Low Back Pain

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Low Back Pain

- Most common source of pain and disability in modern society
- It is estimated that back pain afflicts over 31 million Americans chronically and is the number one cause of activity limitation in young adults
- Americans spend at least $50 billion each year on back pain treatment
- Within a given year, up to 50% of U.S. adults suffer from back pain
- Back pain is one of the most common reasons for missed work
- Back pain is the second most common reason for visits to the doctor’s office, outnumbered only by upper-respiratory infections.
- Experts estimate that as many as 80% of the population will experience a back problem at some time in our lives
Common Causes of Back Pain

- Myofascial Pain Syndrome
- Facet Joint Syndrome
- Lumbar Intervertebral Disc Disease
- Lumbar Herniated Disc
  - Lumbar Radicular Pain
- Lumbar Spinal Stenosis
- Failed Back Surgery Syndrome
- Sacroiliac Joint Dysfunction
- Lumbar Compression Fractures
Myofascial Pain Syndrome

- **Definition**
  - A painful regional syndrome characterized by the presence of an active trigger point (TrP) in a skeletal muscle

- **Symptoms**
  - Localized pain
  - Muscle spasm

- **Exam Findings**
  - Tender spot (TrP) in an affected muscle
  - Referral of pain to a zone of reference
  - Reproduction of the patient’s usual pain with palpation
Myofascial Pain Syndrome

- **Imaging Studies**
  - No significant findings

- **Conservative Treatment Options**
  - Cold spray over the TrP
  - Massage
  - Stretching
  - Physical Therapy
  - Medications
    - Muscle Relaxants
    - Anti-inflammatories (NSAIDs)
    - Tramadol
Myofascial Pain Syndrome

- Interventional Management
  - Local injection
  - Dry Needling
  - Botox Injection
Lumbar Facet Syndrome

- **Anatomy**
  - Lumbar Facet Joints (LFJs) are synovial joints with cartilaginous articular surfaces, synovial membranes, and fibrous capsule
  - Located dorsally at the junction of the lamina, pedicle, and base of the transverse process
Lumbar Facet Syndrome

- **Anatomy**
  - Link the posterior aspect of the spine
  - Each joint is comprised of two articular processes, superior and inferior, stemming from the corresponding vertebrae
Lumbar Facet Syndrome

- **Anatomy**
  - Each facet joint receives innervation from the medial branch of the posterior primary ramus at the same vertebral level and from the vertebral level above.
  - The fibrous capsule and the synovium of the facet joints are richly innervated by nociceptive fibers.
Lumbar Facet Syndrome

Definition
- Pain arising from the lumbar facet joints
- May affect up to 40% of LBP sufferers

Terminology
- Very little standardization in nomenclature for the condition
- Often used interchangeably with lumbar spondylosis which refers to nonspecific degeneration of the spine due to aging
Pathophysiology

- Largely unknown, but lesions that can cause LFS:
  - Degenerative arthritic changes
  - Systemic inflammatory arthritides (RA & AS)
  - Microtrauma
  - Joint subluxation
  - Villonodular synovitis
  - Synovial cysts
  - Infections
  - Meniscoid and synovial entrapment
Lumbar Facet Syndrome

- **Symptoms**
  - LBP
  - Referred pain to groin, hip, posterior thigh—rarely below the knee
  - Pain exacerbated by twisting or arching movements, prolonged sitting or standing
  - Pain relieved by forward flexion, rest, and walking
  - Pain on back extension
Physical Exam Findings
- Localized tenderness over facet joints/paraspinous muscles
- Positive Kemp’s test
- No neurologic deficits
- Normal straight leg raise

Imaging Studies
- No imaging findings reliably predict facet joints as source of pain
- Joints can appear hypertrophic or arthritic on MRI or CT
Lumbar Facet Syndrome

- Diagnostic Facet Injections
  - The only accepted standard for diagnosing pain originating from the LFJs
  - Analgesic response to targeted, low-volume (less than 2mL), local anesthetic injections
    - Intra-articular injections
      - Placement of needle tip directly into joint
    - Medial Branch Blocks (MBBs)
      - Injecting local anesthetic at the junction of the transverse process (TP) and the superior articular process (SAP) ~ “the eye of the scottie dog”
Facet Innervation
Lumbar Facet Syndrome

- Interventional Management
  - Therapeutic injection of local anesthetic and steroid
  - Facet denervation
    - Radiofrequency ablation (RFA) is most commonly used
    - Cryoablation
Lumbar Intervertebral Disc Disease

- **Normal Disc Physiology**
  - **Vascularization**
    - Largest avascular structure in the body
    - Metabolic requirements are met by diffusion to and from the capillary plexuses in the adjacent vertebral bodies
  - **Innervation**
    - Innervated by plexuses along the anterior and posterior longitudinal ligaments
    - Nerves are mostly mechanoreceptors
    - Rich autonomic connections, which may contribute to hyperalgesia in a chronically painful disc
  - **Lacks scavenger cells**
    - Degradation products accumulate over time, which can alter normal cell matrix interactions
Lumbar Intervertebral Disc Disease

- Normal Disc Physiology
  - Compartments of the IVD
    - Nucleus Pulposus (NP)
      - Clusters of chondrocyte-like cells
      - Jelly-like matrix
      - High concentration of water and proteoglycans
    - Annulus Fibrosus (AF)
      - Fibrocyte-like cells
      - Matrix is high in collagen that is arranged as interlacing lamellae that attach to vertebral bodies
Lumbar Intervertebral Disc Disease

- Internal Disc Disruption
- Herniated Lumbar Disc
  - Protruded disc
  - Disc extrusion
  - Disc sequestration
Definition

- Pain originating from the disc itself
- Also referred to as:
  - Degenerative Disc Disease
  - Discogenic pain
Internal Disc Disruption

- Degenerative Disc Disease (DDD)
  - Degeneration of the IVD along with direct annular compression leads to annular failure and development of fissures that spread outward toward the periphery
  - Common in older asymptomatic individuals
  - Regarded as a physiologic consequence of aging
Internal Disc Disruption

- Degenerative Disc Disease (DDD)
  - Predisposing Factors for early DDD
    - Diminished blood supply
    - Genetic predisposition
    - Increased mechanical stress
    - End plate injury
    - Vascular disease
    - Obesity
Degenerative Disc Disease (DDD)

Changes in the disc dynamics increase stress on adjacent structures and may lead to the following:

- Sclerosis
- Hypertrophic new bone formation in adjacent vertebral bodies
- Accelerated degeneration of adjacent discs
- Hypertrophy & arthritis of the facet joints
- Sacroiliac joint dysfunction
- Paraspinal myofascial syndrome
- Stenotic changes in spinal canal causing nerve root (NR) and spinal cord compressive symptoms
Internal Disc Disruption (IDD)

Pathology of IDD

- Patients with pain on discographic evaluation show zones of vascularized granulation tissue that extends from the NP to the outer AF
- These zones correlate with annular tears seen on post-discography CT scans and high intensity zones seen on MRI
Internal Disc Disruption (IDD)

Pathology of IDD (cont.)

- Two types of nerve fibers are found along the zones of granulation tissues
  - Vasoregulatory fibers
  - Nociceptors that are high in substance P, and penetrate deep into the inner AF and NP
- These discs produce significant amounts of pro-inflammatory mediators, which sensitize the nociceptors and maintain a state of hyperalgesia within the affected disc
Internal Disc Disruption (IDD)

Pathology of IDD (cont.)

- Hyperalgesic discs cause chronic pain, worse with mechanical stress and produce a painful response with minimal stimulation on discography

Clinical Findings

- Acute or chronic pain in low back or buttocks
- Often precipitated by a torsion injury to low back and exacerbated by axial loading (occurs with prolonged sitting or standing)
- Pain can radiate to lower extremities
Internal Disc Disruption (IDD)

Imaging Studies

- Spinal images show degenerative disc changes in many asymptomatic individuals
  - Highly sensitive, but poorly specific in diagnosis
- MRI Images
  - Shows a loss of signal intensity on T2-weighted MR images ~ signifies desiccation of NP
  - High intensity zone in the posterior annulus (most prominent on T1-weighted MRI image) indicates the presence of a tear in the posterior annulus and correlates closely with pathologic lesions of IDD
Internal Disc Disruption (IDD)

- Imaging Studies
  - Discogram
    - Procedure in which contrast is injection into the NP
    - Currently the only accepted means for diagnosing IDD
    - Findings in IDD
      - Painful response to disc provocation, in the presence of a non-painful response at another disc level
      - Must be coupled with morphologic abnormalities seen on post-discography CT scan (tears extending to the outer one third of the AF)
Internal Disc Disruption

Discogram ~ AP View

Discogram ~ Lateral View
Internal Disc Disruption

Treatments

- Interventional
  - Intradiscal electrothermal therapy
    - Involves thermal lesioning of the posterior disc annulus by a percutaneously placed heating coil
    - Hypothesized to shrink annular collagen and coagulate nociceptive fibers
Internal Disc Disruption

› Surgical
  • Removal of painful disc and arthrodesis of the adjacent vertebral bodies (spinal fusion) should theoretically relieve the pain
  • Results are mixed and doubts have been raised about efficacy
Internal Disc Disruption
Terminology

- A bulging disc occurs when the tough outer fibers of the spinal disc weaken and stretch allowing the “jelly center” of the disc to “bulge” outward
  - Generally considered the first step toward a more serious problem called a Herniated Disc
- A herniated disc is similar to a disc bulge except that the outer layers of the disc actually weaken to the point of tearing
  - Misleadingly called a “slipped disc”
  - A tear in the annulus fibrosus of a disc allows the nucleus pulposus to bulge beyond the edges of the adjacent vertebral bodies
  - Almost always postero-lateral in nature owing to the presence of the posterior longitudinal ligament in the spinal canal
  - Tears can result in the release of inflammatory chemical mediators which may directly cause severe pain, even in the absence of nerve root compression
    - This is the rationale for the use of anti-inflammatory treatments for pain secondary to “chemical radiculitis”
Herniated Lumbar Disc

- Terminology
  - Protruded disc
    - The base is the widest portion of the herniated material
  - Disc extrusion
    - The neck is the narrowest portion of the herniated material
  - Disc sequestration
    - Type of disc extrusion wherein no continuity exists between the herniated material and the parent disc
Herniated Lumbar Disc

Disc Protrusion
Herniated Lumbar Disc

- Pathophysiology
  - Most common cause of Lumbar Radicular Syndrome
  - Mechanical compression of the nerve roots (NRs) by the herniated material is assumed to be the primary factor inducing radicular symptoms
  - The presence of inflammatory mediators in the herniated disc (HD) may also contribute to radicular symptoms
Herniated Lumbar Disc

- Imaging/Diagnostic Studies
  - MRI
  - CT Scan
  - Discography
    - Useful to assess the size and location of the HD, as well as the integrity of the disc annulus
Herniated Lumbar Disc

- Conservative treatment
  - Activity Restrictions
  - Bracing - limited evidence
  - Traction
  - Acupuncture
  - Chiropractic manipulations
  - Massage
  - Magnets
  - Electrical nerve stimulation
  - Ultrasound
  - Physical Therapy
Herniated Lumbar Disc

- **Conservative Treatment**
  - Medications
    - NSAIDs
    - Opioids
    - Muscle relaxants
    - Neuroleptics
    - Systemic corticosteroids—little literature to support
Herniated Lumbar Disc

- Interventional Management
  - Interventional Treatment
    - Epidural Steroid Injections (ESIs)
Favorable Outcome Predictors for Conservative Treatment

- Negative crossed straight leg raise
- Absence of leg pain on extension of spine
- Return of neurologic function within 12 weeks of onset
- Absence of stenosis
- Favorable response to epidural steroid injections
- Patient is motivated, physically fit, has a normal psychological profile, no worker’s comp claims, and has 12 years of education
Herniated Lumbar Disc

※ Surgical Options
  › Surgery is common, but little high-quality evidence supports this practice
  › The main benefits of surgery appears to be a more rapid resolution of disabling pain
Herniated Lumbar Disc

- Surgical Indicators
  - Cauda Equina Syndrome (CES)
  - Progressive motor deficits
  - Intractable Pain
  - Poor response to conservative therapy
Lumbar Radicular Syndrome

Definition

- A constellation of clinical signs & symptoms of variable etiology secondary to pathology or dysfunction of the NR or dorsal root ganglia (DRG)

Terminology

- Frequently referred to inappropriately as:
  - *Lumbar radiculopathy* (implies objective signs of NR damage)
  - *Lumbar radiculitis* (implies inflammatory processes being solely responsible)
  - *Lumbar radicular pain* (implies pain is the predominant symptom)
  - *Sciatica* (implies pain of only the sciatic nerve)
Lumbar Radicular Syndrome

- **Prevalence**
  - 12% to 40% of pts with LBP have radicular symptoms

- **Etiology**
  - Pathologic processes that affect the sensory spinal nerve roots (SSNRs) and the DRGs
    - Lesions of the IVD
    - Degenerative spinal disorders
    - Herniated disc
    - Neoplastic lesions
    - Infectious lesions
    - Traumatic lesions
    - Metabolic lesions
    - Vascular lesions
“Red Flags” that require further work-up

Cauda Equina Syndrome

- Definition
  - Acute compression of the spinal NRs comprising the cauda equina
- Prevalance
  - 4/10,000 patients with LBP and LRS
- Causes
  - Massive midline disc herniation
  - Smaller disc herniation in a stenotic spine
  - Spinal metastases
  - Spinal hematoma
  - Epidural abscess
  - Traumatic compression
  - Acute transverse myelitis
  - Abdominal aortic dissection
“Red Flags” that require further work-up

- Cauda Equina Syndrome

  - Symptoms
    - Often present within 24° of onset
    - Bilateral radicular pain, although one leg is usually worse than the other
    - Weakness in both feet
    - Gait disturbances
    - Abdominal discomfort related to urinary retention, may be followed by urinary incontinence
Lumbar Radicular Syndrome

- “Red Flags” that require further work-up
  - Cauda Equina Syndrome
    - Objective Signs
      - Motor and sensory deficits
      - Diminished reflexes
      - Positive SLR in both lower extremities
      - Diminished sensation in buttocks and perineum*
    - Diagnosis
      - Made with MRI
    - Treatment
      - High-dose IV steroids
      - Urgent decompressive surgery to reduce permanent disability
Lumbar Radicular Syndrome

- Clinical Features of LRS
  - Pain
    - Travels along a narrow band
    - Has a sharp, shooting, and lancinating quality
  - Paresthesias, numbness, and weakness in the territory of the involved NR
  - Gait disturbances
  - Loss of sensation
  - Reduced muscle strength
  - Diminished reflexes
Lumbar Radicular Syndrome

Dermatome Map of the Body

Levels of principal dermatomes

- **C5** Clavicles
- **C6, 7, 8** Lateral parts of upper limbs
- **C7, T1** Medial sides of upper limbs
- **T1** Spine
- **C8** Nipples
- **T4** Level of nipples

- **T10** Level of umbilicus
- **T12** Inguinal or groin regions
- **L1, 2, 3, 4** Anterior and inner surfaces of lower limbs
- **L4, 5, S1** Foot
- **L5, S1** Medical side of great toe
- **S1, 2, 3** Posterior and outer surfaces of lower limbs
- **S2, 3, 4** Lateral margin of foot and little toe
- **S3** Penis
Clinical Features of various NR involvements

- **S1 NR**
  - Pain, paresthesia, and numbness of the posterior thigh, calf, and plantar surface of the foot
  - Difficulty with toe walking
  - Weakness of plantar flexion
  - Loss of plantar reflex

- **L5 NR**
  - Similar to S1 NR involvement
  - Pain also involves buttock, anterolateral leg, dorsal foot, and great toe
  - Possible difficulty in heel walking
  - Weakness of ankle and toe extension
Lumbar Radicular Syndrome

- Clinical Features of various NR involvements
  - L4 NR
    - Pain in anterior thigh, knee, and upper-medial leg
    - Weakness of knee extension
    - Diminished patellar tendon reflex
  - L3 and L2 NR
    - Pain and sensory alterations in the groin and inner thigh
  - Lower Sacral NR
    - Decreased sensation in buttock & perineal areas
    - Autonomic dysfunction (bowel & bladder dysfunction)
    - Sexual dysfunction (loss of erection & vaginal anesthesia)
Clinical Tests

- Straight-leg raise test (SLR)
  - Positive (pain in the radicular distribution)
  - Suggests radicular pathology of lower lumber NR (L4, L5, & S1)

- SLR and ankle dorsiflexion of the extended lower extremity
  - Causes traction of the lower lumber NR by pulling them caudally
Lumbar Radicular Syndrome

Clinical Tests

› Crossed straight leg raise (X-SLR)
  • Raising the asymptomatic leg reproduces pain
  • More specific for lumbar NR irritation than SLR
Clinical Tests

- Femoral stretch test
  - Bending the knee and extending the hip in the prone position
  - Places the L2 and L3 NR under tension
Lumbar Radicular Syndrome

- **Imaging Studies**
  - **MRI**
    - Gold Standard in determining etiology of LRS
    - Offers best resolution of spinal canal, spinal cord, neural foramina, NRs, and disc spaces
    - Allows evaluation of entire spine
    - A contrast-enhanced MRI is indicated in pts with previous spine surgery to differentiate between scar tissue and recurrent disc herniation
    - Contraindicated in patients with pacemakers, mechanical heart valves, aneurysm clips, and intraocular foreign bodies
Imaging Studies

- Computed Tomography (CT)
  - Superior to MRI in evaluating bony details of the spine, particularly facet joints and lateral recesses
  - When combined with myelography, results are comparable to MRI in diagnosing spinal canal lesions
  - CT with myelography can be used when MRI is contraindicated
  - CT without myelography cannot distinguish between HD and other intradural lesions
Lumbar Radicular Syndrome

- Imaging Studies
  - Plain radiography
    - Flexion and extension films reveal segmental instability as a source of pain
    - Spondylolisthesis- anterior displacement of a vertebra or the vertebral column in relation to the vertebrae below
Spondylolisthesis

Grades of spondylolisthesis:

- Normal spine
- Grade 1: <25% slippage
- Grade 2: 25-50% slippage
- Grade 3: 50-75% slippage
- Grade 4: >75% slippage
Spondylolisthesis
Electrodiagnostic Studies

Electromyography (EMG)/Nerve Conduction Studies (NCS)

- Have high diagnostic specificity
- Useful in distinguishing LRS from symptoms of peripheral neuropathy
- Do NOT give information regarding the etiology of LRS and correlate poorly with anatomical level of radicular lesions
Other Diagnostic Tests

- Bone Scan
- CBC
- UA
- Erythrocyte sedimentation rate
- C-reactive protein
- Rheumatoid factor
- Antinuclear antibodies
- HLA-B27 antigen
Lumbar Radicular Syndrome

- Treatment
  - Medications
    - NSAIDS
    - Opioids
    - Lyrica
    - Neurontin
  - Epidural Steroid Injections
  - Spinal Cord Stimulation
  - Surgical Intervention
Lumbar Spinal Stenosis

Definition

› A clinical syndrome of neurogenic claudication and/or radicular pain secondary to the narrowing of the spinal or NR canal and compression of its neural elements
› Classified into congenital and acquired, with the degenerative variety of the acquired type being most prevalent
› Anatomical Classification
  • Central canal stenosis or central stenosis
  • Lateral recess
  • Neural foraminal stenosis or lateral stenosis
Lumbar Spinal Stenosis
Lumbar Spinal Stenosis

Spinal stenosis is a narrowing of the spinal canal.

Normal

Stenosis

Stenosis

Top view after stenosis

Normal

Stenosis

Spinal canal
Lumbar Spinal Stenosis

- Pathophysiology
  - Typical lesions seen in LSS:
    - IVD degeneration with bulging and loss of disc height
    - Facet joint hypertrophy
    - Thickening and redundancy of the ligamentum flavum
    - Osteophyte formation
Lumbar Spinal Stenosis

- **Pathophysiology**
  - Central stenosis compresses the NRs of the cauda equina
  - Lateral stenosis compresses the exiting spinal NRs
  - L5 NR is most commonly involved (75%), followed by L4 (15%), L3 (5.3%), L2 (4%) NRs
  - Degenerative changes that result in spinal stenosis can also result in spinal instability and spinal deformities and can contribute to further spinal narrowing and deformity
Clinical Findings

› Neurogenic Claudication
  • Pain radiating to both lower extremities at the posterolateral aspect of the thighs and legs
  • Worse with walking and lumbar extension, relieved with sitting down
  • Pain often associated with numbness, heaviness, and/or weakness in the lower extremities
  • Must distinguish between vascular claudication (which is not relieved by walking in a flexed position)

› Radicular Pain
  • Unilateral radicular symptoms unrelated to activity reflect NR involvement
Clinical Findings

Axial Pain
- Unlikely symptom of LSS, more reflective of disc, facet joint or sacroiliac joint pathology

Other Clinical Signs
- Walking with a stooped forward gait
- Stooped posture with loss of lumbar lordosis and decrease lumbar extension
- SLR is infrequently positive due to slow onset of symptoms
- Decreased or absent Achilles reflex in about half of pts
Lumbar Spinal Stenosis

- Imaging Studies
  - MRI
    - Most commonly used to detect pathologic lesions of LSS
  - CT Scan
Conservation Treatment

- Medications
  - APAP
  - NSAIDs
  - Limit narcotic use to acute flare-ups

- Activity Modification
  - Avoid aggravating activities
  - Relative rest during acute-flare-ups

- Bracing
  - Lumbar binders may be helpful by reducing loads across the lumbar spine
  - Wear for only a short period of time to avoid deconditioning
Lumbar Spinal Stenosis

- **Conservative Treatment**
  - **Physical Therapy**
    - Flexion-based exercises increase the cross-sectional area of the spinal canal and improve microcirculation of the neural elements
    - Aquatic therapy is also useful
  - **Epidural Steroid Injections**
    - Effective especially in the short term
    - May provide symptomatic control of acute exacerbations of neurogenic claudication
    - Transforaminal ESIs are better suited for radicular symptoms secondary to LSS
Surgical Options

- Wide laminectomy at the stenotic levels is standard for surgical decompression
- Involves the removal of the spinal lamina and the ligamentum flavum, extending laterally from pedicle to pedicle
- Extensive removal of posterior spinal elements can result in spinal instability ~ this can be avoided by preserving the pars interarticularis and the lateral 50% portion of the facet joints
Lumbar Laminectomy

- Disc
- Spinal Cord
- Spinal Nerve

Back View

Top View

Removal of Lamina
Failed Back Surgery Syndrome

- **Definition**
  - Persistence or development of low back or leg pain following surgery of the lumbosacral spine

- **Prevalence**
  - Approximately 300,000 lumbosacral spine procedures are performed each year in the US
  - The incidence of Failed Back Surgery Syndrome (FBSS) is as high as 60%
Failed Back Surgery Syndrome

Reasons for FBSS

› Poor patient selection
› Surgery was not indicated or wrong procedure was performed
› Clear indication, but surgery did not correct original problem
› A complication from surgery (e.g. discitis)
› Recurrent disc herniation
› Secondary instability or degenerative changes
› Neural injury (arachnoiditis or epidural scarring)
› Intercurrent diagnosis, such as cancer
Failed Back Surgery Syndrome

Diagnostic Studies

- Gadolinium-enhanced MRI to r/o epidural fibrosis
- Myelogram to r/o arachnoiditis
- Bone Scan to r/o osteomyelitis
Failed Back Surgery Syndrome

- **Treatment**
  - Focuses on underlying cause
  - Can try nerve blocks, epidural corticosteroid injections, sacroiliac joint blocks, and facet blocks, depending on diagnosis of underlying cause
  - Epidural lysis of adhesions (Racz procedure)
    - Good results for FBSS patients with epidural fibrosis
Failed Back Surgery Syndrome

- **Treatment**
  - **Spinal Cord Stimulation**
    - May be of benefit in patients who have intractable pain, especially those for whom leg pain is the predominant complaint
Sacroiliac Joint Dysfunction

Definition

- Pain arising from abnormalities or injury of the sacroiliac joint (SIJ)

Epidemiology

- Sacroiliac Joint Dysfunction (SIJD) is thought to be the primary source of LBP in 10-25% of patients
- Common in women and pregnancy where the incidence is as high as 80%
Sacral Joint Dysfunction

- **Etiology**
  - SIJD may coexist with other conditions such as HD, IDD, FJS
  - Predisposing Factors
    - Trauma
    - Leg length discrepancy
    - Spinal deformity
    - Previous surgery
    - Disc pathology
    - Lumbar facet syndrome
Sacroiliac Joint Dysfunction

- **Etiology**
  - Predisposing Factors (cont.)
    - Pregnancy
    - Inflammation of the joint (ankylosing spondylitis)
    - Degenerative disease of the joint (osteoarthritis)
    - Metabolic dysfunction affecting the joint (gout)
    - Infection
    - Tumor

- **Imaging Studies**
  - Should be normal
Sacroiliac Joint Dysfunction

- Clinical Findings
  - C/O Pain
    - Originating in the SIJ and surrounding structures with greatest intensity in the region of the affected SIJ and medial buttock
    - May radiate to the groin, posterior thigh and occasionally below the knee joint
  - Tenderness over affected sacroiliac joint, most obvious in the prone position
  - Decreased joint mobility
  - Reproduction of pain when the affected SIJ is stressed
Sacroiliac Joint Dysfunction

- Clinical Tests for SIJD
  - Faber/Patrick Test (Left SIJD)
    - Patient is supine
    - Left leg, near the ankle, is placed in front of the right thigh above the knee
    - Physician places one hand over the medial aspect of the left knee
    - Positive test: pain over left SIJ region (also back, buttock, groin)
    - Test stress the SI and hip joints
Sacroiliac Joint Dysfunction

- Faber Patrick Test (Left SIJD)
Clinical Tests for SIJD

Gaenslen’s Test (Left SIJD)

- Patient is supine
- Left lower thigh and leg hang over the exam table
- Physician flexes right thigh and right knee (hip joint is maximally flexed)
- Physician presses downward over the left thigh (hip joint is hyperextended)
- Positive Test: pain in the left SIJ
- Test stresses both SIJs simultaneously by counter-rotation at the extreme ROM of the joint
- Test also stress the hip joint and stretches the femoral nerve
Sacroiliac Joint Dysfunction

- Gaenslen’s Test (Left SIJD)
Clinical Tests for SIJD

- Yeoman’s Test (Extension Test)
  - Patient is prone
  - Physician places one hand above the anterior knee and elevates it slightly
  - The other hand presses downward over the crest of the ilium
  - Positive test: pain over the posterior SIJ
  - Stress the SIJ, extends the lumbar spine, and stress the femoral nerve
  - Considered the most specific & reliable test
Sacroiliac Joint Dysfunction

- Yeoman’s Test (Extension Test)
Sacroiliac Joint Dysfunction

**Diagnosis**

- Fluoroscopic guided injection of SIJ
  - Gold standard for diagnosis of SIJ originating pain
  - Pain relief with local anesthetic injected into the most caudal aspect of the joint coincides with positive diagnosis
  - Poor technique, pain originating from structures immediately outside the SIJ, and extravasation of local anesthetic (especially anterior to sciatic nerve) may reduce validity of the diagnostic injection
Sacroiliac Joint Dysfunction

- **Treatment**
  - Physical therapy
  - Manipulation
  - Intra-articular steroid injections
    - Similar technique to diagnostic injection
    - Pain-relief is typically short term
Sacroiliac Joint Dysfunction

- Treatment
  - Radiofrequency denervation (RFD)
Vertebral Compression Fractures

- **Prevalence**
  - More than 700,000 osteoporotic vertebral compression fractures in the US each year
  - The rate of symptomatic compression fractures exceeds the frequency of symptomatic hip fractures in the elderly
Vertebral Compression Fractures

- Prevalence
  - Only 30% of vertebral fractures come to the attention of physicians, because lack of severe back pain in many patients does not trigger radiologic evaluation.
Vertebral Compression Fractures

- **Definition**
  - Fracture of the vertebral body which results in loss of normal vertebral body height
  - Often associated with trauma

- **Symptoms**
  - **Pain**
    - Deep ache exacerbated by changing position, twisting, or moving quickly
    - Worsens as the day progresses
    - Alleviated by lying flat
    - Very severe initially, often resulting in ER visit
    - Radicular symptoms suggest some other pathologic process (retropulsed fragment in the spinal canal or neural foramen compressing the neural elements)
    - Generally subsides over 1 week-10 days, becoming manageable with pain meds and restricted activity
Clinical Findings

- Rule out other causes of back pain (i.e. facet disease)
- Pain is elicited with palpation at the level or within one vertebral body inferior or superior to the fracture
- Thoracic compression fractures can result in radiation of pain around the chest wall
- Evaluate for neurologic function or presence of radicular pain
Vertebral Compression Fractures

- **Imaging**
  - **Plain x-rays**
    - Fracture typically visible on plain films and remote studies can be compared to evaluate fracture age and progression
  - **Bone scan**
    - Can help establish age of fractures
  - **MRI**
    - Can demonstrate recent fractures, eliciting evidence of bone marrow edema and inflammatory changes—better seen with fat saturation techniques
    - Also permits evaluation of other potential causes of pain (i.e. spondylosis or metastatic lesions)
Vertebral Compression Fractures
Vertebral Compression Fractures

- Treatment
  - Conservative
    - Limit Mobility
    - NSAIDs
    - Opioids
    - Bracing
Vertebral Compression Fractures

- Treatment
  - Interventional
    - Vertebroplasty
Vertebral Compression Fractures