Evaluation and Treatment of Low Back Pain

Robert Lanter, D.O.
Physiatrist
Lumbar spine common diagnosis:

- Lumbar Radiculopathy/Radiculitis
- Lumbar Spinal Stenosis
- Cauda equina syndrome
- Lumbar Sprain
- Lumbar HNP "slipped disc"
- Sciatica
Three column model of spinal stability
Lumbar Spine

- lateral view: 
- vertebral bodies 
- foramina 
- facet joints 
- spinous processes 
- intervertebral disc spaces
lumbar spine oblique

scotty dog:

pars fx./use this view
Lumbar Spine  L3 - L4

- lose cupid’s bow (lower endplate) w/compression fx.
CT coronal view L-Sp.

Fig. 8.36 (A) CT section through the body of L-3 demonstrates an axial view of the pedicles, transverse processes, and laminae, as well as a cross-section of the thecal sac and the superior part of the spinous process. (B) In a section through the base of the intervertebral foramina, the caudal part of the body and spinous process are seen. (C) At the L3-4 disk space, the facet joints are in full view, and the spinous process and laminae of L-4 can no longer be seen. Note the appearance of the ligamentum flavum.
Lumbar spine myelogram

- conus medularis (T-12)
- cauda equina L-S nn. roots
Lumbar Spine

- low backpain: 60-90% lifetime prevalence
- Annual Incidence 5 - 10%
- affects over 100,000 people in the USA alone
- Usually self limited but with periodic recurrences over time
- 50% resolve in 2 weeks
- 90% resolve 6 -12 weeks
- 85% recurrence over 1 - 2 yrs
Proper Tx. depends upon accurate Dx.

A proper evaluation begins with the Hx. and Physical Exam.

After 6 months - 50% of pts. return to wk., 1yr. - 25%, 2yrs. - 0% return to wk.
History and Physical Examination

What brings you to my office?

Location: Where does it hurt?

Nature of injury: How and when did “you” get hurt?

How does it affect Bowel or bladder habits, ADL’s, chores, work and interpersonal life?

Review of systems
Lumbar Spine
hx. con’t

- Has this been treated in the past?
- How?
- Did it help? and if so, how? and if not, why?
Red Flags

- Gait/Ataxia/upper motor neuron signs: myelopathy
- Bowel / Bladder, LE weakness saddle anesthesia sexual dysfxn: cauda equina synd.
- Night Pain wt. loss.: Tumor/Malignancy
- Fever Chills : Spinal Infection/abscess
Lumbar Spine

Family History: OA, RA, Lupus or other collagen vascular diseases, Spinal disorders congenital birth defects, i.e., spina bifida, scoliosis
Lumbar Spine Examination

- Inspection
- Palpation
- Range of motion
- Power or strength testing
- Neurological Examination
- Dx. & Tx. (aka. dicks and tricks)
Regions of interest
L-Spine

- Midline raphe
- Iliac crest
- PSIS
- Sciatic area
- ant. abdominal wall and inguinal area
The lumbar spine

- contains cauda equina (horses tail)
- provides mobility to the back
- transmits weight/forces to pelvis and lower extremities from the upper body
- great range of motion; why? not restricted by ribcage as is thoracic spine
inspection: posture/skin

- redness mottling of skin: infection chronic heating pad use
- Port wine stains, Lipomas, hairy patches over the spine may indicate underlying bony defects i.e., spina bifida
- skin tags: neurofibromatosis
- listing to a side: HNP/sciatica
- hyperlordosis: abdominal wall weakness, pelvic girdle and lower extremity weakness may be associated with muscular dystrophies
look for asymmetry: spine, scapulae, sacrum, spinal curvature, scoliosis, kyphosis, gibbus deformity

Fig. 1. Skin markings.
Lumbar spine observation

- flattened lumbar lordosis
- muscle spasm
- kyphotic deformity of thoracic spine wedge compression fractures

Gibbus deformity

Fig. 3. Paravertebral muscle spasm.

Fig. 4. Gibbus deformity.
wedge compression fracture

affects anterior 1/3 of vertebral body

severe wedging causes a gibbus deformity
Vertebral Compression fractures

- Treatment: relative rest for two weeks
- custom TLSO
- PT including gait aids
- Kyphoplasty
Lumbar Spine observation

- scoliosis thoraco-lumbar spinal deformity - name the spinal curves
- right thoracic convexity; left lumbar convexity
- what determines head position?
Lumbar Spine

- inspection should reveal:
- a normal lordotic curvature
- similar to that of the cervical spine.
what is Gower’s sign

is it always associated with muscular dystrophy
Palpation

1. Sit behind the patient and palpate iliac crest—and reach to the L4 spinous process—same height: palpate spinous processes and SI joint.
posterior L-spine

- supraspinous ligament: extends from C7 - S1 and is palpable

- intraspinous ligaments: attach from one spinous process to another connecting the adjoining spinous processes; they are short and strong and do not overlies the spinous processes themselves

- paraspinal muscles: Sacrospinalis muscles: spinalis, longissimus and iliocostalis
palpation

PSIS:S2

spina bifida
“step off” - listhesis: palpate down the sacrum to the sacroccocygeal junction and to the coccyx. Can be injured by trauma / can be injected.
palpation

- palpate ischial tuberosity for ischial bursitis
- this is a weight bearing surface that is commonly inflammed by long sitting on hard surfaces and by direct trauma;
- site of Ischial Bursitis and is “injectable”
Sciatic Region

- midway between ischial tuberosity and greater trochanter
- sciatic nn. is the largest nn. in the body exits via greater sciatic foramen under/through piriformis
Lumbar spine

- palpate for paraspinal spasms/tenderness
- supraspinous ligament defect/tear
- fatty lipomas/hair fistulas indicative of spinal pathology ex: spina bifida
palpation: ant. aspect spine

- aortic bifurcation @ L3/L4
- umbilicus @ L3/L4
- in the olden days Drs. palpated deeply into the abdomen
Range of Motion

test and measure

rotation/side bend/lat flexion:
best tested sitting
pelvic obliquity

- observe and palpate for pelvic obliquity which may be due to leg length discrepancy

- Leg length measurement:
  - Real: ASIS - Med. Mall.
Thoraco-Lumbar Spine Scoliosis

- congenital
- acquired
- measurement of curvature: Cobb’s angle
Scoliosis

- congenital: vertebral deformity: hemivertebra deformities can be severe w/pulmonary fxn. compromise and may result in spinal cord compression

- acquired: usually idiopathic (90%) or secondary to developmental disturbances
scoliosis: “Stats”

- 4-5% of all school children
- infantile 0-4 yrs
- juvenile 4 -10 yrs
- adolescent 10 yrs - skeletal maturity
- thoracic/lumbar curvature is usually less than 60 deg.
Scoliosis

con’t

(acquired/secondary)

- intraspinous tumors; neurofibromatosus
- myopathies: muscular dystrophies
- mesenchymal disorders: marfan’s syndrome
- vertebral tumors
- RA/Vertebral Fx./Nerve root compression
Lumbar Spine

any chronic - abnormal spinal curvature will cause:

- overloading of facet joints
- overstretcing of ligaments
- intravertebral disc displacement
Lumbar Spine Neurological Eval.

- T12, L1, L2, L3
- Muscle Test
- Sensibility Test

No reflex test use motor power and sensory exam/dermatomes
Dermatomes fem.cut.nn.

iliopsoas muscle testing T12-L3: resisted hip flexion
L2 L3 L4

- Femoral nn.: Resisted knee extension: Quadriceps
- Obturator nn: Resisted hip adduction
- Sensory: the knee separates L3 (above) from L4 dermatome (below)
L4 deep peroneal nn: tib ant. resist dorsiflexion and inversion

- Patellar tendon reflex: primarily L4

- Sensation: medial leg and foot
L5 deep peroneal nerve: great toe dorsiflexion: ext. hallucis

No reflex

lateral leg and dorsum of foot
S1 sup. peroneal nn.: Peroneus L&B: resist plantarflexion and eversion
S1 S2 post. tib nn. too strong to test
S1 inf gluteal nn: glut max: resisted hip ext.
Achilles tendon reflex
lat. mall./side and sole of foot
S2  S3  S4

- intrinsic musculature of the foot
- innervation of the bladder
- S2,3,4,5 dermatomal bullseye around anus
provocative testing

- babinski: dorsiflexion of great toe
- positive testing is a sign of upper motor neuron injury
upper motor neuron vs lower motor neuron
central vs. peripheral nervous system
What is a myelopathy?
straight leg raising test

- L5, S1 nn root irritation
- HNP
- Space occupying lesion
- Sciatica
- Ipsilateral vs contralateral
milgram test: intrathecal pressure

must hold legs up for 30 seconds

intrathecal pathology

space occupying lesions: HNP
Kernig’s sign: flex neck and increase intrathecal pressure

Meningeal and or dural irritation localizing to C spine or L spine region
increase intra-abdominal and thus intrathecal pressure

- valsalva maneuver
- ask about this in history

Fig. 46. The Valsalva maneuver.
Herniated Nucleus Pulposus

- nucleus pulposus migrates through the annulus fibrosus
- causes direct compression and release of phospholipase A2
- most common sites: L4-5, L5-S1
- 30 - 40 yrs old
- Nucleus: type 2 collagen, water, and proteoglycans
- Annulus: type I fibrous
- Avascular by adulthood
clinical presentation: HNP

- causes: spontaneous, bending, lifting, sneezing

- Severe pain, spasm, listing to one side may or may not be radicular

- central: multiroot involvement/causa equina syndrome

- peripheral - radicular w/LBP

- far lateral - radicular
HNP Evaluation

- Exam reveals that the patient is relatively acute with severe, most often radicular pain
- PE: paraspinal spasm, loss of lumbar lordosis or sidebending secondary to spasm
- + SLR, Possible reflex changes
- Sensory changes in dermatomal distribution
HNP con’t

- X rays of lumbosacral spine AP Lateral and Oblique views
- MRI or CT scan, CT - Myelogram of lumbar spine
HNP Tx:

- Rest: 3 days is as good as 5 or even 7 not strict bedrest
- Medication: narcotics, NSAIDs, muscle relaxers, TCA, oral steroids
- Physical therapy
- Trigger Point injections
- Acupuncture
- Epidural Injections, facet blocks etc...
- OMT
HNP Tx. Con’t

• PT-spinal stabilization- Mackenzie programs
• Modalities
• Patient education, home program
• Traction:
  contraindicated with spinal instability, acute injuries, R.A, Radiculopathy of unknown etiology
HNP Tx: con,t

- Surgical spinal decompression is indicated with progressive neurological deficits, cauda equina syndrome, unremitting pain, myelopathy
HNP outcomes

- 85% of patients get better within 6 - 12 weeks
- 85% of the 15% that do not get better in the first 6 – 12 weeks get better over the course of a year
- Not that many people really need surgery although there are new reports of better surgical outcomes with shorter periods post op treatment as compared to non surgical outcome: also depends on selection of patients
Epidural Injections

- Epidural injections, facet blocks etc. are done under fluoroscopic guidance and have very good short term results for some patients.
- Procedure is “operator dependent” and may help get patient over the rough spots.
pathophysiology of lumbar spine:
dysfunction, instability & stabilization

acute HNP

chronic

Figure 4-152. The Degenerative Cascade.
Cauda Equina Syndrome

- Large central HNP
- Epidural tumors
- Hematoma
- Abscess
- Trauma

S/S: low back pain, lower extremity weakness, bowel and bladder changes, saddle anesthesia including back of legs and soles of feet, sexual dysfunction
Cauda Equina Syndrome

- Acute cauda equina syndrome is worked up with imaging studies:
  - CT-Myelogram
  - MRI
- Tx: surgical decompression
Spinal Stenosis

- 50 yrs old
- L3-L4
- usually degenerative: osteophystosis and facet joint arthropathy
- Hereditary: Achondroplastic dwarfs
- metabolic: Pajet’s ds.
- post traumatic/post surgical
spinal cord diameter 10 mm

17 mm canal diameter

less than 12 mm relative stenosis

10 mm or less absolute
Spinal Stenosis

- General back discomfort with lower limb involvement
- Neurogenic claudication
- May progress to a spinal myelopathy if at higher i.e., thoracic levels
Spinal Stenosis Tx:

- Rest, medication, epidural injections, physical therapy with flexion bracing and posturing
- Rollator walker
- Surgery decompression and fusion
Spondylolysis

- Low back pain with extension usually without neurological deficits
- Pars defect most commonly seen in children at L5
- Hyperextension injury
- Can lead to spondylolisthesis
Meyerding grading of Spondylolisthesis

Grade 0 (normal)

Grade 1 (1–25%)

Grade 2 (26–50%)

Grade 3 (51–75%)

Grade 4 (76–100%)

FIGURE 4–172. Meyerding Grading of Slippage—See text for grading description (p...
L5/S1
spondylolisthesis
spondylolysis vs degenerative spondylolisthesis
Myelopathy

- spinal cord injury
- tumors
- infections/syphilis
- HNP
- MS
- syringomyelgia
- RA

Upper motor neuron s/s: spasticity, bowel and bladder clonus, babinski, weakness, sensory changes
conclusion

- All of these entities have similar workups i.e., imaging studies
- Progressive or persistence of symptomatology is the hallmark of treatment failure and necessitates rethinking of the treatment and possibly diagnosis