and aggravating factors
- Assessment of function

## Neurologic symptoms

- Numbness & tingling
- subjective sense of lower extremity weakness
- changes in bowel & bladder or sexual function

## History of previous painful episodes important

- May influence workup, treatment recommendations

## Psycho/socio/economic factors

- should obtain basic information
- often significantly impacts upon recovery

## Physical examination

- Inspection
- palpation
- ROM measurements
- focused neurologic tests

## Inspection

- Postural abnormalities e.g. kyphosis, scoliosis, lordosis etc.
- trunk, shoulder & pelvic asymmetries
- skin abnormalities
- body movements, gait & posture

## Palpation

- Bony prominences, soft tissues, paravertebral m.m., sciatic notches
- abdominal palpation (auscultation for bruits), peripheral pulses

## Range of Motion

- Trunk flexion/extension, side bending & hips also
- note when pain is increased
- patient's effort is influenced by pain
- ROM not all that helpful for diagnostic purposes

## Focused Neurologic Tests

- Nerve root tension signs
- Straight leg raising (SLR)
- most appropriate for evaluation L5, S1 roots
- can be limited by back pain, hamstring tightness

## Femoral Stretch

- Test for L2-L4 involvement
- Not as well-studied as SLR

## Reflex Testing

- Knee (patellar), ankle (achilles) MSR's
- best obtained in sitting and/or supine position
- patellar- primarily a test of L4 root function
- achilles- S1 root
- medial hamstring, sometimes difficult to obtain in normals, test of L5

## Reflex Testing (cont.)

- Reflexes often do not return when lost
- Reflex testing therefore less useful in cases of recurrent symptoms

## Strength Testing

- MMT-hip flexors, adductors, knee flexors/extensors, ankle plantar/dorsiflexors, invertors/evertors
- EHL weakness suggests L5 root involvement (can also be S1)

## Strength Testing (cont.)

- Assess for muscle atrophy
- Inspection, circumference measurement
- Quads-assess also with getting up from chair or up on stool
- Long tract signs, ie. Babinski, clonus

## Sensation

- may be evaluated to different modalities (pinprick, light touch etc.) but not always helpful

## Waddell's signs

- Consistent with symptom 'magnification'
- suggest possibility of nonorganic pathology
- not necessarily indicative of malingering

## Red flags for Potentially Serious Conditions

- Possible fracture
- major trauma, fall from height or high-energy MVA
- minor trauma in older or potentially osteoporotic patients

## Possible Tumor or Infection

- Age over 50 years or under 20 years
- history of cancer
- constitutional symptoms, eg. fever, chills, unexplained weight loss
- risk factors for spinal infection: e.g. recent bacterial infection, IVDA, immune suppression (steroid use, HIV)
- pain that is worse in supine position
- severe nocturnal pain

## Possible Cauda Equina Syndrome

- Saddle anesthesia
- recent onset of bladder dysfunction
- severe or progressive weakness of lower extremities
- decreased sphincter tone
- perianal/perineal sensory loss
- major motor weakness

## Two General Categories:

- Those performed to detect physiologic abnormalities (ie. lab tests, bone scans, Edx studies)
- those performed to detect anatomic abnormalities, provide anatomic definition (ie. X-rays, CT, myelography, MRI)

## Serologic Tests, Urinalysis

- Of limited value in LBP
- indicated when systemic diagnosis is suspected, ie. Infection, inflammation, malignancy
- HLA-B-27 sensitive marker for ankylosing spondylitis but nonspecific

## Radiographs

- Commonly ordered
- findings correlate poorly with back pain
- degenerative changes common in patients with & without pain
- usually not clinically indicated in absence of 'red flags'

## Radiographs (cont.)

- Main findings of clinical importance:
- spondylolisthesis
- severe deformity
- severe degenerative changes
- fractures, bony tumors, and some infections can also be detected but are rare

## CT, MRI, Myelogram, Diskogram

- Allow assessment of anatomy of spinal canal and its contents
- anatomic evidence of disk herniation seen in 20-30% of these tests in normal persons
- findings only valid when carefully correlated with clinical signs and symptoms

## MRI

- Diagnostic test of choice in evaluation of patients with low back & sciatic pain
- noninvasive
- produces direct multi-planar images with high spatial and contrast resolution
- covers entire lumbar spine, including conus medullaris and cauda equina

## Disadvantage- Cost

- ranges from \$1000-1600

## CT Imaging

- uses ionizing radiation
- projections limited compared to MR
- may be study of choice in certain situations
- less expensive than MR (~\$4-600)

## Discography

- Purports to determine whether axial LBP is of discogenic etiology
- frequently done prior to fusion procedures
- provocation of typical vs. atypical pain
- Caragee, et.al., Spine 2000- found high rate of false-positives
- ? Correlation with surgical outcomes

## Electrodiagnostic Studies

- Indicated in a relatively small percentage of patients with LBP symptoms
- Not indicated in those without lower extremity symptoms
- Helpful when clinical picture is unclear
- Timing of Edx study is critical

## Edx Studies ( cont. )

- Can help to localize single vs. multiple root involvement
- Needle electrode examination, H reflexes most useful
- Limitations

Thank You