A PHYSIATRIST’S VIEW ON LOW BACK PAIN: PART I
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Objectives
Session 1
- Discuss the relevant anatomy, history and physical exam in a patient with acute Low Back Pain
- Generate a Differential Diagnosis, based on history and physical examination

Objectives
Session 2
- Identify appropriate diagnostic tests as further work-up to confirm diagnosis
- Discuss Treatment Algorithms – conservative and invasive

Epidemiology
- 60-90% lifetime prevalence
- 15 million office visits annually
  - 80 – 90% resolve in 1-3 months
  - Approximately 10-30% become chronic (> 6 Mth)
- 80 – 90% of health care costs come from the 10% or so who develop chronic back pain
- Total health care costs related to back and neck pain amount to roughly $ 50 billion annually

Common conditions causing LBP
- Spondylosis
- Spondylolysis
- Spondylolisthesis
- Canal Stenosis
- Disc herniation / degeneration
- Fractures
Low Back Pain is a symptom, not a disease

ANATOMY OF LBP: PAIN GENERATORS

- Vertebral bodies (Periosteum)
- Facet joints (Medial branch of DPR)
- Annulus fibrosis (the outer 1/3 - the “shock absorber”)
- Ligaments: ALL, PLL, Interspinous
- Musculature
- Nerve Roots (Dura)

Non-Innervated Structures

- Inner 2/3 Annulus fibrosis
- Ligamentum flavum
- Nucleus pulposus

Innervated Structures: Joints, ligaments & Nerve Roots

Innervated Structures: Muscles

Important Points in History

- Age
- Onset: Trauma?
- Location: Radiation?
- Duration
- Characterization
- ↑/↓ factors
- Constant / intermittent
- Progress / Treatment so far

Neurologic symptoms (positive and negative)
Age in LBP
- Older age:
  - CA
  - Mets
  - Infection

Co-relating history with the Pain Generator Source

RED FLAGS (Associated symptoms)
- Age >70
- Night / rest pain
- Unexplained weight loss, h/o CA
- Fever with chills
- Immunosuppression, IV drug use, prolonged use of corticosteroids
- Duration greater than 6 weeks
- Weakness, Bowel / Bladder or Erectile dysfunction
- Associated morning stiffness, iritis, colitis, skin rash, urethral discharge

DEFINITIONS

Mechanical Low Back Pain
- Low Back Pain, generally triggered by an ACUTE event
- Aggravated by activity e.g. bending, lifting, walking
- Relieved by rest / recumbency
- May radiate to buttock, hip, rarely thigh, rarely distal to knee
- NO ASSOCIATED NEUROLOGIC SIGNS e.g. weakness or numbness

MECHANICAL LOWBACK PAIN (contd)

- SOURCES:
  - Disc, facet joint, ligament, muscle, instability
- SCLEROTOMAL PAIN:
  - Pain arising from pain-sensitive tissues of the vertebral joint complex is expressed sclerotomally
Non-mechanical Back Pain

- Generally no preceding acute event
- Constant pain at rest
- +/- night pain
- No relief with recumbency / rest / change in position
- NO RADIATING LEG PAIN

Non-mechanical Back Pain

- Causes:
  - Infection (bone, disc, epidural space)
  - Neoplasm (primary / secondary)
  - Inflammatory arthritides e.g. A.S. / seronegative spondyloarthropathies
  - Miscellaneous e.g. Pager’s disease
  - Referred pain e.g. abdomen / retro peritoneum

Mechanical Low Back Pain

1. Preceding Acute event
2. Intermittent, constant later
3. Aggravated by activity & relieved with rest
4. No constitutional symptoms
5. Usually no night pain
6. No radiation distal to knee

Non-mechanical Low Back Pain

1. No Acute event
2. Constant, from the outset
3. No relief with rest or recumbency
4. Constitutional symptoms +
5. Usually night pain +
6. No radiation distal to knee

Categories: Mechanical Back Pain

1. Discogenic Pain
2. Facetal Pain  Radicular Pain ?
3. Instability Pain  Myofascial Pain ?
4. Claudication Pain

Facet joint Pain:

- Acute / subacute, trauma +/-
- Referral to buttock area is common (SCLEROTOMAL)
- Exacerbated with Lumbar flexion
- Usually relieved by lying down

Discogenic Pain

- Acute onset, s/p trauma (usually)
- Often described as “Band-like” Back Pain
- Exacerbated by Lumbar flexion
- Initially intermittent, in 1-2 years, becomes constant (as disc space collapses / end plates are eroded) and worsened with slightest of activity
Radicular Pain:

- Acute onset, s/p trauma (usually)
- Back Pain +/- for several years
- LMET Pain down to the hand – usually sharp, shooting / stabbing
- In a DERMATOMAL / RADICULAR fashion
- Paresthesias usually ++

Exam:
- SLR: strong ++
- Associated findings e.g. weakness, atrophy, loss of reflexes

Radicular Vs Sclerotomal Pain

<table>
<thead>
<tr>
<th>Symptom</th>
<th>Radicular Pain</th>
<th>Sclerotomal Pain</th>
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</thead>
<tbody>
<tr>
<td>1. Radiation distal to knee</td>
<td>++</td>
<td>Usually --</td>
</tr>
<tr>
<td>2. Dermatomal pattern</td>
<td>++</td>
<td>--</td>
</tr>
<tr>
<td>3. Associated weakness, reflex loss, atrophy</td>
<td>++</td>
<td>--</td>
</tr>
<tr>
<td>4. Chiropractic manipulation</td>
<td>Less likely to help</td>
<td>Appropriate Indication</td>
</tr>
</tbody>
</table>
Radiculitis Vs Radiculopathy

- Radicular pain, exam suggestive of nerve root involvement
- No neural compression on MRI
- Annular tears usually + (HIZ on MRI T2 imaging)

Claudication Pain:

- Back pain for several years
- Leg pain is the most common "presenting incapacitating symptom"
- Usually Bilateral
- Vague: "heaviness, cramping, soreness" (multiple NR involvement & ischemic rather than an acute inflammatory component of the radiculopathy)

Neurogenic vs Vascular Claudication

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<thead>
<tr>
<th></th>
<th>Neurogenic Claudication</th>
<th>Vascular Claudication</th>
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<tbody>
<tr>
<td>Location of Pain</td>
<td>Back, Thigh, Calf, rarely in buttock area</td>
<td>Usually calf +/- buttock</td>
</tr>
<tr>
<td>Quality</td>
<td>Vague: radicular, cramping, “heaviness”</td>
<td>Sharp, cramping</td>
</tr>
<tr>
<td>Aggravating factors</td>
<td>Spine extension, Standing, Walking, especially downhill</td>
<td>Not affected by spinal position or by standing, but by walking or any leg exercise</td>
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<td>Relieving factors</td>
<td>Flexed spine posture, lying down, sitting, slow relief</td>
<td>Stopping muscular activity even standing, quick relief</td>
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<tr>
<td>Skin / Vascular exam</td>
<td>Paresthesias common</td>
<td>Weak / absent pulses, atrophic skin changes</td>
</tr>
<tr>
<td>SLR</td>
<td>Mild +/- or negative</td>
<td>Negative</td>
</tr>
<tr>
<td>Neurologic exam</td>
<td>+/- depending on severity</td>
<td>Negative</td>
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Instability

- Often-used term
- 2 definitions
- Mechanical (Gross) Instability
  - Relative motion of one vertebrae on another, seen on flexion/extension films
  - Requires evaluation by spinal surgeon
- Micro-instability
  - Refers to very small movement, caused by tissue damage, poor muscular endurance, or poor muscular control
  - Contributes to Mechanical Low Back Pain
Myofascial Low Back Pain

- In the face of a non-focal neurologic exam, normal plain film, a normal MRI, and continued low back pain, a diagnosis of myofascial pain must be considered
- Treatment – antidepressants, trigger point injections, stretching, strengthening, ROM, aerobic exercise

Referred pain

- SI joint pain: groin, trochanter & buttock
- Hip joint pain
- Abdominal organs

PHYSICAL EXAMINATION

- Examine every patient with LBP in a gown !!!
- Gait: while walking into the room
- Posture with standing
  - Bending forward / Leaning to one side
  - Weight bearing on one leg more than the other
- Spine deformity e.g. scoliosis, kyphosis, lordosis
- Limb length discrepancy

PALPATION

- Muscles:
  - Paraspinals, gluteals, piriformis, quadratus lumborum, TFL
- Bony prominences:
  - Spinous processes
  - Facets
  - Iliac crest
  - Ischial tuberosity
  - Greater trochanter
ROM and rhythm
- Flexion: 40 – 60 deg
- Extension: 20 – 35 deg
- Side bending: 15 – 20 deg
- Rotation: 15 – 20 deg

Which range specifically reproduces the pain?

Neurological Exam
- Strength testing (MMT): 0 – 5
  - Hip flexors: L2/3
  - Quads: L3/4
  - Tibialis Anterior: L4
  - EHL: L5
  - Gastroc: S1
  - Toe/Heel walking

Neurological Exam (contd)
- Reflexes: 0 – 4+ (clonus): Compare side to side
  - Knee (Patellar): L4
  - Tibialis Posterior: L5
  - Ankle (Achilles): S1
  - Medial Hamstring: L5/S1
  - Abdominal Reflexes: T6-T12
- Sensations:
  - LT / Pinprick/Temp

SPECIAL TESTS
To complete the physical exam in a patient with LBP, it is important to examine the following:
- Nerve Root tension signs
- Hip joints
- SI joints
- Lumbar facets

SLR (Straight Leg Raise):
- Purpose: stretch the sciatic nerve by elevating the lower limb
- Patient lies supine with his pelvis flat on the bed and in a neutral position
- Elevate the leg by cupping your hand below the patient's heel, slowly, with the knee locked in extension => ask the patient whether elevating the leg causes any pain in the leg/foot below the ipsilateral knee

SLR: Positive test
- (+) if reproduces same pattern of leg pain below the ipsilateral knee; occurs between 30 – 70 deg of hip flexion
- Pain felt below < 30° elevation: Not sciatica, the sciatic nerve roots are not sufficiently stretched
CROSSED SLR:
- If pain is felt below the knee in the opposite (symptomatic) leg while the ipsilateral (asymptomatic) leg is being raised => highly specific for sciatica of the opposite leg (crossed straight leg raising test) - although it is a very insensitive test
- C/L axillary disc herniation

Laségue’s sign:
- Pain on leg raising => lower the leg a few degrees => the pain should disappear / lessen
- then dorsiflex the foot in that position
- re-appearance / aggravation of the pain suggests sciatica
- Flex the knee: should relieve the pain
- If patient still has pain with the knee flexed
- ??? Hip pathology vs non-organic pain

Bowstring sign:
- Flex knee till pain abates
- Rest limb on shoulder
- Pressure in the medial and lateral parts of popliteal fossa over the HS tendons and tibial and peroneal nerves
- Pain over the nerves
- No pain on pressure over the tendons

Sitting SLR:
- Often used when there is concern whether LBP is organic
- Positive Tripod Sign
- Very strong ++ test for root tension when considering non-organic pain

Concern with sitting SLR:
- Sensitivity of the supine SLR test was .67 compared with a sensitivity of .41 of the seated SLR test (P=.003)
- The traditional SLR test performed in a supine position is more sensitive in reproducing leg pain than the seated SLR test in patients presenting with signs of and symptoms consistent with lumbar radiculopathy and MRI evidence of nerve root compression

False negative SLR:
- Proximal lumbar disc herniation

Femoral Nerve Stretch Test for Proximal Lumbar Disc Herniation
SLR Sensitivity & Specificity

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<thead>
<tr>
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<th>Sensitivity (%)</th>
<th>Specificity (%)</th>
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<tr>
<td>SLR</td>
<td>73-98</td>
<td>11-61</td>
</tr>
<tr>
<td>Crossed SLR</td>
<td>23-43</td>
<td>88-98</td>
</tr>
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Lumbar facet exam

- TTP laterally over the facet area
- Loading lumbar facets causes pain
  - Standing position
  - Extension
  - Lateral flexion
  - Causes pain +/- TTP

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  - Extension
  - Lateral flexion
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SI joint Stress Tests:

- “Fig 4” test
  (FABER test)
- Gaenslen’s test
- Multiple other tests

Special Tests (contd):

- Ober’s test
  - Assess tightness of TFL & IT band

Waddell’s signs

- Indicates symptom magnification and nonorganic etiology of LBP
- DOES NOT MEAN PATIENT IS MALINGERING

Waddell’s signs

- 3/5 of the following needed:
  - Inappropriate tenderness (skin rolling)
  - Reproduction of pain with axial loading
  - Inconsistency with exam (SLR supine vs sitting)
  - Regional sensory deficits
  - Overreaction to exam
Bibliography

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3. MacNab's Backache 4th edition: David A Wong & Einer Transfeldt (Author)


