Low Back Pain

“One would have thought by now that the problem of diagnosis and treatment would have been solved, but the issue remains mysterious and clouded with uncertainty.”


Magnitude of the Problem

- 5% ann. Incidence
- Frymoyer
- In 2005 Americans spent $85.9 billion looking for relief from back and neck pain through surgery, doctor’s visits, X-rays, MRI scans and medications, up from $52.1 billion in 1997
- Number one cause of disability Age 24-39 (Burton 1991)

Magnitude of the Problem

- Professional golfers 10-30%/yr (McCarroll)
- 11% of gymnasts with spondyloysis (Jackson)
- 5% of runners develop LBP per yr (Brody)
- 15% of tennis players (Chard)
- 30% of football players (Saal)
- 35% of sedentary workers
- 47% of physical laborers (Svensson)

Common thinking

- 90% of back pain resolves on its own in 1-2 weeks
- Lumbar disc herniation is a surgical disease
- “Get back to work”
The Data!
- 30-60% recover in one week
- 60-90% recover in six weeks
- 95% recover in 12 weeks
- Specific causes of LBP account for 20% of the cases

Lumbar Spine

Low Back Pain
- Not all low back pain is bulge or herniation

Differential Diagnoses
- Aortic Aneurysm
- Tumors/cancer
- Bony metastasis
- Vertebral Osteomyelitis
- Epidural abscess
- Neurofibromatosis
- Pelvic pathology
- Abdominal pathology
- Herniated disc
- Compression fracture
- Rheumatoid arthritis
- Degenerative joint Disease
- Osteoarthritis
- Ankylosing spondylitis
- Cauda equina syndrome
- UTI
- Strain/ sprain

Symptoms of Benign LBP
- Dull and achy quality
- Diffuse aching with associated muscle tenderness
- Exacerbated with movement
- Relieved with rest in recumbent position
- No radiation, paresthesias
- No dermatomal pattern
- Pt. is able to find a position of comfort
- DTR are within normal limits

Risk Factors for Back Problems
- Non-modifiable:
  - Family history (osteoporosis/joint problems)
  - Age
- Modifiable:
  - Postural: Poor postural habits
  - Physical: Poor fitness in low back area
  - Behavioral: Lifestyle behaviors
    - Dangerous exercises or movements
    - Frequent or improper lifting
    - Extended standing or extended sitting
Are there risk factors for LBP?
- Obesity
- Smoking
- Poor education
- Pregnancy
- Socioeconomic status
- Flexibility, Strength & Endurance
- Age – Males = Females to age 60, then Females
- Size & Shape of Canal
- Psychosocial factors
- Occupation
  - Lifting
  - Vibration

Definitions
- Acute LBP: Back pain <6 weeks duration
- Subacute LBP: back pain >6 weeks but <3 months duration
- Chronic LBP: Back pain disabling the patient from some life activity >3 months
- Recurrent LBP: Acute LBP in a patient who has had previous episodes of LBP from a similar location, with asymptomatic intervening intervals

Anatomy
- Vertebral body
- Disc
- Intervertebral foramen
- Anterior longitudinal ligament
- Posterior longitudinal ligament
- Ligamentum flavum
- Facet joints

Anatomy Continued:
- Ligamentum flavum
- Intervertebral foramen
- Facet Capsular Ligament
- Interapophyseal Ligament
- Supraspinous Ligament
- Anterior longitudinal ligament

Intervertebral Disc
- Posterior disc receives innervation from the sinovertebral nerves
- Lateral disc receives innervation from the gray rami communicantes.
Ligaments
- Anterior longitudinal ligament
- Posterior longitudinal ligament
- Ligamentum flavum
- Interspinous ligament
- Supraspinous ligament

Diagnoses & Red Flags
- Cancer
  - Age > 50
  - History of Cancer
  - Weight loss
  - Unrelenting night pain
  - Failure to improve
- Infection
  - IVDU
  - Steroid use
  - Fever
  - Unrelenting night pain
  - Failure to improve
- Fracture
  - Age > 50
  - Trauma
  - Steroid use
  - Osteoporosis
- Cauda Equina Syndrome
  - Saddle anesthesia
  - Bowel/bladder dysfunction
  - Loss of sphincter control
  - Major motor weakness

Overview of Guidelines: ACP/APS 2007
- Diagnosis and Treatment of Low Back Pain: A Joint CPG from the American College of Physicians and the American Pain Society
- Two Supplemental Publications
  - Medications
  - Nonpharmacologic Therapies
Overview of Guidelines: ACP/APS 2007
- Multidisciplinary panel of experts
- Extensive literature review of RCTs only
- Systematic evidence review
- Intervention ➔ Level of Evidence ➔ Net Benefit ➔ Grade
- Formulated 7 key recommendations

Overview of Guidelines: ICSI 2010 14th Ed.
- Institute for Clinical Systems Improvement
  Health Care Guideline: Adult LBP
- “ICSI is a non-profit organization that brings together diverse groups to transform the health care system so that it delivers patient-centered and value-driven care.”

Overview of Guidelines: ICSI 2010 14th Ed.
- “Consistent & defined process” for guideline development using ‘Conclusion Grading’
- Primary care and practice oriented
  - Phone Triage
  - Assessment Tools
  - Performance Measures

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Evaluation of Low Back Pain
ACP/APS Key Recommendation #1:
- Focused physical and history should place LBP patients in 1 of 3 broad categories:
  1. NSLBP
  2. LBP potentially assoc. with radiculopathy/stenosis
  3. Back pain potentially assoc. with another specific spinal cause

* Strong rec, moderate-quality evidence

Causes of “Non-specific LBP”
- Acute lumbar strain
- Facet pain
- Discogenic pain
- Ligamentous pain
- Spondylosis
  (Osteoarthritis of facet/disk)
- Spondylolisthesis
- Kyphosis/scoliosis
**Pain History**

- **Localization:**
  - Where does it hurt? central, unilateral, bilateral
  - Does the pain go anywhere? upper lumbar, lower lumbar, gluteal, perineal, legs

- **Onset:**
  - When did the pain start? days, weeks, months, years
  - How did the pain start? suddenly, gradually

- **Severity:**
  - 0-10 Scale: Current? Average? Worst?

**Evolution:**

- How has the pain changed over time?

**Relationship to activity:**

- What postures or movements worsen the pain?
- Does it hurt to cough or sneeze?
- Does the pain wake you at night?
- What makes the pain better?

**Focused History**

- **Clarify Current Condition:**
  1. Pain assessment
  2. Neurologic involvement
  3. Previous history of LBP

- **Exclude RED FLAUS:**
  1. Cancer
  2. Cauda Equina
  3. Infection

**BAD low back pain (examples)**

- **CANCER (0.7%)**
  1. Age > 50 years
  2. History of Cancer
  3. Unexplained Weight Loss
  4. Failure to improve in 4-6 weeks

  → History of Cancer Raises Probability to 9%
  → If all 4 absent, cancer ruled out w/100% sensitivity.

- **CAUDA EQUINA (0.04%)**
  1. Urinary retention (if absent, likelihood is less than 1 in 10,000)
  2. Urinary Incontinence
  3. Saddle Anesthesia
  4. Fecal Incontinence
  5. Radicular Symptoms (less reliable)
Focused History

- SPINAL INFECTION (0.01%)
  1. Fever, recent infection
  2. IV Drug use
  3. Immunosuppression
  4. History of TB (inactive or active)

Specific Spinal Causes
- Red Flag Conditions
- FX: Compress/Traumatic
- Spondylolysis, - Listhesis
- Congenital Abnormalities (i.e. scoliosis)
- Paget’s Disease
- Inflammatory Arthritis (Ankylosing Spondylitis)

Non-Spinal Causes
- Ruptured AAA
- Retroperitoneal Hematoma
- Nephrolithiasis
- Pyelonephritis
- Endometriosis
- Pancreatitis
- Duodenal Ulcer

Focused History: Assessment of Psychosocial Risk Factors

Psychosocial risk factors are stronger predictors of outcome than exam findings and severity of pain!!

Focused History: Assessment of Psychosocial Risk Factors

- Belief that pain and activity are harmful
- Depressed mood
- Passive coping
- Disputed compensation claims
- Low job satisfaction
- Non-compliance
- Life stressors
- Lack of support

Focused History: Assessment of Psychosocial Risk Factors

6 Specific Screening Questions (ICSI):
1. Have you had time off work in the past with back pain?
2. What do you understand is the cause of your back pain?
3. What are you expecting will help you?
4. How is your employer responding to your back pain? Your Family?
5. What are you doing to cope with back pain?
6. Do you think you'll return to work? When?

Focused Exam

- Inspection of back, posture, +/- ROM
- Palpation of paraspinal m. and spine
- Straight leg raising
- Neurologic assessment of L4, L5, and S1 roots
- Non-Organic (Waddell’s) signs for malingering
**Clinical Evaluation**

**Lower Quarter Neurological Screen**

<table>
<thead>
<tr>
<th>Nerve Root Level</th>
<th>Motor Testing</th>
</tr>
</thead>
<tbody>
<tr>
<td>L1</td>
<td>Hip flexion</td>
</tr>
<tr>
<td>L2</td>
<td>Hip flexion</td>
</tr>
<tr>
<td>L3</td>
<td>Knee extension</td>
</tr>
<tr>
<td>L4</td>
<td>Knee extension, Dorsiflexion</td>
</tr>
<tr>
<td>L5</td>
<td>Great toe extension</td>
</tr>
<tr>
<td>S1</td>
<td>Plantarflexion</td>
</tr>
<tr>
<td>S2</td>
<td>NA</td>
</tr>
</tbody>
</table>

**Evaluation of Lumbar Spine Disease**

- **Reflexes:**
  - L3 - iliopsoas reflex (meaningful?)
  - L4 - knee jerk
  - L5 - extensor hallucis reflex (meaningful?), Medial Hamstrings
  - S1 - ankle jerk
  - Babinski - in adults, UMN lesion from motor strip to lower spinal cord

- **Range of Motion:**
  - Straight leg raise - most sensitive for sciatic pain syndromes
  - Pain in contralateral leg with straight leg raise is most specific for sciatic pain syndromes
  - Lumbar flexion/extension (lumbar stenosis worse with extension, better with flexion)

**Evaluation of Lumbar Spine Disease**

- **ROM to rule out other causes of back/leg pain:** internal and external hip rotation
- **Palpation over spine, SI joint, pelvis and hip**

**Diagnostic Testing:**

**When to Image**

1. **IMMEDIATE:**
   - Previous history of cancer (plain film + ESR)
   - Infection, cauda equina, SEVERE neurologic deficits (MRI)
2. **DEFERRED** imaging until trial of therapy complete:
   - Weak RP for cancer, A5, CompFx (plain film +/- ESR)
   - Radiculopathy, spinal stenosis (MRI)
3. **MRI imaging:**
   - Does not meet criteria above
   - Pain improved or resolved in 4-6 weeks
   - Previous spinal imaging w/no change in clinical status
Diagnostic Testing

**ACP/APS Key Recommendation #2:**

“Clinicians should not routinely obtain imaging or other diagnostic tests in patients with NSLBP.”

* Strong rec, moderate-quality evidence

**ACP/APS Key Recommendation #3:**

“Imaging/testing for patients w/ low back pain when severe or progressive neurologic deficits are present or when serious underlying conditions are suspected on the basis of history and physical exam.”

* Strong rec, moderate-quality evidence

**ACP/APS Key Recommendation #4:**

“Clinicians should evaluate patients with persistent LBP and signs or symptoms of radiculopathy or spinal stenosis with MRI (preferred) or CT ONLY if they are potential candidates for surgery or epidural steroid injection.”

* Strong rec, moderate-quality evidence

**Imaging Strategies for Low Back Pain: Systematic Review and Meta-Analysis.**

Lancet 2009.

- 6 RCTs of 1804 patients with acute or subacute non-specific low back pain
- NO difference in outcomes with routine imaging vs. usual care for pain, function, quality of life, anxiety, or patient-rated improvement

*Routine imaging = More cost w/o clinical benefit*
Diagnostic Testing

- Relationship of Early MRI for Work-Related Acute LBP with Disability and Medical Utilizations Outcomes. JOEM 2010.
  - 6-fold increase in surgery *
  - 5-fold increase in total cost *

Why is routine imaging not beneficial?
1. Abnormalities VERY common
2. Acute LBP has a favorable history
3. Imaging rarely affects treatment plans
4. Potential benefits offset by harms
5. Unintended harms related to ‘labeling’
6. May lead to unnecessary procedures

Plain Films

- Disc space narrowing
- Marginal sclerosis
- Vacuum phenomenon
- Disc calcification

Spondylolisthesis

- Localized pain from the free nerve endings at the fracture site
- Compression of the L5 nerve root as it exits the foramen
- Traction the S1 nerve root over the posterior aspect of the sacrum

Diagnostic Studies

- MRI indications
  - Possible cancer, infection, cauda equina syndrome
  - 6-12 weeks of pain
  - Pre-surgery or invasive therapy
- Disadvantages
  - False-positives; may not be causing pain
  - More costly, increased time to scan, problem with claustrophobic patients

MRI

Diagnostic Imaging for LBP: Advice for High Value Health Care from the ACP. Ann Int Med 2011.
Myelogram with CT
- To confirm clinical diagnosis
- Determines lesions at other levels
- Inflammatory complications of surgery
- Identifies disc fragments

Radionuclide Bone Scanning
- Assess metabolic activity of bone
- Infiltrating tumor
- Infectious processes and blood flow
- Inflammatory arthropathies
  - Adolescent LBP (r/o spondy) SPECT scan

Discograms
- Reproduce patients symptoms
- Assess characteristics of disc anatomy
- Most useful at L5-S1 level

Electrodiagnostic Studies
- Benefits
  - physiologic integrity of nerve root
  - changes in uncooperative patient noncompressive radiculopathy

Diagnostic Studies
- EMG/NCV
  - r/o peripheral neuropathy
  - localize nerve injury
  - correlate with radiographic changes
  - order after 6-12 weeks of symptoms
  - Pre-surgical or invasive therapy

Selective Blocks
- Nerve root
- Facet blocks
Lab Studies

- Indications
  - Chronic LBP
  - Suspected systemic disease
- CBC, CRP, ESR, +/- UA, SPEP, UPEP
- Avoid RF, ANA or others unless indicated

Additional Investigations

- Routine blood work – ESR, CRP, CBC for those who may have an infection or malignancy and have not improved. Urinalysis for unexplained LBP.
- May add SPEP, Serum immunoelectrophoresis
- HLA-B27 if xray suggests sacroiliac involvement.
- Psychological testing
- MMPI

Possible BAD Low Back Pain

- Cauda Equina:
  - MRI STAT → Neurosurgery consult
- Fracture: x-rays
  - MRI/CT if still suspect
- Cancer: x-rays + CRP, ESR, CBC (+/- PSA)
  - MRI if still suspect
- Infection: x-rays; CRP, ESR, CBC, +/- UA

Clinical Evaluation

- Sciatica:
  - General term for any inflammation involving sciatic nerve
- Causes:
  - Lumbar disc herniation
  - SI joint dysfunction
  - Scar tissue around nerve root
  - Nerve root inflammation
  - Spinal stenosis
  - Synovial cysts
  - Cancerous or noncancerous tumors

Disc Herniation

- Intervertebral Disc Herniation:
  - Extrusion of nucleus pulposus through annulus fibrosus
  - Impingement/pain on nerve root below affected disc
  - Sequestrated – nuclear material breaks away from rest of disc
**Clinical Evaluation**

- **Lumbar Disc Degeneration:**
  - Inspection:
    - Slow Gait
    - flattened lumbar spine
    - Changes in body position – guarded and painful
    - Changes in disc pressure
  - Standing position:
    - Lateral shift away from side of leg pain
  - Palpation:
    - Musculature spasm

**MRI lumbar image:**
- L5/S1 disc has suffered a 9mm disc extrusion (red arrow) that is not contained by the PLL.
- L4/5 disc has suffered a smaller 4mm disc protrusion (green arrow) that is contained by the PLL.
- L3/4 disc is completely normal and has no disc material projecting posteriorly into the epidural space.
- L3/4 disc is white in color, which indicates it is non-degenerated (i.e., full of water and healthy proteoglycan).

- Herniated discs (L4/5 & L5/S1) are "black" which indicates disc desiccation (lack of water and proteoglycan).

**Facet Joint Disease**

- **History:**
  - Onset: insidious
  - Pain characteristics: localized
  - MOI: extension, rotation, lateral bending of vertebrae
  - Predisposing conditions: repeated motions of spinal extension, rotation, lateral bending

**Spondyloysis/Listhesis**

- **Spondylosis:**
  - Defect in pars interarticularis (area between inferior and superior articular facets)
  - MOI: repetitive stress
  - Unilateral or bilateral defects
  - Listhesis:
    - Posterior portion of the vertebrae, laminae, inferior articular surfaces, spinous process separates from vertebral body
    - "Collared Scottie dog" deformity
  - Symptoms:
    - Localized low back pain (↑ during/after activity)
    - Pain with extension

**Sacroiliac Joint**

- **Sacroiliac Dysfunction:**
  - **History:**
    - Onset: acute or insidious
    - Pain characteristics:
      - One or both SI joints; possibly radiating pain in buttocks, groin, thigh
  - Predisposing conditions:
    - Prolonged stress
    - Postpartum women (relaxin levels)
    - Hormonal levels during menstruation

**Sacroiliac Joint image:**
- Lateral view of the lumbar spine: Bilateral break in the pars interarticularis (spondylolysis - black arrow)
- L5 vertebral body (red arrow) has slipped forward on the S1 vertebral body (blue arrow – spondylolisthesis)
- Normal pars interarticularis - white arrow.
- Degree of forward slippage is equal to about 1/4 to 1/2 of the AP diameter of S1 (Grade 1-Grade 2 spondylolisthesis).
Sacroiliac Pain

- Usually buttock, hip, groin location
- As high as 15% of all acute LBP
  - Fortin, J Spine 1994 – 10 volunteers had “mapping”
- Fortin, Tolchin, 2005 (Pain Physician)
- Joint injection may help – Pilot study
  - 31 patients – retrospective analysis
  - Total pain scores and disability scores were lower
  - Stignani CM, et al, Anit J PMR 2001

Spinal Stenosis

- Narrowing canal due to hypertrophy, HNP
- Neurogenic claudication. From metabolic deprivation, venous engorgement, blocked CSF impairs nutrient supply to N. roots
- Relief with spinal flexion
- Vague pain in buttocks, LE’s
- Cart use in supermarket
- Spinal stenosis

Spinal Stenosis

- NOT a cause of back pain
- The clinical presentation is neurogenic claudication
  - Classical presentation:
    - Bilateral thigh and or lower extremity pain for canal stenosis
    - Unilateral dermatomal radicular pain for foraminal stenosis
  - Variant presentation:
    - Buttock pain only with standing and walking

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Fortin, Tolchin, 2005 (Pain Physician)
Radiculopathy, Spinal Stenosis

- Sciatica (pain below knee)
- May have abnl neuro exam

Compression Fracture

- Sudden, severe back pain
- Neurological pain after lifting or bending
- Sudden pain when using leg
- Difficulty getting up or bending or leaning
- Loss of height
- Deformity of the spine - the curved, "hunchback" shape
- Nursing spine center referral

Issues specific to CHRONIC LBP

- (>6 weeks and/or non-responsive)
  - Evaluation
    - X-rays, labs
    - Evaluate for "YELLOW FLAGS"
  - Management
    - Medication selection
    - Interventions

YELLOW FLAGS in CHRONIC LBP

- Affect: anxiety, depression; feeling useless; irritability
- Behavior: adverse coping, impaired sleep, treatment passivity, activity withdrawal
- Social: h/o abuse, lack of support, older age
- Work: believe pain will be worse at work; pending litigation; workers comp problems; poor job satisfaction; unsupportive work env’t

Consideration

- Up to 85% of patients cannot be given a definitive diagnosis because of weak association among symptoms, pathological changes, and imaging results
  - Nachemson A, Spine, 1972

- Non-specific diagnosis leads to Non-specific treatments- leads to non-specific outcomes
  - Herring S, 1998

Red Flags for Serious Low Back Pain

- Recent significant trauma, or milder trauma age >50
- Unexplained weight loss
- Unexplained fever
- Immunosuppression
- History of cancer
- Intravenous (IV) drug use
- Osteoporosis, prolonged use of corticosteroids
- Age >70
- Focal neurologic deficit progressive or disabling symptoms
- Duration greater than 6 weeks
- Night pain
Treatment Options

ACP/APS Key Recommendation #5:
“Provide patients with evidence-based information on LBP with regards to expected course, advise patients to remain active, and provide information about effective self-care options.”

* Strong rec, moderate-quality evidence

ACP/APS Key Recommendation #6:
“Consider use of medications with proven benefits in conjunction with self-care. Assess baseline severity of pain and functional deficits, potential benefits/risks, and relative lack of long-term efficacy and safety before initiating meds.”

ACP/APS Key Recommendation #7:
“For pts who do not improve with self-care, consider the addition of nonpharmacologic therapy with PROVEN benefits.”

* Weak rec, moderate-quality evidence

Treatment Options: Medications (ACUTE)
- Acetaminophen: Good Moderate B
- NSAIDs: Good Moderate B
- Skeletal Muscle Relaxants: Good Moderate B
- Benzodiazepines: Fair Moderate B
- Opioids: Fair Moderate B
- Systemic Steroids: Fair None D
- Aspirin: Poor Unable I
- Tramadol, Antidepressants, Antiepileptic: No Evidence
**Treatment Options: Medications (Discussion)**

- Pain relief does not equal functional improvement
- Short term use is recommended
- More head-head data is needed
- Better evidence regarding long term use
- Better understanding of risk/benefit profiles

**Treatment Options: Medications**

- Bottom-line…ADAPT approach to each specific case
- **CONSIDER:**
  - Risk factors for complications
  - Potential for interactions
  - Duration and severity of pain
  - Cost
- ALWAYS discuss risks/benefits with the patient and document

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**Treatment Options: Nonpharmacologic (ACUTE)**

- **Superficial Heat:** Good Mod B
- **Advice Remain Active:** Good Small* B
- **Self-Care Information:** Fair Small* B
- **Spinal Manipulation:** Fair Sm-Md BC

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**Treatment Options: Nonpharmacologic (ACUTE)**

- Poor Evidence / Unable to Estimate / I
  - Acupuncture
  - Back Schools
  - Ultrasound
  - Lumbar Supports
  - Massage
  - Modified Work
  - TENS
  - Superficial Cold

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**Treatment Options: Nonpharmacologic (Subacute or Chronic)**

- **CBT:** Good Mod B
- **Exercise Therapy:** Good Mod B
- **Interdisc. Rehab:** Good Mod B
- **Spinal Manipulation:** Good Mod B
- **Acupuncture:** Fair Mod B
- **Massage:** Fair Mod B
- **Yoga (Viniyoga):** Fair Mod B
- **Firm Mattresses:** Fair None D
- **Traction:** Fair None D

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**Treatment Options: Counseling (ICSI)**

- Most improve in 4 weeks
- Bed rest NOT recommended
- Recurrence expected
- Adopt lifestyle changes
- Remain active
- Discuss red flag symptoms
- Re-evaluate in 2-4 weeks if NO improvement
Treatment Options: Self-Care Brochures (ICSI)
- Focus less on anatomy, ergonomics, & exercises
- Focus on benign course of LBP, reduction of fear, and promotion of active self-management
- Emphasize lack of serious disease when red flags are absent
- Hurt is NOT equal to harm
- Progressive resumption of work activities

Key Points
- Classify the patient’s back pain.
- Assess and treat prognostic indicators.
- Avoid unnecessary imaging.
- Utilize proven therapies.
- Take the time to educate.

Approach to LBP
- History & physical exam
  - Classify into 1 of 4:
    - BAD: LBP from other serious causes
      - Cancer, infection, cauda equina, fracture
    - LBP from radiculopathy or spinal stenosis
    - Non-specific LBP
    - Non-back LBP
  - Workup or treatment

Management of an acute low back muscle strain should consist of all the following EXCEPT:
1. X-rays to rule out a fracture
2. Educate the patient on generally good prognosis
3. Non-opiate analgesics
4. Remain active

What to do about Non-specific Low Back Pain
- Educate patient about expected good prognosis
- Advise to remain active as tolerated
- Provide analgesics and self-care directions
- FU in 2-4 weeks; adjust tx as needed
- Don’t do x-rays unless it becomes chronic
- WU if no improvement

Integration of Therapy
- Physical therapy
- Pilates for Core strengthening
- Chiropractic
- Home Education
- Wellness program including Tai Chi and other enhancement
- Pain Management
Non-operative treatment of lumbar disc herniation

- Saal JA and Saal JS (1989)
  - 64 patients with CT and EMG confirmed HNP
  - Aggressive rehab
  - 90% good outcome and return to work
  - 6 patients 4/6 w/stenosis req. surgery
  - 52 patients w/degenerative stenosis treated w/rehab & ESI
  - 63% improved pain and ADL scores
  - 4 required surgery

Physical therapy

- Provide additional evaluation
- Provide initial treatment modalities
  - Deep heat/ultrasound
  - Different types of massage
  - TENS/Estim
- Provide exercise treatments
- Address areas of tightness, weakness, instability
- Communicate findings to MD
- Communicate progress in therapy

Role of the physical therapist (stretching is not evidence based medicine)

Why therapy?

“While pain relief may be achieved, the functional deficits persist and maladaptive patterns emerge...”
- Stan Hamling, MD

- Combat effects of bedrest
- Certain muscles are prone to tightness, others prone to weakness
- Vladimir Janda 1993 JOSPT

What therapy?

- Williams flexion exercises
- But did not work in everybody
- Flexion caused increased intradiscal pressure
- Nachemson AL 1981
- Used now for stenosis patients

Mc Kenzie extensions

- Goal is centralization of leg pain
- Decrease intradiscal tension
- Decrease nerve root tension
- 76/87 patients achieved centralization and outcomes good-exc in 83%
  - Donnalson R 1997 Spine
Lumbar stabilization

- Basics: Finding “neutral spine” where there is the least pain
- Performing the stretching and strengthening in this position
- Individualized rehab
- “Painless” Rehab
  - Saal JS et al 1992

What is “the Core”

- It is the lumbo-pelvic-hip complex
  - Center of Gravity is located there
  - Where all movement begins
- It consists of 29 different muscles

The Core Muscles

<table>
<thead>
<tr>
<th>Lumbar spine/muscles</th>
<th>Abdominal muscles</th>
<th>Hip muscles</th>
<th>Transversospinalis Group</th>
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<tbody>
<tr>
<td>Transversospinalis group</td>
<td>Rectus Abdominus</td>
<td>Gluteus Maximus</td>
<td>Rotatores</td>
</tr>
<tr>
<td>Erector Spine</td>
<td>External Oblique</td>
<td>Gluteus Medius</td>
<td>Interspinales</td>
</tr>
<tr>
<td>Quadratus Lumbrorum</td>
<td>Internal Oblique</td>
<td>Psoas</td>
<td>Intertransversarii</td>
</tr>
<tr>
<td>Latissimus Dorsi</td>
<td>Transverse Abdominus</td>
<td>Semispinales</td>
<td></td>
</tr>
</tbody>
</table>

Rationale for Core Training

- Will improve
  - Posture
  - Muscle balance
  - Stabilization
- Help prevent low back pain
- Help prevent the development of muscle imbalances and inefficient neuromuscular control
- All movement starts here

Strength Training Exercises

- Planks
- Trunk Bridge
- Front plank with lower extremity on Theraball
- Theraball curls
- Supermans
- Trunk bridge with leg extension

Planks

- Lie on your stomach
- Forearms flat on floor with hands together
- Feet together with toes on ground
- Lift stomach off ground and hold
- Keep body in straight line from shoulders to toes
- Keep stomach tight
Trunk Bridge
- Lay with back on Theraball
- Feet flat on floor, and knees bent to 90 degrees
- Move forward until just shoulders are on Theraball
- Keep body in a straight line from head to knees
- Keep stomach tight

Front Plank with lower extremity on Theraball
- Lay with stomach on Theraball
- Walk hands out until lower leg is on Theraball
- Keep arms extended.
- Stay in straight line head to toes and hold
- Keep stomach tight

Theraball Curls
- Lay on ground with heels on Theraball
- Arms out to side for stability
- Lift hips off ground until just the shoulder blade is in contact with the ground
- Curl legs in towards the body and hold
- Return to start position and repeat
- Keep stomach tight

Superman
- Lay with stomach on ground
- Extend legs and arms
- Lift left arm and right leg and hold
- Lower slowly and then lift opposite arm and leg
- Keep hips neutral (do not roll with movement)
- Keep stomach tight

Trunk Bridge with Leg Extension
- Lay with back on ground
- Put feet flat on floor with knees bent at 90 degrees
- Lift hips off of ground and hold
- Lift one foot off of ground and extend lower leg
- Return to starting position and then lift other leg
- Keep body in a straight line between head and knees
- Keep stomach tight

Trunk Bridge with Leg Extension (continued)
Exercise Progression

As training program progresses it may be necessary to increase the difficulty of the exercises, or change the program.

Dynamic Stabilization/Pilates

Modalities

- TENS
- Ultrasound
- Electrical stimulation
- Ice and Heat
- Biofeedback
- Acupuncture
- Laser
- Others

What to do about Suspected Radiculopathy or Spinal Stenosis

- Refer to Physical Therapy
- Follow in 2-4 weeks for progress
- If no improvement by 6-12 weeks
  - Plain films, MRI, +/- EMG/NCV
  - Refer for interventions
    - Epidural steroid injections for radiculopathy

Bracing

- Restrict ROM
- Reflexive muscle relaxation
- Reduce soft-tissue swelling and edema
- Generates heat, pressure, massage like effect
- Increase trunk support and improve posture

Bracing Types

- Corsets
- Lumbar belts
- SIJ belt and corset
- Rigid orthoses – chairback
- Cruciform anterior spinal hyperextension (CASH)
- Custom molded
Medications in Chronic LBP
- **FIRST**: Acetaminophen
- Second: NSAIDs
  - If one fails, change classes
    - Meloxicam → naproxen → COX2’s
- Third: tramadol
- Fourth: tri-cyclic antidepressants
  - Radiculopathy: gabapentin
- LOATHE: narcotics

Non-pharmacologic treatments
- **EFFECTIVE**
  - Acupuncture
  - Exercise therapy
  - Behavior therapy
  - Massage
  - TENS
  - Spinal manipulation
  - Multidisciplinary rehab

- **NOT EFFECTIVE/CONFLICTING EVIDENCE**
  - Back schools
  - Low-level laser
  - Lumbar supports
  - Prolotherapy
  - Short wave diathermy
  - Traction
  - Ultrasound

Epidural Steroid Injections
- Indicated for radiculopathy not responding to conservative mgmt
  - Conflicting evidence
  - Small improvement up to 3 months
  - Less effective in spinal stenosis

Trigger Point Injection
- Beneficial in patients with tender points in the lumbar paraspinals or iliolumbar ligaments associated with myofascial pain syndrome.
- Limited benefit observed in heterogeneous, low quality studies.
- Several studies found the injections superior to control intervention but not statistically significant.

Surgery for Chronic LBP
- Most do NOT benefit from surgery
- Should have ANATOMIC LESION C/W PAIN DISTRIBUTION
- Significant functional disability, unrelenting pain
  - Several months despite conservative tx
- Procedures: spinal fusion, spinal decompression, nerve root decompression, disc arthroplasty, intradiscal electrothermal therapy
Myofascial Pain

- Generalized non-descriptive pain
- Diffuse but more spinal
- Overall deconditioning
- Poor sleep associated

Underlying Effects of Manual Medicine

- Improved pain and increased movement
- Less deconditioning
- Interruption the pain/spasm cycle
- Restoration of function
- Muscle rebalancing

High Velocity Low Amplitude Thrust (HVLA)

Post Isometric Relaxation

Neurotoxin

- Injection of Neurotoxin into the paraspinal muscles to cause graded neuromuscular blockade
- Foster, 2001: Small randomized trial of patients with chronic LBP. Superior to placebo and improved function at 8 weeks 60% vs. 16%.
Acupuncture

- Useful adjunct in pain management
- Wide variety of conditions: post-operative pain, fibromyalgia, headache, low back and neck pain, myofascial pain, osteoarthritis, enthesopathy, rheumatologic conditions
- National Center for Complementary and Alternative Medicine (NCAM) funded studies

Tai Chi

Maintenance exercise

- Yoga
- Pilates
Rehabilitation must connect to the workplace

“We conclude that there is moderate evidence of positive effectiveness of multidisciplinary rehabilitation for subacute low back pain and that a workplace visit increases the effectiveness.”

Cochrane Database Systematic Review 2000;(3):CD002193

Summary

- Classify the patient’s back pain.
- Assess and treat prognostic indicators.
- Avoid unnecessary imaging.
- Utilize proven therapies.
- Take the time to educate.

Summary

- Spine pain – many facets
- Commonly found, frequently misunderstood
- Keep in mind less common causes of LBP
- Many treatment options
- A coordinated and comprehensive program is the best approach
- Keep an open mind and know as many options as possible working in team oriented approach

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