So why is low back pain (LBP) an important clinical issue?

- Among most common presenting clinical complaints
- Major cause of chronic impairment/disability
- There exist excellent, evidence-based clinical guidelines for evaluation and management
- Poor adherence with management guidelines for LBP is a major cause of unnecessary medical procedures and expenditures and major contributor to the epidemic of prescription narcotic use

Low Back Pain: Variation in Use of Imaging for Older Patients

- Retrospective cohort study of 145,320 Texas Medicare beneficiaries age ≥ 66 with acute low back pain identified through claims data
  - ➢ Patients with previous back pain claims or "red flags" were excluded
  - ➢ PCPs identified by NPI and only those with more than 20 patients with LBP claims were included
- Tracked and measured whether patients received lumbar radiographs or advanced imaging within 4 weeks of diagnosis
- **Main results**:
  - ❑ 27.2% of patients received lumbar radiography
  - ❑ 11.1% received CT or MRI

(Tan A et al. *J Gen Intern Med*. 2015;31:156-63.)

Back Pain: Worsening Trends in Management

- Study of trends in the management of neck and back pain from 1999 through 2010
  - ✓ Representative sample of 23,918 visits for neck and back pain using NAMCS and NHAMCS data → extrapolable to 440 million visits nationally
  - ✓ Excluded visits with "red flags"
- Assessed use of imaging, narcotics and referral to other physicians (guideline discordant) and NSAIDs/ acetaminophen and referral to physical therapy (guideline concordant)
- **Main results**:
  - ❑ Narcotic use increased (19.3% to 29.1%, P < .001) while NSAID and acetaminophen use decreased (36.9% to 24.5%, P < .001)
  - ❑ Physical therapy referrals remained stable at 20% while physician referrals increased from 6.8% to 14.0% (P < .001)
  - ❑ Radiograph rate stable at 17% while CT and MRI increased from 7.2 to 11.3% (P < .001)

(*JAMA Intern Med*. 2013;173:1573-81)

Low Back Pain: <u>Opioid rx of chronic back pain</u>

- Systematic review/meta-analysis → 9 studies included
  - ✓ Opioid prescribing rate 3% to 66% across studies
- 4 studies assessed opioid vs placebo/nonopioid control
  - ✓ Reduced pain not shown with opioids (P=0.136)
- 5 studies directly compared different opioids
  - ✓ Nonsignificant reduction of pain from baseline (P=0.055)
- Prevalence of lifetime substance abuse disorders 36% to 56%...

(Martell BA et al. *Ann Intern Med*. 2007;146:116-27.)

"Efficacy, Tolerability, and Dose-Dependent Effects of Opioid Analgesics for Low Back Pain: A Systematic Review and Meta-Analysis"

- 13/20 RCTs included in the meta-analysis evaluated short-term effects of opioid analgesics on chronic low back pain
- Moderate quality evidence of modest acute pain relief -10.1 (95% CI, -12.8 to -7.4) on normalized 100 point pain scale
  - ✓ 20 point difference felt to be clinically meaningful
- In half the reviewed trials, 50% of participants withdrew due to lack of efficacy or adverse effects
- No RCTs addresssed issue of acute low back pain

(JAMA Intern Med. 2016:958-68;2016*)*

Acute Low Back Pain: Opioids or Cyclobenzaprine Added to Naproxen

- RCT of 323 patients with acute LBP presenting to ED
  - ✓ All patients received naproxen 500 mg q12h X 10 days
  - ✓ Patients randomized to oxycodone/acetaminophen vs cyclobenzaprine vs placebo q8h
- Primary outcome → improvement in Roland-Morris Disability Questionnaire (RMDQ) one week after ED discharge
- Secondary outcomes → RMDQ score at one week and three months after ED discharge
- **Results:**
  - ❑ No difference in adding oxycodone/acetaminophen or cyclobenzaprine from placebo in any outcome
  - ❑ Adverse effects significantly more common in both active treatment arms

(*JAMA*. 2015;314:1572-80.)

More general concerns with opioid use…

- Among Medicare beneficiaries discharged from an acute care hospital in 2011, 15% of discharges were associated with a new opioid claim
- 42.5% of opioid claims within 7 days post-discharge were associated with an opioid claim after 90 days post-discharge

  (JAMA Intern Med. 2016;176:990-7.*)*
- 25% of opioid naïve patients discharged from a large safety-net hospital in 2011 had opioid receipt within 3 days of discharge
- Chronic opioid use 1-year post-discharge more common among patients with opioid receipt at discharge – 4.1% vs 1.3%, p<0.0001, AOR 4.90

  (J Gen Intern Med. 2016;31:478-85.*)*
- Chronic opioid use among opioid-naïve patients in the post-operative period varied across different surgical procedures (2001-20130)
- Risk factors for chronic opioid use included male sex, age > 50, preoperative hx of drug abuse, alcohol abuse, depression, benzodiazepine use and antidepressant use

  (JAMA Intern Med. 2016;Epub ahead of print*)*

Low Back Pain: Presentation Format

- Background, epidemiology, demographics
- Case-based discussion of clinical scenaria
  - ✓ Acute mechanical low back pain
  - ✓ Sciatica/disc herniation
  - ✓ "Red flag" diagnoses
  - ✓ Lumbar spinal stenosis
  - ✓ (Malingering/symptom amplification)
- Algorithm for diagnosis/management and overview of the ACP/APS clinical guideline
- Summary → clinical messages and case outcomes
- Q & A

A vexing set of terms… "spondylo…

...spondylosis

= facet joint arthritis

…spondylolysis

= disruption of the pars interarticularis

…spondylolisthesis

= slippage of one vertebra over another

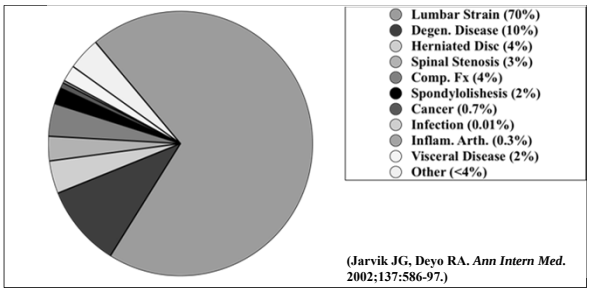
Low Back Pain: Background

- Most common musculoskeletal complaint among adult patients seen in primary care practices
- Specific pathoanatomic diagnosis established in only 15-20%
- Produces at least short-term impairment in 70-80% of a general population over a lifetime
  - ✓ Point prevalence 5-13% among adults
  - ✓ Impairment > 2 weeks in 14% of adults
  - ✓ Results in loss of work in 2-8% annually
- Sciatica in 1-4% of cases of acute low back pain, 13-40% lifetime prevalence

Low Back Pain: Demographics/Epidemiology

- Most cases in individuals age 30-60
- Leading cause of disability in persons < 45
- Comparable rates among men and women
  - ✓ Incidence greater among women than men in occupations requiring heavy exertion
  - ✓ Men generally present at younger age
- Clear precipitating event in minority of cases
- Recurrence of occupational low back pain in 33-60% of patients within 3 years

Distribution of Causes of Acute Low Back Pain



(Jarvik JG, Deyo RA. *Ann Intern Med.* 2002;137:586-97.)

Low Back Pain: Clinical Case #1

A 44 year old man presents with severe low back pain X 2 days. He describes pain on movement, especially with twisting and standing. No antecedent injury, but performed heavy work on his car one day before onset of pain. Pain radiates to buttocks and upper thighs, L > R.

Exam: of note for paralumbar tenderness and spasm, L > R, with increased pain on torsion and extension of the trunk. No motor or sensory deficits.

Low Back Pain: DDX: Acute Mechanical Low Back Pain

History
- Pain in back, buttock +/ - thigh, often severe
- Onset hours to days after new/unusual exertion
- No history of major trauma, infection or malignancy
- Relief of pain in supine position +/- legs flexed

Physical Examination
- Paravertebral tenderness/spasm
- Acute dynamic scoliosis or flattening of lumbar lordosis from spasm
- No demonstrable neurologic deficits

Supporting Studies
- None necessary

Low Back Pain: Clinical Case #2

A 64 year old man presents with complaint of leg pain and R foot drop. He developed pain in his lower back 6 weeks previously, for which he consulted a chiropractor with some relief. Pain recurred and he consulted a second chiropractor. Subsequently, he noted difficult lifting his R foot, and worsening leg pain. He is active, without underlying medical problems. He is upset that his leg weakness precludes his daily 3 mile walks.

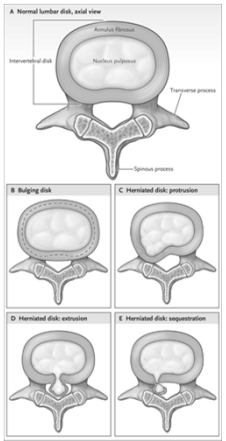
Exam: back tenderness and spasm, with spine flexion limited by pain. He has readily demonstrable weakness of foot and great toe dorsiflexion, with diminished sensation in the first web space. Positive SLR and crossed SLR.

Low Back Pain: DDX: Herniated Intervertebral Disc

History
- Acutely, back pain is severe, lancinating
- Often, antecedent flexion strain injury or trauma
- Sciatica (sensitivity/specificity = .95/.88)
- Relief of pain with hip in partial flexion
- Bilat. leg weakness, bladder/bowel dysfunction after central disc herniation
- With chronic disc herniation, pain, usually dull, may be confined to leg

Physical Examination
- Striking paravertebral tenderness/spasm, with splinting in awkward postures
- **Radiculopathy**

Supporting Studies
- Usually, none early; later, MRI, CT, or myelogram; EMG/NCV



CT and MRI Terminology for Herniated Disks.

Management of Sciatica
- Emphasize generally favorable outcome and benefit of conservative management
  → NSAIDs and exercise-based PT
- Describe pathology as disc "protrusion" rather than "rupture" or "herniation"
- Limit imaging to those with failure to respond (or who worsen) and who are candidates for surgery or injection
- Cite early relief of sciatica with surgery but outcome at one year no different from conservative management

Deyo RA, Mirza SK. *N Engl J Med.* 2016;374:1763-1772.

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Lumbosacral Disc Disease: Under-appreciation of Inherited Predisposition

- Detailed analysis of combined clinical health and genealogical data for > 1 million Utah residents (UPD)
  (Patel et al. *J of Bone Joint Surg Am. 2011;93:225-9)*
- Similar analyses previously tested and validated for breast cancer, severe asthma and rotator cuff disorders
- 1,264 individuals with lumbar disc disease (ICD-9 codes for disc herniation or degeneration)
- **Results**:
  - ❑ **RR 4.15 (2.82-6.10, P < 0.001) for 1st degree relatives**
  - ❑ RR 1.15 (0.71-1.87, P 0.60) for 2nd degree relatives
  - ❑ RR 1.46 (1.06-2.01, P 0.027) for 3rd degree relatives
- Findings reinforce results from earlier case control and twin studies

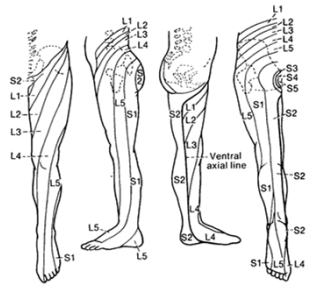
Low Back Pain: Focused Examination

- Inspection: curvature, symmetry
- Palpation: bony irregularities, paravertebral muscles, skin and soft tissue lesions
- Landmarks
  - ✓ Spinal cord ends at L1-L2
  - ✓ Umbilicus at L3-L4
  - ✓ Iliac crest at L4-L5

Low Back Pain: Focused Neurological Examination

- Sensory
  - ✓ Dermatomes
    - "Palm span"
- Deep tendon reflexes
  - ✓ "Counting mnemonic"
- Motor
- Radicular signs
  - ✓ Direct SLR, supine and seated
  - ✓ Crossed SLR
  - ✓ Femoral stretch

Lower Extremity Dermatomes



Low Back Pain: Radiculopathies Associated with Disc Herniations

Disk	Root	Rate*	Pain	Sensory	Motor	Reflex
L5-S1	S1	45-55%	Poster thigh Post/lat calf Heel	Posterior calf Lateral foot	Plantar flexors	Ankle
L4-L5	L5	30-40%	Lateral thigh Anterior calf Dorsum of foot +/- great toe	Anterior calf Medial foot First web space +/- great toe	Dorsiflexors	None
L3-L4	L4	2-12%	Lat/ant thigh Medial calf/foot +/- great toe	Medial calf/foot +/- great toe	Quadriceps	Knee
Cauda equina	Multiple	< 1%	Bilateral, incl. Any/all above	Saddle anesth. Any/all above	Multiple, incl. Any/all above Bladder/bowel	Any/all above Anal wink Cremasteric

*herniation at more than one level in 10%

Low Back Pain: Clinical Case #3

A 63 year old woman presents for an initial primary care evaluation. She reports worsening low back pain X 3 months. She is employed in an electronics manufacturing plant. Pain is in low back, extending to buttocks, worse w/movement, but now also present in bed. No fever or weight loss. No meds.

Exam: tenderness across lower back, especially at L5 and sacral levels. No obvious tenderness of spinous processes. SLR + bilat, L > R. A 2 cm R breast nodule is noted; mammogram is suspicious for malignancy.

Suspected Condition	"Red Flag"
Cancer or infection----------	Prior cancer or recent infection
	Fever > 100 F
	Unexplained weight loss
	Immunosuppression
	Intravenous drug use
	Prolonged use of corticosteroids
	Not improved or worse with rest
	Age > 50
	Persistence for more than a month
Spinal fracture----------	Hx of significant trauma
	Prolonged use of corticosteroids
	Age > 70 +/- limited trauma
Cauda equina syndrome-----	Acute onset urinary retention
	Loss of anal sphincter tone
	Saddle anesthesia
	Global/progressive LE weakness

Low Back Pain: Malignancy/Infection

Physical Examination
- Tender spinous process (neither sensitive nor specific)
- Variable neurologic findings
- Evidence of systemic cancer/infection

Supporting Studies
- Epidural process best delineated by MRI, CT +/- myelogram
- Standard radiographs may reveal destructive bony lesions
- Radionuclide bone scan sensitive for metastatic carcinoma (but not for myeloma)
- Erythrocyte sedimentation rate usually elevated
- Appropriate search for treatable primary lesions

Low Back Pain: Systematic Review of "Red Flags" to Screen for Fracture and Malignancy

- Included 14 studies evaluating 53 red flags
- Many red flags in current guidelines provide virtually no change in probability of fracture or malignancy or have untested diagnostic accuracy
- **Main Results**:
  - Red flag with highest post-test probability for detection of spinal malignancy is **history of malignancy** (33%, 22% to 46%)
  - Red flags with highest post-test probability for detection of spinal fracture (1) **older age** (9%, 3% to 25%); (2) **prolonged use of corticosteroids** (33%, 10% to 67%); (3) **severe trauma** (11%, 8% to 16%); and (4) **presence of contusion/abrasion** (62%, 49% to 74%)

(*BMJ*. 2013;347:f7095)

Imaging Findings in a Patient with a "Red Flag" Diagnosis

Darouiche R. *N Engl J Med.* 2006;355:2012-2020

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Imaging Findings in a Patient with a Lumbar Spinal Epidural Abscess

Darouiche R. *N Engl J Med.* 2006;355:2012-2020

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Low Back Pain: Clinical Case #4

A 74 year old woman reports leg heaviness and pain on ambulating 3 blocks, with relief when she rests and sits. Onset gradual, more noticeable recently. Previous history of intermittent back pain, but also remote tobacco use, hypertension (well-controlled) and recently identified type 2 DM with good response to diet and metformin.
Exam: reduced range-of-motion at lower spine; well-preserved pulses and normal skin adnexae in lower extremities.

So what is spinal stenosis…?

Narrowing of the spinal canal with variable root and less commonly cord impingement generally as the result of the combined effect of multilevel disc protrusions, ligamentous hypertrophy, spondylolisthesis and bony overgrowth from osteoarthritis, often superimposed on a congenitally narrow spinal canal

Low Back Pain: DDX: Spinal Stenosis

History
- Back pain may vary from absent to severe
- Pseudoclaudication often prominent (.60/NA)
- Pain worsens during the day, aggravated by standing, relieved by rest and trunk flexion
- Weakness, bladder and bowel dysfunction
- Age >50

Physical Examination
- Neurologic findings vary, often multiple levels
- Findings of osteoarthritis may be prominent

Supporting Studies
- Standard radiographs; MRI or CT +/-- myelography; NCV/EMG

Low Back Pain: Focus on Spinal Stenosis

- Evaluate as for mechanical back pain with/without radiculopathy
- "Shopping cart" sign
- Consider and assess for vascular claudication
  - ✓ "Hill climb" differential
  - ✓ Pulses and bruits
  - ✓ Many patients will have evidence of both lower extremity arterial insufficiency (claudication) and spinal stenosis (pseudoclaudication)

Low Back Pain: Postures, Maneuvers and Exercises

- Resting
- Sleeping
  - ✓ Getting in and out of bed
- Sitting
- Driving
- Lifting

- Exercises
  - ✓ Pelvic tilt
  - ✓ Rotations
  - ✓ Single knee to chest
  - ✓ Knee to chest seated
  - ✓ Heel shoulder bridging
  - ✓ Supine march
  - ✓ Pyriformis stretch
  - ✓ Cobra stretch
  - ✓ Bird dog
  - ✓ Abdominal curl

Low Back Pain: Clinical Practice Guideline from ACP & APS

1. Conduct focused history and exam to triage patients into 1 of 3 categories
   1. Nonspecific low back pain
   2. Back pain potentially associated with radiculopathy and/or spinal stenosis
   3. Back pain associated with another potential spinal cause
   - Include assessment of psychosocial risk factors
2. Do not obtain imaging or other diagnostic tests routinely in patients with nonspecific low back pain
3. Perform diagnostic imaging and testing for severe or progressive neurological deficits or when serious underlying conditions are suspected

(Chou R et al., *Ann Intern Med*. 2007;147:478-91.)

Low Back Pain: Clinical Practice Guideline from ACP & APS (cont.)

4. Evaluate patients with persistent low back pain and/or radiculopathy or spinal stenosis with MRI or CT only if they are potential candidates for surgery or epidural injection
5. Provide patients with evidence-based information with respect to expected course, advice to remain active and self-care options
6. Consider use of medications with proven benefits in conjunction with back care information and self care
7. For patients who do not improve with self-care options, consider nonpharmacologic therapy with proven benefits

(Chou R et al., *Ann Intern Med*. 2007;147:478-91.)

Medications for Acute and Chronic Low Back Pain: EBM Review from APS/ACP

Acute low back pain

Good evidence for benefit
- NSAIDs
- Acetaminophen
- Skeletal muscle relaxants

Fair evidence for benefit
- Opioids
- Tramadol
- Benzodiazepines

Subacute/chronic low back pain

Good evidence for benefit
- Tricyclic antidepressants

Fair evidence for benefit
- Opioids
- Tramadol
- Benzodiazepines
- Gabapentin (radiculopathy)

(Chou R et al., *Ann Intern Med*. 2007;147:505-14.)

Nonpharmacologic Therapies for Acute and Chronic Low Back Pain: EBM Review from APS/ACP

Acute low back pain

Good evidence for benefit

- Superficial heat
- Spinal manipulation

Subacute/chronic low back pain

Good evidence for benefit

- Cognitive-behavioral therapy
- Exercise
- Spinal manipulation
- Interdisciplinary rehablilitation

Fair evidence for benefit

- Acupuncture
- Massage
- Yoga
- Functional restoration

(Chou R et al., *Ann Intern Med*. 2007;147:492-504.)

Low Back Pain: Resources for Patients

- Handout materials --
  - ✓ Whatever is available through your home institution (e.g., through PT office)
  - ✓ *Up-to-Date for Patients*
  - ✓ *MerckMedicus*
  - ✓ *MD Consult…*
- Video demonstration of exercises and maneuvers
  - ✓ *YouTube*
    - Search under "back pain exercises" not under "back exercises"
    - Rich mix of video vignettes by physical therapists, chiropractors, orthopedists, physiatrists and others

Low Back Pain: Clinical Messages for Patients

- Set clear expectations --
  - ✓ Advise that they are in good company, as the majority of adults suffer with low back pain at some point
  - ✓ Be upbeat, and stress generally very favorable outlook with 60% of patients better in 2-3 weeks and 85% recovered in 6 weeks
- Emphasize focus on symptom control as a priority early on --
  - ✓ Stress benefits of NSAIDs and acetaminophen, supplemented by muscle relaxants for short periods
  - ✓ Be open to spinal manipulation and physical measures
  - ✓ Narcotics limited to no more than several days in cases of extreme pain from radiculitis

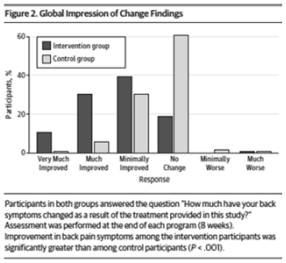
Low Back Pain: Clinical Messages for Patients (continued)

- Take pro-active position against imaging in cases of mechanical back pain and sciatica on the basis of no benefit
  - ✓ Point out that only 36% of adults without pain have normal MRIs
  - ✓ Stress that you will obtain imaging if any red flags arise or if he/she fails to respond to standard care
- Recommend staying as active as tolerated --
  - ✓ Stress proven benefit of activity over bed rest
  - ✓ Emphasize "back friendly" low impact-loading exercises such as stationary bicycle, elliptical, and water-based activities
  - ✓ Consider referral to physical therapy as initial severe pain wanes
- Check in over several days by phone, email or follow up visit
- Be open to cognitive behavioral therapy or integrative modalities – massage, yoga, acupuncture -- for persistent symptoms

New Study Findings: Mind-Body Medicine for Chronic LBP

An MBM program in patients age ≥ 65 with chronic LBP was associated with improved short-term function and long-term current and most severe pain

(Morone et al. *JAMA Internal Med*. 2016;176:329-37.)



Participants in both groups answered the question "How much have your back symptoms changed as a result of the treatment provided in this study?" Assessment was performed at the end of each program (8 weeks). Improvement in back pain symptoms among the intervention participants was significantly greater than among control participants ($P < .001$).

Low Back Pain: Prevention – A Systematic Review and Meta-analysis

- 23 published reports on 21 RCTs including 30,850 participants met inclusion criteria
- **Results**:
  - ❑ Moderate quality evidence that exercise combined with education reduces the risk of an episode of LBP (RR 0.55 [0.41-0.74])
  - ❑ Low quality evidence that exercise alone reduces the risk of an episode of LBP (RR 0.65 [0.50-0.86])
  - ❑ Education alone, back belts and shoe insoles do not appear to prevent LBP

(*JAMA Internal Med*. 2016;176:199-208.)

Low Back Pain: Outcome of Clinical Cases

(#1) Acute mechanical low back pain; resolution of symptoms over 7 days w/ reduction in activity and NSAID

(#2) Herniated disc on MRI w/ extruded disc material between L4-L5. Resolution of back pain but residual foot drop from radiculopathy/neuropathy.

(#3) Breast biopsy negative. Evidence of spondylolisthesis with spinal stenosis and progressive symptoms. Surgical candidate.

(#4) Spinal stenosis at multiple levels on MRI. Good overall response to PT and epidural steroid injection.

Acute Low Back Pain: Summary

- Extremely common, generally with good outcome, but recurrences are also common
- Recognize common scenaria: acute low back strain, sciatica, spinal stenosis
  - ✓ Exclude "red flag" conditions
- Focused exam
- Symptom control
  - ✓ Medications and physical measures
- More extensive diagnostics and referral generally only if acute measures fail

Association of Obesity with Low Back Pain and Sciatica

- Obesity associated with increased prevalence of LBP in preceding 12 months (OR = 1.33) seeking care (OR = 1.56) and chronic LBP (OR 1.43)

  Am J Epidemiol. 2010;171:135-54
- Obesity found to be risk factor for sciatica (OR = 1.31), hospitalization for sciatica (OR = 1.38) and surgery (OR = 1.89); similar but weaker associations for overweight

  Am J Epidemiol. 2014;179:929-37.

Oral Steroids for Acute Radiculopathy Due to a Herniated Lumbar Disk

- Randomized, double-blind controlled trial among 269 patients with radicular pain < 90 days, ODI > 30 and MRI confirmation of herniated disk
  - ✓ 2:1 assignment – steroid:placebo
  - ✓ Steroid → 15-day course of oral prednisone (60,40,20mg, each for 5 days) vs placebo
- Primary outcome measure → ODI change at 3 weeks
- Secondary outcome measures → ODI change at 1 year, change in LE pain, rate of spine surgery, SF-36 PCS and MCS scores

(Goldberg et al. *JAMA*. 2015;313:1915-23.)

Oral Steroids for Acute Radiculopathy Due to a Herniated Lumbar Disk -- Results

- ❑ Prednisone group showed modest but significantly greater reduction in ODI at 3 weeks (6.4 points) and at 1 year (7.4 points)
- ❑ No significant reduction in LE pain at 3 weeks or 1 year
- ❑ Slight improvement in SF-36 PCS score at 3 weeks but not at 1 year
- ❑ No improvement in SF-36 MCS score at 3 weeks but slight improvement at 1 year
- ❑ No difference in surgery rates between groups
- ❑ Higher rate of at least 1 adverse event at 3 weeks in prednisone treated group (49.2% vs 23.9%; P < .001)

(Goldberg et al. *JAMA*. 2015;313:1915-23.)

Surgery vs. Conservative Therapy for Sciatica

- RCT of 283 patients with severe sciatica X 6-12 weeks
- Early surgery vs conservative rx with later surgery if needed
  - ✓ Of 141 patients randomized to surgery, 125 (89%) underwent microdiscectomy after mean of 2.2 weeks
  - ✓ Of 142 patients randomized to conservative rx, 55 (39%) went to surgery after mean of 18.7 weeks
- **Results** (repeated-measures analysis/intention-to-treat)
  - ❑ No significant difference in overall disability score at 1 year (P=0.13)
  - ❑ Relief of leg pain faster for patients assigned to early surgery (P<0.001)
  - ❑ Early surgery group reported faster rate of perceived recovery but probability of perceived recovery 95% in both groups after 1 year follow up

(Peul WC et al. *N Engl J Med*. 2007;356:2245-56)

Observations About the Utility and Limitations of MRI in Assessing Sciatica

- Abnormalities routinely noted among 100 individuals with no history of sciatica or back pain (Jensen et al. *N Engl J Med*. 1994;331:69-73)
  - ✓ Only 36% with normal discs
  - ✓ Disc bulge in more than half and protrusion in more than a quarter
  - ✓ Other findings --> spondylolisthesis, etc.
- Meta-analysis of 6 studies of spine imaging among low risk patients showed no benefit with regard to clinical outcomes (Chou et al. *Lancet*. 2009;373:463-72)
- MRI performed at 1-year follow up in patients treated for sciatica and disc herniation did not distinguish between those with favorable and unfavorable outcomes (Barzouhi et al. *N Engl J Med*. 2013;368:999-1007)
  - ✓ Follow up of trial of surgery vs conservative rx in 283 patients by Peul et al. (*N Engl J Med*. 2007;356:2245-56); 267 patients available for analysis
  - ✓ At one year, herniated disk present in 20% of those who had undergone surgery and 60% of those who had undergone conservative therapy ($P < 0.001$); root compression had disappeared from 82% of surgery patients and 60% of those managed conservatively ($P < 0.001$)
  - ✓ 84% of all patients reported favorable outcome at one year
  - ✓ Disk herniation visible in 35% with favorable outcome and 33% with unfavorable outcome
  - ✓ Favorable outcome among 85% with disk herniation and 83% without disk herniation

Recent Study Results: Acute Low Back Pain

- Acetaminophen no better than placebo in acute low back pain
  - ✓ Double-blind, randomized controlled trial in 1,652 patients
  - ✓ Three treatment arms: (1) regular acetaminophen; (2) as needed acetaminophen; (3) placebo
  - ✓ No difference in time to recovery among the groups – median 17 days for all ($P = .79$)

  (Lancet. 2014;S01406736:60805-9*)*
- Spinal manipulation effective in short term relief of back-related leg pain
  - ✓ Controlled pragmatic trial of spinal manipulation, home exercise and advice versus home exercise and advise alone in 192 patients
  - ✓ Spinal manipulation improved self-reported pain and functional outcomes at 12 weeks but not at 52 weeks

  (*Annals Intern Med*. 2014;161:381-91)

Recent Study Results: Acute Low Back Pain (continued)

- Caudal epidural steroid injection ineffective for chronic lumbar radiculopathy
  - ✓ Randomized trial of caudal steroid vs sham subcutaneous saline injection
  - ✓ No difference in low back and leg pain or disability index at 6, 12 and 52 weeks
  - ✓ Potential flaws: caudal vs foraminal injection; no local anesthetic injected

  (BMJ. 2011;343:d5278*0)*
- Patients randomized to 12-session yoga trial (n=156) did better than patients receiving usual care in terms of back function at 3, 6 and 12 months (on basis of RMDQ)
  - ✓ No difference in back pain or general health scores

  (Annals Intern Med. 2011;155:569-578*)*
- Systematic review and meta-analysis of epidural steroid injections in managing sciatica
  - ✓ 25 published reports (23 trials) included, encompassing a mix of caudal, interlaminar and transforamimal modalities
  - ✓ Significant, albeit small, beneficial effect, for short term leg pain relief (6 points on 100 point scale) and short term disability (3 points on 100 point scale) for epidural injection over placebo; no effect on back pain
  - ✓ Long-term effect on pain relief and disability small and not statistically significant

  (Annals Intern Med. 2012;157:865-77*)*

Other Study Results: Chronic Low Back Pain

- In randomized trial among 342 adults with chronic LBP, an 8 week program of mindfulness-based stress reduction or cognitive behavioral therapy demonstrated meaningful and significant improvements in back pain and functional limitations over usual care at 26 weeks

  (*JAMA*. 2016;315:1240-9.*)*
- The most useful predictors of progression to persistent disabling symptoms include nonorganic signs (LR 3.0), maladaptive pain coping behaviors (LR 2.5), high baseline functional impairment (LR 2.1), psychiatric comorbidities (LR 2.2) and low general health status (LR 1.8)

  (*JAMA*. 2010;303: 1295-1302)

Low Back Pain: <u>Physical Exam and General Reference</u>

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Expenditures and Health Status Among Adults with Back and Neck Problems

- National survey with 23,000 respondents reporting health status
- 3,200 reported spine problems
- Annual health expenditures for respondents with spine problems increased from $4,695 in 1997 to $6,096 in 2005
  - ✓ Expenditures 73% higher than for those without spine problems
  - ✓ Medication accounted for largest component of increase (171%)
- Those with spine problems 2-3 times more likely to report limitations in physical, work and social function
- Estimated total national cost of spine problems: <u>$86 billion</u>
  - ✓ For comparison --> cancer care $89 billion; DM care $98 billion

(Martin BI et al., *JAMA*. 2008;299:656)

Low Back Pain:
Group Cognitive Behavioral Treatment

- Randomized trial in 701 patients with troublesome subacute or chronic pain
- All received basic care; 468 randomized to CBT, 233 to no further intervention
- At one year, CBT patients demonstrated greater mean improvement in Roland Morris disability questionnaire, Von Korff disability score and Von Korff pain score
- Costs low compared with traditional interventions

(*Lancet*. 2010; 375:916-23)

Low Back Pain:
Bed Rest, Exercises or Ordinary Activity?

- Randomized trial involving 186 patients, none with neurologic deficit, although some with pain radiating below knee
- Three treatment arms:
  - ✓ Bed rest for 2 days
  - ✓ Back-mobilizing exercises
  - ✓ Continuation of ordinary activities, as tolerated (control group)
- After 3 and 12 weeks, patients in control group had better outcomes
  - ✓ Statistically significant differences in duration of pain, pain intensity, lumbar flexion, and ability to work as measured subjectively
- No difference in direct costs of care

(Malmivaara et al. *N Engl J Med.* 1995;332-351-5)

Low Back Pain:
Surgery for lumbar degenerative spondylolisthesis

- Comparison of surgical versus nonsurgical treatment of patients with degenerative spondylolisthesis and spinal stenosis
- 304 patients in randomized and 303 in observational cohorts
  - ✓ High crossover rate (40%) in each arm of randomized cohort
  - ✓ Lower crossover in observational cohort -> 17% to surgery; 3% to non-surg.
- Primary outcomes -> change in SF36 (pain and disability) and Oswestry Disability index
- Intention-to-treat analysis for randomized cohort showed no statistically significant effects for primary outcomes
- As-treated analysis for both cohorts showed significant advantages for surgery 3 months, increased at 1 yr, and slightly decreased at 2 yr

(Weinstein JN et al. *N Engl J Med.* 2007;356:2257-70.)

Low Back Pain:
Surgical therapy for lumbar spinal stenosis

- Surgical candidates with lumbar spinal stenosis without spondylolisthesis
  - ✓ 289 patients in randomized cohort
  - ✓ 365 patients in observational cohort
- Primary outcomes: (1) bodily pain and (2) physical function (SF-36) and (3) modified Oswestry Disability Index at 6 weeks, 3, 6, 12 and 24 months
- At 2 years 67% of patients originally randomized to surgery and 43% of those randomized to medical care had undergone surgery
- In the intention to treat analysis -- significant treatment effect favoring surgery on SF-36 for bodily pain (7.8; 1.5-15.1)
- In combined as treated group there was significant advantage for surgery in all 3 primary measures by 3 months persisting at 2 years

(Weinstein et al. *N Engl J Med*. 2008;358:794-810.)

Low Back Pain:
Surgery for Cauda Equina Syndrome

- Meta-analysis of 42 studies including 322 patients
- Significant differences in resolution of sensory and motor deficits and urinary and rectal function in patients surgically decompressed within 48 hours after onset of symptoms

(Ahn UM et al. *Spine.* 2000;25:1515-22.)

Low Back Pain:
Accuracy of Exam for Disc Herniation (w/ Sciatica)

Test	Sensitivity	Specificity
Ipsilateral SLR	0.80	0.40
Crossed SLR	0.25	0.90
Ankle dorsiflexors weak	0.35	0.70
Great toe extensors weak	0.50	0.70
Impaired ankle reflex	0.50	0.60
Sensory loss	0.50	0.50
Plantar flexor weakness	0.06	0.95
Impaired patella reflex	0.50	-----
Quadriceps weakness	0.01	0.99

(Deyo et al. *JAMA.* 1992;268:760-5)