

## DSA17 Mechanical Low Back Pain

Ryan Seals, DO

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### Required Reading

1. This DSA
2. Review Year 1 DSA- Lumbar Region
3. Review Somatic Dysfunction of Lumbar, Sacrum, and Pelvis

### Optional Reading

1. Foundations of Osteopathic Medicine. (2010). Chila, Anthony G. Lippincott Williams & Wilkins, 3<sup>rd</sup> Edition. Chapter 40, p. 543-574
2. Piriformis Syndrome. Atlas of Common Pain Syndromes , Third Edition
3. Steven D. Waldman Chapter 84, 266-268  
Copyright © 2012, 2008, 2002 by Saunders, an imprint of Elsevier Inc.
4. Psoas Syndrome: A frequently missed diagnosis. JAOA Vol 112, No. 8, August 2012

### Learning Objectives

- A. Be able to provide differential diagnosis, treatment, management, and explanation of common and important causes of Low Back Pain.
  - a. Mechanical low back pain: lumbar sprain/strain, somatic dysfunction (“dirty half-dozen”)
  - b. Degenerative diseases of the lumbar spine: disc disease, lumbar facet arthritis, spondylolisthesis
  - c. Neurologic causes: disc herniation with radiculopathy, spinal stenosis
  - d. Inflammatory: Ankylosing Spondylitis (to be covered with rheumatologic causes)
  - e. Referred pain: Prostate cancer, abdominal aortic aneurysm, urolithiasis
- B. Biomechanical Model
  - a. Identify biomechanical relationships in which somatic dysfunction can either be a cause of or a result of the clinical conditions listed above.
  - b. Explain the effects of performing OMT to address biomechanical relationships of the low back/ pelvis.
- C. Neurologic Model
  - a. Identify the nerves that cause pain in the above disorders.
  - b. Explain the effects of performing OMT to address pain.
- D. Behavioral Model
  - a. Describe behavioral modifications that may be useful in the treatment of the above common clinical conditions.
  - b. Describe exercises that may be useful in the treatment of the above common clinical conditions.
- E. List indications and contraindications for OMM in the above conditions.
- F. Recall relevant literature related to the use of manual medicine on the above disorders.

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### Significance

- One of the top three reasons patients see their family physicians
  - Family physicians see more low back pain than any other specialist
- Third most common surgical indication
- 65-80% of the population will experience low back pain during their lifetime

### Etiology

- 97% are mechanical causes
  - 75-80% of mechanical causes are considered “*lumbar sprain/strain*” meaning that no objective cause is found for the pain
    - Obesity and smoking seemed to be associated with increased risk of back pain
  - Other causes include degenerative joint disease, herniated disks, spinal stenosis, spondylolisthesis
    - Spondylosis: Incorporates degenerative changes in both the anteriorly placed discovertebral joints and the posterolaterally placed facet joints. These degenerative or osteoarthritic changes are seen radiographically as disk or joint space narrowing, subchondral sclerosis, and osteophytosis
    - Spondylolysis: a defect in the pars interarticularis that is most commonly seen at L5. It is typically a fatigue fracture acquired early in life that is more commonly seen in boys. Spondylolysis progresses to spondylolisthesis in approximately 15% of patients
    - Spondylolisthesis: the anterior displacement of a vertebra on the one beneath it.
      - Grade 0: spondylolysis only, no spondylolisthesis
      - Grade 1: 0-24% displacement
      - Grade 2: 25-49% displacement
      - Grade 3: 50-74% displacement
      - Grade 4: 75-99% displacement
      - Grade 5: completely displaced (spondyloptosis)
- 3% or less are secondary to neoplasm, inflammatory diseases, infection, visceral referred pain
  - *Even though these are rare, you don't want to miss them!!*

### Diagnosis

- Often made by ruling out severe disease based on history, exam, or diagnostic tests
- Red flags include: trauma, history of cancer, unexplained weight loss, fecal or urinary retention/incontinence, saddle anesthesia, severe morning stiffness, sensory or motor deficits.
- Acute vs. Chronic
  - Back pain for greater than 12 weeks is considered chronic
  - 30-60% resolve in one week
  - 60%-90% resolve in 6-8 weeks

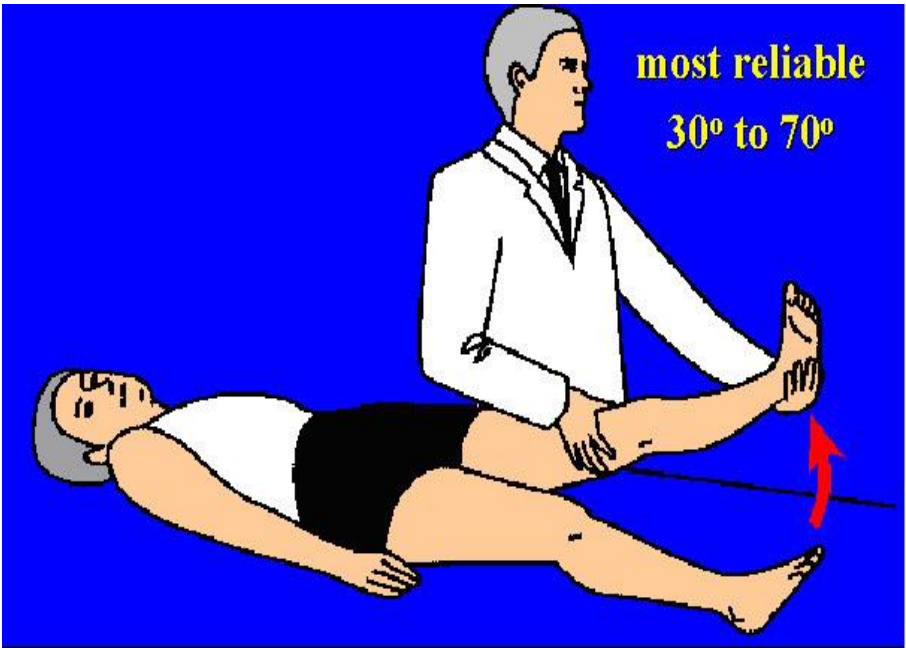
### Exam

- Visually inspect (look for trauma, asymmetry, herpes zoster rash)
  - especially prominent spinous process may be spondylolisthesis
  - lumbar scoliosis commonly associated with herniated disk (herniation of nucleus pulposus)
  - uneven iliac crests (palpate) may indicate leg length discrepancy
- Check active and passive ROM
  - with internal disk derangement - pain with flexion common
    - deviation to one side with forward flexion may indicate posterolateral disk bulge
  - extension (standing) often alleviates if disk derangement (may worsen if acute herniation)
  - localized unilateral paralumbar pain with *extension* may be *facet syndrome*
  - Patrick's Test (also called **FABERE** sign)
    - Flexion, **AB**duction, **E**xternal Rotation, and then **E**xtension of hip
    - pain suggests arthritis of hip or sacroiliac pathology

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- Osteopathic structural exam and TART findings
  - Often tenderness is found over iliolumbar ligament or involved strained muscle
  - Check for somatic dysfunction of lumbar, sacrum, and pelvis at a minimum
- Neurologic Exam (See chart on this page.)
  - Reflexes
  - Strength
  - Sensation
  - Special Tests: straight leg raise



### Straight leg raise test

- Pulls on sciatic nerve & will cause a radicular pain if inflamed
- Passively flex patient's hip while keeping knee extended
- (+) if radicular pain down leg, especially if reproduces pt's symptom
- In acute, inflamed discs, usually (+) around 40 degrees
- contralateral positive straight leg raise test more specific for lumbar radiculopathy

Lower extremity dermatome	Disc	Nerve root	Motor loss	Sensory loss	Reflex loss
	L3-4	L4	Dorsiflexion of foot	Medial foot	Knee
	L4-5	L5	Dorsiflexion of great toe	Dorsal foot	None
	L5-S1	S1	Plantarflexion of foot	Lateral foot	Ankle

### Pathophysiology

Rothman-Simeone The Spine , Sixth Edition Harry N. Herkowitz, et al. Ch 62

- *Disc degeneration* is believed to be the first step in degeneration of the spine. At birth, the nucleus pulposus and the annulus occupy roughly 50% of the disc area.
- Hydration of the disc also changes due to an alteration in the type of collagen within the disc over time. The annulus contains 60% type II and 40% type I collagen, whereas the disc contains mainly type II collagen. Thus as the type I collagen content increases with age, hydration of the disc decreases. The normal nucleus pulposus typically consists of 85% water, whereas the annulus consists of 78% water. *With degeneration of the disc, the water content drops to roughly 70%.* A desiccated disc has a decreased ability to handle mechanical load.
- The Kirkaldy-Willis theory explains how these changes progress over time. This theory is based on viewing the spine as a tripod with the disc and the two facet joints making up the three legs.
  - The initial stage in the degenerative cascade is circumferential *tearing of the annulus*, which progresses to radial tears. This, along with the biochemical changes in the disc described previously, leads to further degeneration of the disc and disc height loss.
  - Altered disc structure and disc height loss lead to bulging of the disc and the posterior longitudinal ligament. This causes narrowing of the spinal canal and potential neural impingement.
  - The lost disc height also leads to buckling of the ligamentum flavum and settling of the facet joints. *The facet joints* subsequently deteriorate and form osteophytes, which further narrows the spinal canal.
  - The altered structure, motion, and biomechanics then lead to additional disc deterioration, which propagates the cycle of degeneration.
- As the disc degenerates and narrows, the facet joints settle and increased stress is placed across *the facet joint*. This leads to facet joint degeneration, hypertrophy, and osteophyte formation. These osteophytes can cause impingement of the thecal sac within the spinal canal or the nerve root in the neural foramen
- With aging, *central canal stenosis* occurs as degenerative changes progress.
  - As the axial height of the disc and facet joints decreases, the disc bulges into the spinal canal.
  - The central canal is further narrowed by posterior impingement from enlarged facets and the hypertrophied ligamentum flavum. *Hypertrophy of the soft tissues is responsible for 40% of spinal stenosis.*
  - With extension, the hypertrophied ligamentum buckles centrally into the canal and worsens the central stenosis. This explains why patients with stenosis typically report worsening of their symptoms in *extension*.

Pain can be generated from

- Disc annulus
  - Inflammatory chemicals from the nucleus pulposus can create chemical irritation as well
- Muscles, ligaments, tendons, and periosteum
- Dura mater and epidural veins
- Nerves
- Referred pain

This is why knowing your anatomy is so important to your differential diagnosis!

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### Diagnosis

#### Urgent/Emergent Causes

##### Cauda equina syndrome

- medical emergency that results from a lesion compressing the bundle of nerve roots at the lower end of the spinal cord
  - Only occurs in .04% of low back pain cases
- Nerve root compression results in low back pain, unilateral or bilateral sciatica, saddle (perineal) anesthesia (75%), genitourinary dysfunction (90%), and leg paresis that may be asymmetric
- Most commonly caused by acute disc herniation
- *Urgent* surgical spinal decompression of a mass lesion is indicated to prevent permanent neurologic damage

##### Abdominal Aortic Aneurysm

- Highly associated with smoking and atherosclerosis. Also common in those with connective tissue diseases (e.g. Marfan's)
- Almost 75% of patients with AAA are asymptomatic, and the condition is discovered on routine examination or serendipitously when ordering studies for other symptoms. Diagnosis of AAA should be considered in the differential of the following symptoms: abdominal pain radiating to back, back or flank pain, and/or pulsatile abdominal mass.
- Diagnose via pulsatile mass on exam and imaging via ultrasound or CT
- Treatment is surgery if greater than 5.5cm
  - Treatment is emergent if there is a rupture of the aneurysm

#### Referred Pain

##### Prostate cancer

- Prostate cancer often metastasizes to the lumbar spine so may be a rare cause of back pain.
- Ask for personal or family history of cancer and cancer screening status
- Prostate exam reveals firm nodules; Lab reveals elevated PSA
- Spine may have bony tenderness to palpation/percussion

##### Urolithiasis

- The pain starts in the flank and generally radiates down the patient's side and into the *groin*. Some patients also experience nausea and vomiting during these episodes and can have blood in the urine.
- Exam will often reveal costovertebral angle or flank tenderness
- Patient unable to get in comfortable position due to pain
- Non-contrast CT is the imaging study of choice
- Treatment and management to be discussed in renal system 2 block

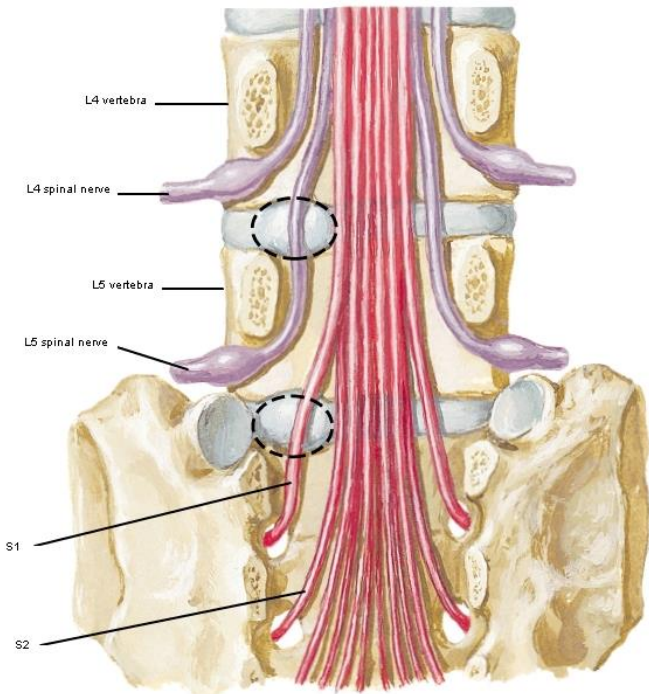
#### Inflammatory

##### Ankylosing Spondylitis

- Dull back pain that is worse in the morning and usually begins before age 40
- Stiffness in nature that is worse with rest and improves with activity
- Schober's test may be positive (due to loss of flexion)
  - 10 cm measurement made in lumbar and increases by less than 5 cm during full flexion
- Xray may reveal "bamboo spine"; MRI may detect earlier changes
- Often associated with enthesitis of Achilles/plantar fascia or dactylitis
- HLA-B27 positive in 85-95% of cases

Neurologic

Relation of Spinal Nerve Roots to Vertebrae  
Lateral Protrusion



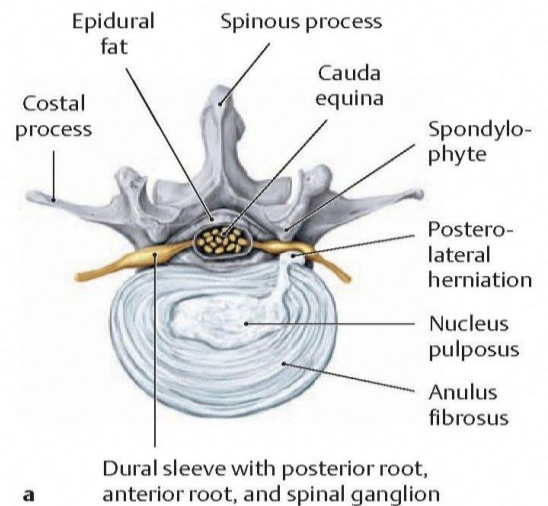
Lumbar disc protrusion does not usually affect nerve exiting above disc.  
Lateral protrusion at disc level L4—5 affects L5 spinal nerve, not L4 spinal nerve.  
Protrusion at disc level L5—S1 affects S1 spinal nerve, not L5 spinal nerve

**Radicular Pain** (from irritation of spinal nerve)

- Lateral recess stenosis typically results from posterior disc protrusion in combination with some superior articular facet hypertrophy.
- Presents with lumbar radiculopathy (*sharp and electric pain*)
  - Radiculopathy- disturbance or disease of spinal nerve
- These patients present with pain or neurologic symptoms in a *dermatomal* distribution (review chart page 3)
- Note that herniated disc usually compresses the more *inferior* nerve root
- In image the L4-L5 disc herniates and compresses on L5 nerve root
- L5-S1 disc herniates and compresses on S1 nerve root
- 90-95% of herniations occur at these two levels

Disc Pathology

- A disk bulge is a symmetric, circumferential extension of disk material beyond the interspace. A disk herniation is a focal or asymmetric extension of nucleus pulposus.
  - Herniation usually occurs posterolaterally
  - Herniations can repair themselves (most do within 6 months)
- Unless it is causing nerve compression, it may not be the source of back pain
  - Over 25% of people *without* low back pain have disc herniation on MRI
- Inflammatory chemicals from the nucleus pulposus can irritate the nerves and lead to pain



**C Lumbar disk herniation**

a Posterolateral herniation, superior view.

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### Spinal Stenosis

- Myelopathy: disturbance or disease of the spinal cord
- With aging, central canal stenosis occurs as degenerative changes progress.
  - As the axial height of the disc and facet joints decreases, the disc bulges into the spinal canal.
  - The central canal is further narrowed by posterior impingement from enlarged facets and the hypertrophied ligamentum flavum.
    - *Hypertrophy of the soft tissues* is responsible for 40% of spinal stenosis.
  - With extension, the hypertrophied ligamentum buckles centrally into the canal and worsens the central stenosis.
    - This explains why patients with stenosis typically report worsening of their symptoms in *extension*.
- Presentation: The primary complaint is of pain in the buttocks, thighs, and legs. The pain may be accompanied by paresthesias. Symptoms usually are *not dermatomal*. Neurogenic claudication is induced by standing erect or walking and is relieved by sitting or flexing forward (shopping cart sign). Frequently have gait disturbance due to leg weakness. Bowel or bladder incontinence is uncommon. Neurogenic claudication is most indicative symptom - important to assess vasculature to differentiate it from vascular claudication.
- Exam: May have weakness, decreased reflexes, and decreased sensation, but does not seem to associate with particular nerve root. Often bilateral

### Mechanical

#### Spondylolisthesis

- Often worsened by extension (more commonly) and/or flexion
- Hamstring tightness and lumbar hyperlordosis are often present in younger patients
- Physical exam reveals lumbar tenderness
  - “step-off sign” is present if severe (depression above or below spinous process)
- Diagnose via lateral lumbar x-ray
- Treatment with PT, OMT, Bracing, or NSAIDs for conservative cases
  - May require surgery if progresses or causes neurologic deficits

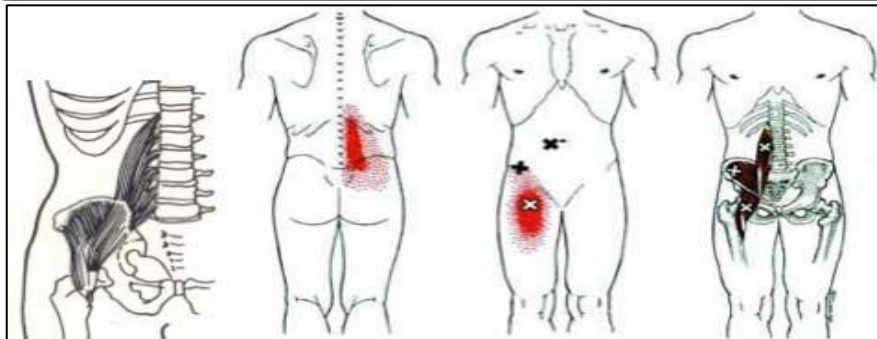
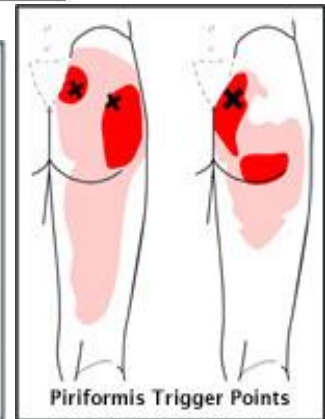
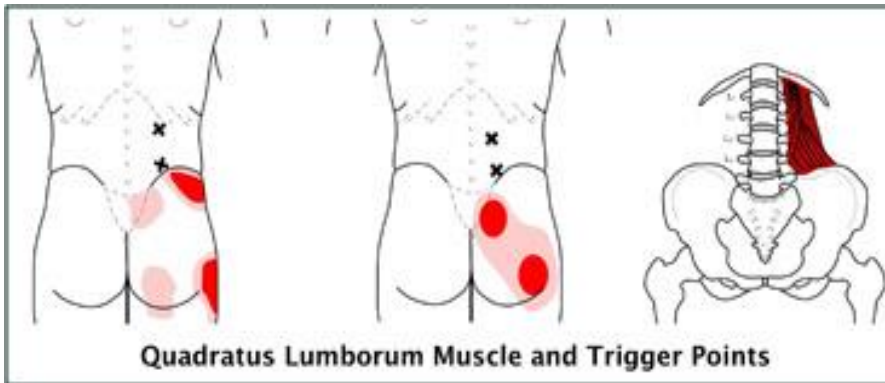
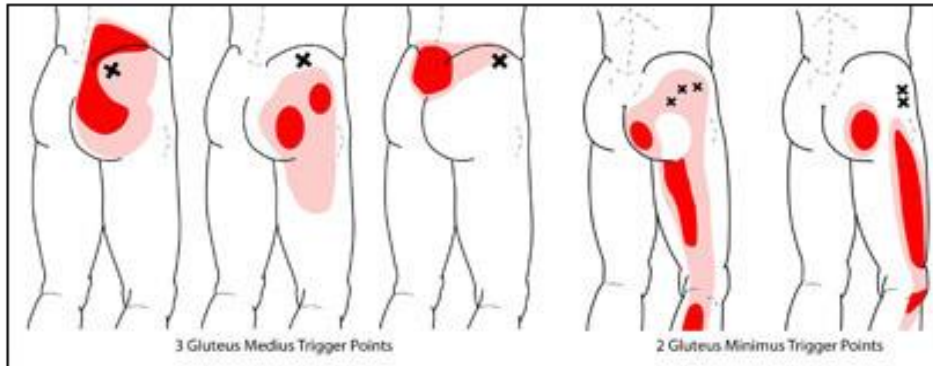
#### Facet Syndrome

- Pain caused by increased load being placed on facet joint from spinal degeneration
- Innervated by medial branch of the dorsal primary rami of the spinal nerve
  - Can cause radiation of pain into leg due to irritation of spinal nerve
- Pain is often worse with *extension*
- Superior lumbar facets face medially and dorsally and are oriented in sagittal plane
  - More sagittally oriented facets are associated with spondylolisthesis



Muscular causes of low back pain

- Trigger Point: “A small hypersensitive site that, when stimulated, consistently produces a reflex mechanism that gives rise to referred pain and/or other manifestations in a consistent reference zone.”
  - Usually palpable hypertonic bands in a muscle belly
  - Characteristic radiation pattern (See examples below)
  - Often explain pain that radiates, but exam/imaging reveal no nerve involvement
  - Can be treated with OMT, stretching, or injecting a local anesthetic into the trigger point



Iliopsoas

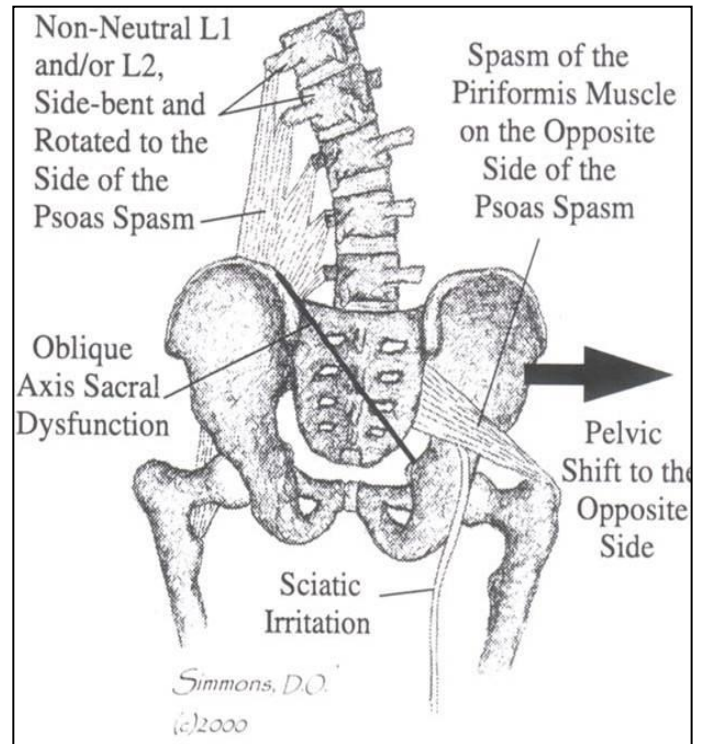


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### Psoas Syndrome

- Condition that results from hypertonicity/ irritation and inflammation of the psoas muscle
  - Usually the result of being in a position that allows prolonged shortening of the psoas followed by its sudden lengthening
- Common Causes
  - working at a desk or crawlspace
  - road trips
  - trauma (strain)
- Secondary Causes
  - viscerosomatic reflex
  - psoas fascia touches the sigmoid colon and ureters
  - weakness in the small stabilizing muscles of the low back lead to overwork of the psoas muscle
- Signs and Symptoms
  - Stooped posture
  - Back pain
  - Buttock, anterior or posterior thigh pain
- Positive Thomas test
- Psoas tender point
- *Non-neutral* upper lumbar somatic dysfunction
- Rule out other non-musculoskeletal causes of psoas syndrome
  - Pathology of ureters, colon, or appendix
  - Tumor



### Piriformis Syndrome

- Six per 100 cases of sciatica
- 6:1 female-to-male ratio
- Causes
  - Trauma
  - Prolonged sitting
  - Anatomic variation of piriformis muscle and/or sciatic nerve location
  - Anatomic asymmetry
- History of trauma to the sacroiliac and gluteal region.
- *Pain in the region of the sacroiliac joint, greater sciatic notch, and piriformis muscle, extending down the leg and causing difficulty during walking.*
- Acute exacerbation of pain by stooping or lifting and moderately relieved by traction.
- Radiation to the posterior thigh down to the knee if there is involvement of the posterior cutaneous nerve of the thigh.
- Aggravation of pain by prolonged sitting (e.g. driving or biking) or on rising from a seated position.
- Pain is worse after sitting on hard surfaces with wallet in the back pocket ('wallet neuritis').
- Pain occurs with bowel movements because of the proximity of piriformis to the pelvic floor.
- Tenderness in the piriformis muscle and/or tendon.
  - Counterstrain tender point
  - Myofascial trigger point
- *External rotation of the hip.*
- *May have positive straight leg raise test.*
- Possible gluteal atrophy.

*Robinson DR (1947) Piriformis syndrome in relation to sciatic pain. Am J Surg. Windisch G, Braun EM, Anderhuber, F. Piriformis muscle: clinical anatomy and consideration of the piriformis Syndrome Surgical and Radiologic Anatomy. 2007*

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### Osteopathic Considerations

#### “Dirty Half-Dozen”- Failed Back Syndrome (Phil Greenman, DO)

The following are common causes of Chronic Low Back pain that are often overlooked, but where OMT can really be effective.

1. Non-neutral lumbar somatic dysfunction
2. Pubic shear
3. Posterior sacral base or backward sacral torsion
4. Innominate shear
5. Short leg and pelvic tilt syndrome
6. Muscular imbalance of the trunk and lower extremity (including psoas syndrome)

#### Approach to diagnosis

1. Start with a good history and physical looking for red flags in history or exam.
2. Based on above decide if blood tests or imaging are needed.
  - a. Imaging usually not indicated without abnormal exam findings or suspicious history
3. Use your osteopathic findings (especially the dirty half dozen) to see if they seem to explain the patient's complaints.
4. Treat affected areas (use below sequencing to help).

#### Using OMT in patients with Low Back Pain

##### Contraindications - Absolute and Relative

- Vertebral fracture (or suspected)
- Acute disc herniation-avoid HVLA to region and/or stop OMT if causes neurological symptoms
- Avoid HVLA if suspected vertebral infection
- Suspicion of severe underlying disease causing patient's back pain.

One recommended treatment sequence for mechanical low back pain is called LIPLSIP.

1. Lower Extremity
2. Innominate shears
3. Pubic shear
4. Lumbar (non-compensated L5)
  - L5 should be rotated opposite of the sacrum-, if not it is considered non-compensated
5. Sacroiliac dysfunctions
6. Innominate rotations and flares
7. Psoas

Check in this order and treat areas of greatest restriction -

If patient has left sided lumbar muscle tightness and a positive standing flexion test on the left, then first check the left lower extremity (talus, fibular, head, etc.) for significant restriction and treat the worst finding if present. Recheck.

- If findings persist in lumbar and positive standing flexion test remains, then check for innominate and pubic shears. Treat what you find. Recheck.
- If findings persist, look for L5 rotated the same direction as sacrum and treat.
- Treat Sacrum
- Etc.
- Usually after treating one or two significant dysfunctions, the lumbar and flexion test findings are drastically improved/or resolved.

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### Differential Diagnosis Approach: Summary

1. Urgent/Emergent (less than 1% of low back pain, but most important to rule out)
  - a. Cauda Equina Syndrome - Bowel or bladder incontinence, saddle anesthesia
    - i. About .04% of low back pain
  - b. Referred Pain
    - i. Ruptured Adominal Aortic Aneurysm - Pulsatile abdominal mass, hypotensive, weak or asymmetric pulses in lower extremities
      1. Much less than 1% of low back pain (exact amount unknown-not a common cause of presenting with low back pain)
    - ii. Urolithiasis - flank pain, severe and colicky in nature, hematuria or dysuria usually present
  - c. Compression fracture - bony tenderness to palpation over vertebrae, x-ray finding
    - i. Osteoporosis vs. metastatic cancer vs. other - need to identify why fracture occurred!
    - ii. Osteoporotic compression fractures are 4% of low back pain
2. Neurologic
  - a. Spinal Stenosis (Myelopathy - usually from herniated disc or degenerative changes. 3% of LBP)
    - i. Older age, bilateral neurologic signs/symptoms (not dermatomal), gait disturbance
      1. Need to follow to make sure neurologic symptoms don't progress
  - b. Radiculopathy (usually secondary to herniated disc or degenerative changes) 4% of LBP
    - i. Follow to make sure neurologic signs/symptoms don't progress
3. Inflammatory
  - a. Reactive Arthritis
  - b. Ankylosing Spondylitis (HLA-B27 positive)
    - i. Decreased flexion on Schober's test
    - ii. Bamboo spine on x-ray (late finding)
    - iii. Ethesitis- commonly in Achilles and plantar fascia
4. Mechanical (85-90% of low back pain)
  - a. Facet Arthritis
    - i. Due to degenerative changes and abnormal load placed on facet joints
    - ii. Worse with extension and radiation of pain can occur, Neuro exam should be normal
    - iii. Neuro exam is normal and imaging is negative
  - b. Lumbar strain/sprain
    - i. Usually due to injury or postural strain
    - ii. Myofascial trigger points may be palpated and reproduce pain
  - c. Somatic Dysfunction
    - i. Look for dirty half dozen, but somatic dysfunctions in seemingly unrelated area may also contribute significantly

As osteopathic physicians you will have a huge advantage in addressing mechanical low back pain by addressing somatic dysfunctions, trigger points, and short leg syndrome. This accounts for over 75% of low back pain!!

OMM Research

Ann Fam Med. 2013 Mar-Apr;11(2):122-9.

Osteopathic manual treatment and ultrasound therapy for chronic low back pain: a randomized controlled trial.

Licciardone JC1, Minotti DE, Gatchel RJ, Kearns CM, Singh KP.

**Abstract**

**PURPOSE:**

We studied the efficacy of osteopathic manual treatment (OMT) and ultrasound therapy (UST) for chronic low back pain.

**METHODS:**

A randomized, double-blind, sham-controlled, 2 × 2 factorial design was used to study OMT and UST for short-term relief of nonspecific chronic low back pain. The 455 patients were randomized to OMT (n = 230) or sham OMT (n = 225) main effects groups, and to UST (n = 233) or sham UST (n = 222) main effects groups. Six treatment sessions were provided over 8 weeks. Intention-to-treat analysis was performed to measure moderate and substantial improvements in low back pain at week 12 (30% or greater and 50% or greater pain reductions from baseline, respectively).

**RESULTS:**

**Patients receiving OMT were more likely than patients receiving sham OMT to achieve moderate (response ratio [RR] = 1.38; 95% CI, 1.16-1.64; P <.001) and substantial (RR = 1.41, 95% CI, 1.13-1.76; P = .002) improvements in low back pain at week 12...** Nevertheless, patients in the OMT group were more likely to be very satisfied with their back care throughout the study (P <.001). Patients receiving OMT used prescription drugs for low back pain less frequently during the 12 weeks than did patients in the sham OMT group (use ratio = 0.66, 95% CI, 0.43-1.00; P = .048). Ultrasound therapy was not efficacious.

**CONCLUSIONS**

The OMT regimen met or exceeded the Cochrane Back Review Group criterion for a medium effect size in relieving chronic low back pain. It was safe, parsimonious, and well accepted by patients.

N Engl J Med. 1999 Nov 4;341(19):1426-31.

A comparison of osteopathic spinal manipulation with standard care for patients with low back pain.

Andersson GB1, Lucente T, Davis AM, Kappler RE, Lipton JA, Leurgans S.

**Abstract**

**BACKGROUND:**

The effect of osteopathic manual therapy (i.e., spinal manipulation) in patients with chronic and subchronic back pain is largely unknown, and its use in such patients is controversial. Nevertheless, manual therapy is a frequently used method of treatment in this group of patients.

**METHODS:**

We performed a randomized, controlled trial that involved patients who had had back pain for at least three weeks but less than six months. We screened 1193 patients; 178 were found to be eligible and were randomly assigned to treatment groups; 23 of these patients subsequently dropped out of the study. The patients were treated either with one or more standard medical therapies (72 patients) or with osteopathic manual therapy (83 patients). We used a variety of outcome measures, including scores on the Roland-Morris and Oswestry questionnaires, a visual-analogue pain scale, and measurements of range of motion and straight-leg raising, to assess the results of treatment over a 12-week period.

**RESULTS:**

Patients in both groups improved during the 12 weeks. There was no statistically significant difference between the two groups in any of the primary outcome measures. **The osteopathic-treatment group required significantly less medication** (analgesics, antiinflammatory agents, and muscle relaxants) (P < 0.001) and used less physical therapy (0.2 percent vs. 2.6 percent, P < 0.05).

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### DSA Summary:

#### Low Back Pain Causes

- Urgent/Emergent
  - Ruptured Abdominal Aortic Aneurysm
    - Radiates to one side, often asymptomatic, note pulsatile mass
    - Risk factors: connective tissue disease (Marfans), smoking, atherosclerosis
  - Cauda Equina
    - Back Pain with saddle anesthesia, bowel or bladder dysfunction due to compression of the cauda equine (often by acutely herniated disc)
- Referred Pain
  - Prostate Cancer
    - Urinary symptoms, family history, prostate exam findings/PSA
  - UTI/Pyelonephritis
    - Dysuria, positive urinalysis
  - Uterolithiasis
    - Colicky pain radiating to groin, dysuria, hematuria, CT scan confirms
- Inflammatory
  - Ankylosing Spondylitis
    - Back pain with morning stiffness, usually onset before age 40
    - HLA B27 highly correlative, Bamboo spine classic finding on xray
- Mechanical
  - Muscle Sprain/Strain- Piriformis Syndrome, Psoas syndrome
    - Soft tissue injury causing muscle pain and stiffness
    - Tenderness located in muscles involved
    - Neurologic exam should be normal
    - Treated with exercise, mobilization, OMT, +/- NSAIDs
  - Trigger Points
    - Hypertonic bands in muscle belly with characteristic radiation pattern
    - Treat with OMT, stretching, dry needling, or injection
  - Somatic Dysfunction- Diagnose and treat with OMT
- Degenerative Changes
  - Spondylosis: degenerative changes of the spine
  - Spondylolysis: a defect in the pars interarticularis
    - Spondylolysis progresses to spondylolisthesis in approximately 15% of patients
  - Spondylolisthesis: the anterior displacement of a vertebra on the one beneath it.
    - Graded 0-5 based on degree of slippage
  - Facet Arthritis
    - Due to arthritic changes on the facet joint
    - Can cause sharp pain with radiation that is typically worse with extension
- Neurologic
  - Radiculopathy- related to spinal nerve causing radiating pain
    - Usually from disc herniation or vertebral foramina stenosis
      - Nerve affected is usually the *inferior* nerve of the involved disc level
    - Pain is classically sharp and electric
    - Typically get neurologic deficits along that level
      - Also typically has positive straight leg raise
  - Myelopathy-disturbance of the spinal cord
    - Usually from narrowing around the cord from degenerative changes in the discs, vertebrae/facets, and ligaments
    - Symptoms are often bilateral and non-localized

## DSA17 Mechanical Low Back Pain

Ryan Seals, DO

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- Difficulty with gait or balance, bilateral lower extremity numbness
- Upper motor neuron signs
- Emergent surgical evaluation if symptoms have rapid onset or progression (cauda equina)
- Conservative management (PT, OMT) is appropriate for stable cases that aren't progressing rapidly

### Physical Exam

- ROM, palpation, somatic dysfunction diagnosis
- Understand segmental diagnosis for L1-L5, Sacrum, and Pelvis
- Recall
- Preview

### Treatment

- OMT is indicated as conservative management for neck pain
- Some techniques may be relatively contraindicated
  - Direct techniques if patient has warning signs and no clear diagnosis
    - Suspected Fracture
    - Concerns for severe cord or nerve injury
- Recall treatment of the cervical spine with HVLA, ME, CS