



Diagnosing Leg Pain

Lumbar Spinal Stenosis vs Hip Osteoarthritis

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Case

- ▶ 68 y/o gentleman with severe left buttuck pain.
- ▶ Radiates to left upper lateral thigh and occasionally lateral calf
- ▶ Aggravated with standing, walking, doing stairs and getting out of the car
- ▶ Alleviated with sitting down and NSAIDS
- ▶ Onset 1 year ago, worsening over past 5 months
 - severely limits walking (5 min)
- ▶ *Diagnosis:*

Case

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 - severely limits walking (5 min)
- ▶ *Diagnosis:* **Hip or Spine??**

Epidemiology

- ▶ Proximal leg pain induced by or worsened with walking is a common complaint in older adults.
- ▶ Most often caused by musculoskeletal disorders involving the hip or spine.
 - Most common being hip osteoarthritis (hip OA) and lumbar spinal stenosis (LSS).
- ▶ Differentiating between hip OA and LSS is challenging – resulting in the incorrect diagnosis and ineffective treatment (Saito, 2012).



Similarities between symptomatic LSS and Hip OA

- ▶ The prevalence of discernible hip pathology in patients who underwent spinal surgery was 32.5%.(Lee, 2012)
- ▶ In a study of patients presenting to a spine clinic, 12.5% of patient had a diagnosis referable to a hip joint.(Sembrano, 2009)

Similarities between symptomatic LSS and Hip OA

- ▶ Thigh and lower leg pain is frequently associated with low back pain.
 - In a study of 93 adults with back pain, the symptom of pain radiating into the buttocks or leg had a sensitivity of 88% but a specificity of only 34% for lumbar spinal stenosis. (Katz, 1995)



Epidemiology

- ▶ Case series looked at 4 patients with LSS and hip OA with only ipsilateral pain in the lateral aspect of the lower leg.
 - Underwent lumbar decompression after several examinations to detect the origin of the pain.
 - Pain did not resolve after surgery, but after subsequent hip replacement, all patients became pain-free. (Saito, 2012)



Epidemiology

- ▶ A study of 61 patients with leg pain who had lumbar spinal surgery prior to their THR
 - 15 patients (24%) stated that their leg pain was not relieved postoperatively.
 - Their pain was resolved following THR.
 - 15 patients underwent the wrong operation.
 - The accurate diagnosis took an extended period of time, multiple MRI scans and invasive procedures.
 - Some of these cases underwent revision back surgery for the continued complaint of leg pain – the etiology which was hip pathology. (VAN ZYL ,2010)

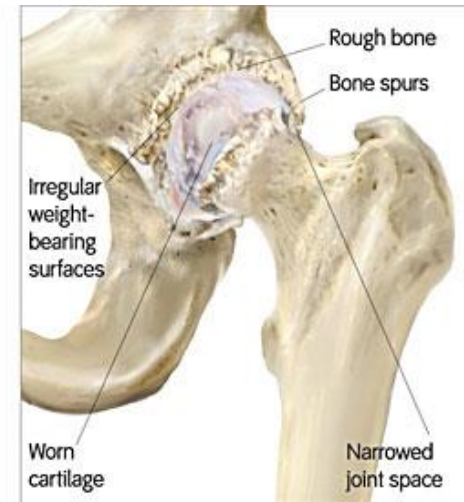
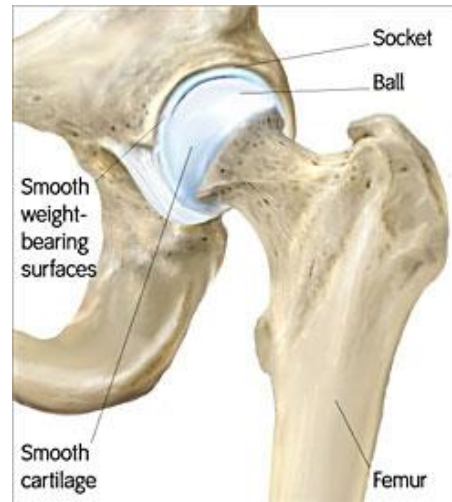


Hip OA epidemiology and clinical features

- ▶ Common degenerative condition in the aging population.
 - Begins as cellular and molecular changes of the hip joint articular cartilage,
 - Results in thinning/breakdown of articular surfaces.
 - Reactive changes in the neighboring bone produce bone overgrowth, sclerosis and cyst formation.
 - Local inflammatory reactions within the joint alter the joint capsule and synovial membrane.
- ▶ Painful hip OA affects between 5–10% of adults ≥ 60 (Jacobsen, 2004; Quintana, 2008; Jordan, 2009).
- ▶ OA is most common MSK disease of aging and cause of disability. (Dagenais, 2009)

Hip OA epidemiology and clinical features

- ▶ **Pain symptoms can vary:** (Khan, 2004)
 - groin (84%)
 - buttock (76%)
 - anterior knee (69%)
 - anterior thigh (59%)
 - shin (47%)
 - posterior thigh (43%)
 - calf (29%)



Hip OA epidemiology and clinical features

- ▶ Pain symptoms induced with weight bearing on the symptomatic leg.
 - Worse with standing, walking and stair climbing. (Altman, 1987)
- ▶ Advancing hip OA results in significant reduction of hip joint mobility.
 - Effects dressing the lower extremities and other ADL's. (Altman, 1987)

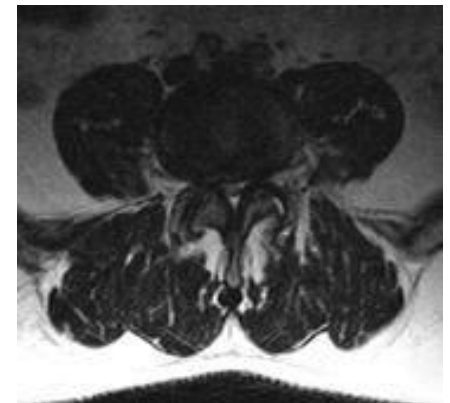


Hip OA epidemiology and clinical features

- ▶ Advancing hip OA causes reproduction of pain with certain hip movements
 - Positive FABER (Patrick's) and FLAIR (FADIR) tests.
- ▶ Unusual for patients with hip OA to report concurrent neurological symptoms.

Lumbar spinal stenosis epidemiology and clinical features

- ▶ Narrowing of the spinal canal or intervertebral foramina
 - Results in compression of the cauda equina or lumbar nerve roots. (Arnoldi, 1976)
- ▶ Develops as a consequence of a combination of age-related degeneration and distortion of:(Anderson 1997, Herkowitz 1995)
 - intervertebral discs
 - facet joint OA
 - ligamentum flavum hypertrophy
 - spondylolisthesis



Lumbar spinal stenosis epidemiology and clinical features

- ▶ 25% of elderly report monthly back pain. (Edmond, 2000)
- ▶ Back Pain cause disability in 20% of elderly.(Lavsky-Shulan,1985)
- ▶ LSS increasingly common with advancing age and present in up to 40% of adults ≥ 60 .
(Kalichman, 2009)
- ▶ By year 2020– over 50 million Americans will be 65 or older.



Lumbar spinal stenosis epidemiology and clinical features

- ▶ Approximately 1.2 mil office visits/year related to LSS. (Devin,2012)
- ▶ Current annual inpatient expense for surgically treated LSS is about \$1 billion.
 - Even more with outpatient expense. (Katz, 1994)



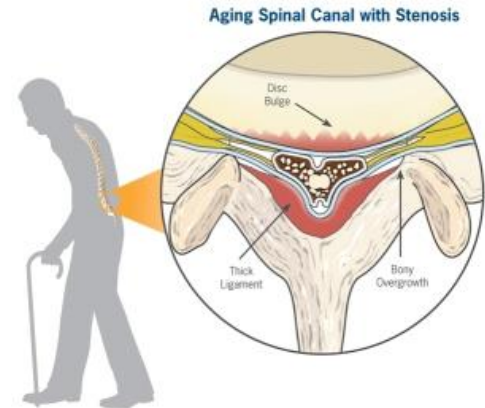
Lumbar spinal stenosis epidemiology and clinical features

▶ Presence of LSS is without consequences

- Does not induce pain or other symptoms (Boden, 1990; Jensen, 1994).

▶ Develops due to age-related degeneration and distortion of: (Anderson 1997)

- Intervertebral discs
- Facet arthropathy
- Ligamentum flavum hypertrophy
- Spondylolisthesis



Lumbar spinal stenosis epidemiology and clinical features

- ▶ Neurogenic claudication (NC) – symptoms uniquely associated with LSS.
 - Characterized as unilateral or bilateral buttocks and leg discomfort
 - Induced by standing and walking after a patient-specific and often predictable time and distance.
 - NC leg pain location varies greatly between individuals (Rainville, 2013).
- ▶ May involve neurological symptoms induced by walking
 - numbness/tingling
 - weakness
 - balance problems (Katz, 1994)

Lumbar spinal stenosis epidemiology and clinical features

- ▶ Physical examination can reveal:
 - wide based gait
 - positive Romberg
 - diminished sensation
 - lower extremity muscle weakness
 - impaired reflexes
 - altered walking ability (Jonsson 1993; Iversen 2001, Goh 2004).
- ▶ NC often has a gradual onset and protracted clinical course
 - When severe – limits standing and walking
- ▶ Estimated that in the United States approximately 1.2 million physician office visits/year related to NC. (Devin, 2012)



Similarities between symptomatic LSS and Hip OA

- ▶ Hip OA and LSS are both age-related, degenerative musculoskeletal disorders
- ▶ Both increase in prevalence within the same aging population
 - must be considered when evaluating patients with pelvic and leg pain associated with walking. (NIH Consensus, 1994; Weinstein, 1983)
- ▶ Most people have only one of these conditions
- ▶ Both can occur concurrently
 - Radiographic hip OA seen in as many as 1 / 3 of patients with spinal stenosis. (Lee, 2012, Moreland, 1990: Croft, 1990)
 - LSS is present in up to 1/4 of patients with hip OA. (McNamara, 1993; Sambrano, 2009; Van Zyl, 2010)

Similarities between symptomatic LSS and Hip OA

- ▶ Pain referral patterns of hip OA and LSS overlap.
 - Clinicians must evaluate multiple presenting symptoms to correctly discern between these two diagnoses. (Swezey, 2003, Van Zyl, 2010, Saito, 2012)
- ▶ Differences in the frequency of symptom location in pelvis and leg between these disorders
 - Groin and anterior thigh pain are experienced in a majority of patients with symptomatic hip OA compared with only a minority of those with LSS (Altman, 1987; Khan, 2004)
- ▶ Pain in the groin is an uncommon symptom in patients with lumbar stenosis
 - Can be the presenting complaint with stenosis at the L1 or L2 level.
 - 41% of patients diagnosed with single level lumbar pathology @ L4-L5 and L5-S1 reported groin pain. (Yukawa, 1997)

Similarities between symptomatic LSS and Hip OA

- ▶ Both disorders can produce symptoms in almost any area of the pelvis and leg. (Altman, 1987; Wolf, 1999; Yukawa, 1997; Khan, 2004; Leshner, 2008; Rainville 2013)
- ▶ Hip OA may present with radiating pain below the knee and back pain creating difficulty in the determination of spine versus hip etiology. (Wolfe, 1999)
- ▶ Also, both lumbar pathology and primary hip OA can cause referred pain in the lateral hip/thigh region, causing difficulty in determining the potential etiology. (Devin, 2012)

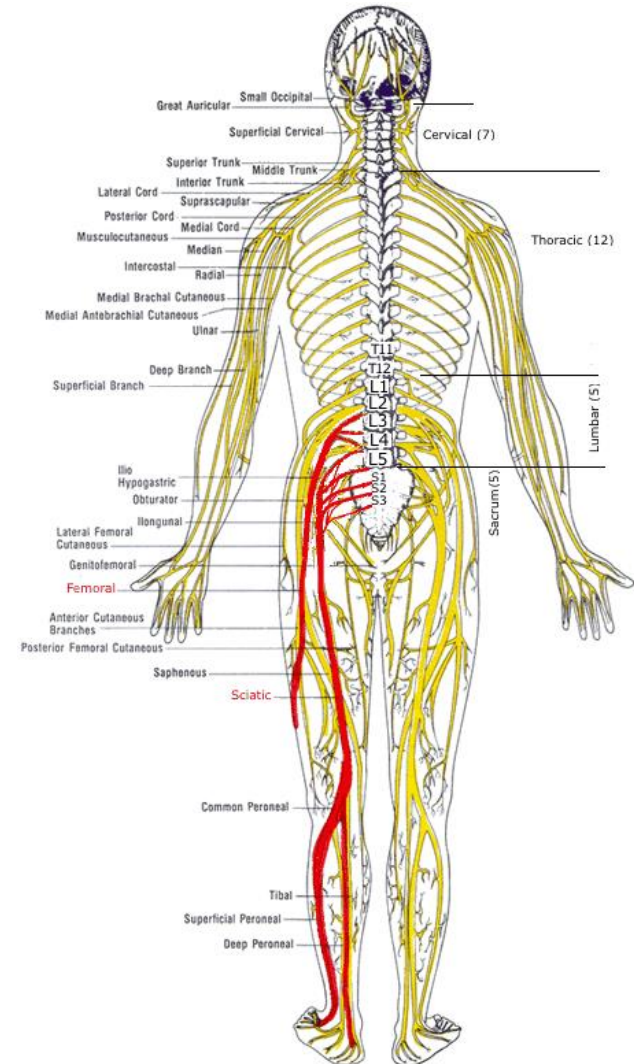
Similarities between symptomatic LSS and Hip OA

- ▶ Positive physical exam findings for both disorders may overlap.
 - Although a limp, groin pain, and limited internal rotation of the hips are more commonly associated with hip disorders, these conditions are also present in patients with spine pathology. (Brown, 2004)
 - Femoral stretch sign was positive more frequently in those with LSS, though also present in cases of hip OA (Brown, 2004).



Similarities between symptomatic LSS and Hip OA

- ▶ Pathophysiology of neurogenic claudication and the development of leg pain from spinal stenosis remains unclear.
 - Believed to be secondary to either compression or irritation through inflammation of the nerve root. (Goupille,1998)
 - Refers pain along the dermatomal distribution of the affected nerve root down the leg.



Similarities between symptomatic LSS and Hip OA

- ▶ Similarly the cause of referred leg pain from hip OA remains elusive.
 - Referred pain into the leg from hip pathology may be transmitted along the saphenous branch of the femoral nerve. (Khan,1998)
 - The rat hip joint is innervated from dorsal root ganglion neurons from T13 through L5, providing an explanation for referred pain in the lower leg. (Nakajima,2008)
- ▶ Referred pain may be produced by diverging sensory fibers with one branch passing to the origin of pain– the hip– and the other branch to the area of pain referral. (Saito,2012)

Diagnostic tests for differentiating hip OA and LSS

- ▶ The diagnoses of hip OA and LSS are based on imaging studies of the symptomatic areas with established imaging criteria for each disorder (Jacobsen, 2004; Arden, 2009; Lurie, 2008; Steurer, 2011)
 - When imaging evidence of both diagnoses is present – diagnosis of cause of symptoms is based on clinical criteria derived from the detailed history and physical examination.
- ▶ Intra-articular hip injection of Bupivacaine can be used to identify the hip as the source of leg pain
 - sensitivity of 87%
 - specificity of 100%
 - accuracy of 88% (Kleiner, 1991)
- ▶ No studies have been performed that confirmed that accuracy of spinal injections for discerning symptoms caused by LSS from symptoms caused by hip OA.



Differentiating hip OA and LSS

- ▶ The complexity of determining the accurate origin of leg pain makes critical study necessary to determine clinical criteria to improve the diagnostic value of the history and physical examination in patients with leg pain. (Katz, 1995)



Clinical Criteria which differentiate hip OA and LSS

- ▶ Location of pain with walking:
 - buttocks
 - Groin
 - thigh
 - calf
 - Foot

- ▶ Consistency of pattern of leg pain induced by walking:
 - Consistent
 - Inconsistent

- ▶ Patterns for leg pain induced by walking:
 - Immediately upon walking
 - Only after walking for a period of time
 - Increases when stepping with the symptomatic leg
 - No different while stepping with symptomatic leg
 - Continued walking increases or doesn't increase pain
 - Increases with ascending/descending stairs
 - Increases with walking uphill/downhill

Clinical Criteria which differentiate hip OA and LSS

- ▶ **Alleviates leg pain induced by walking**
 - Continued walking
 - Stopping and standing still
 - Bending forward at the waist
 - Leaning forward on shopping cart
 - Squatting
 - Sitting down/Lying down

- ▶ **Aggravates leg pain**
 - Lying down, Lying on the symptomatic side
 - First getting up in the morning
 - Sitting/standing
 - Transitioning from sit to stand
 - Getting in/out of a car
 - Crossing legs while sitting
 - Bending forward at the waist
 - Putting pants, shoe, sock onto symptomatic leg



Clinical Criteria which differentiate hip OA and LSS

- ▶ Change in symptoms over time:
 - Comes and goes, improved, worsened, unchanged

- ▶ Other complaints:
 - Loss of sensation
 - Heaviness
 - Back pain
 - Weakness
 - Leg gives out
 - Can't stand up straight
 - walk with a limp
 - Loss of balance/unsteady on feet
 - Climb stairs one step at a time (step-to-gait)
 - Similar symptoms developing in other leg

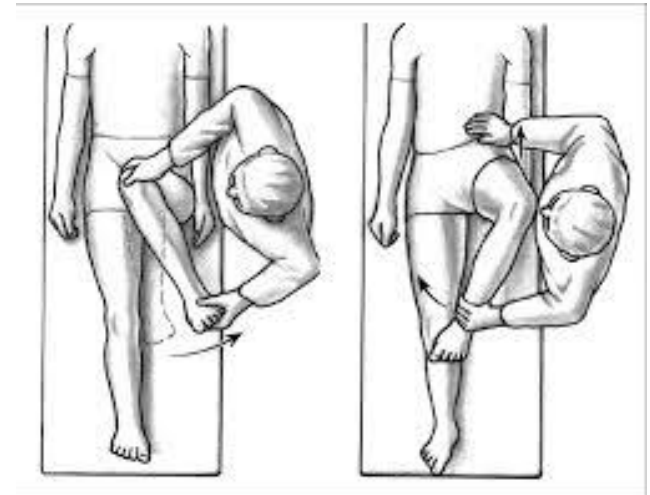
Physical Exam tests which differentiate hip OA and LSS

- ▶ **Gait:**
 - stooped forward, antalgic with unloading of leg, pain with stride
- ▶ **Pain with Trunk ROM:**
 - Pain with extension, relieved with flexion
- ▶ **Hip ROM**
 - Decreased internal, external rotation
- ▶ **Pain with hip ROM**
 - Groin pain with FABER(Patrick)/FLAIR (FADIR)
- ▶ **LE Neurological Exam:**
 - Sensation to pinprick, DTR's, MMT
- ▶ **Nerve Root Tension Signs**
 - Femoral stretch can be seen with hip OA
- ▶ **Lower extremity muscle atrophy**



Physical Exam tests which differentiate hip OA and LSS

- ▶ **Most Reliable hip exam tests by physicians in patients with a known hip OA:**
 - Hip flexion
 - Abduction/adduction
 - Extension strength
 - Log roll test for hip pain
 - FLAIR (FADIR)
 - Thomas test (Cibere,2008)
- ▶ **Most commonly used exam techniques for hip OA:**
 - Flexion ROM (98%)
 - Flexion and external rotation ROM (98%)
 - Flexion and internal rotation ROM (FLAIR) (86%)
 - Gait test (86%)
 - Single-leg stance phase test (77%)
 - Passive supine rotation test (76%)
 - FLAIR (FADIR) (70%)
 - Straight leg raise against resistance test (61%)
 - Prone femoral anteversion test (58%)
 - FABER (Patrick's) (52%). (Martin,2010)



Physical Exam tests which differentiate hip OA and LSS

- ▶ Limited data available on the accuracy of special tests to determine LSS.
 - PE findings which correlated with patients symptom severity of neurogenic claudication were:
 - Positive quadrant test (70%)
 - LE muscle weakness (64%)
 - Abnormal reflexes (62%)
 - Active lumbar extension (61%) (Lyle,2005)
 - Femoral tension sign is 5x more common in patients with LSS than in those with hip OA. (Brown,2004)
 - SPORT: less than 20% of patients with LSS had a positive straight leg raise test or femoral tension sign.(Weinstein,2009)

Physical Exam tests which differentiate hip OA and LSS

- ▶ Reproduction of leg pain with lumbar extension for 30 minutes is strongly associated with LSS.(Katz, 1995)
- ▶ 1 / 3 of patients may have motor weakness.(Katz, 1995)
- ▶ Decreased or absent Achilles reflexes in 43% of LSS patients and decreased or absent patellar reflexes in 18%. (Hall, 1985)



Case

- ▶ Further history:
 - Pain with putting on shoes and crossing legs
- ▶ PE:
 - Pain with hopping on one leg and stepping onto a stool
 - Decreased Internal and external rotation
 - Reproduced buttocks pain with FABER and FLAIR
- ▶ Diagnosis: ??

Case

- ▶ Further history:
 - Pain with putting on shoes and crossing legs
- ▶ PE:
 - Pain with hopping on one leg and stepping onto a stool
 - Decreased Internal and external rotation
 - Reproduced buttocks pain with FABER and FLAIR
- ▶ Diagnosis: **HIP OA**



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Thank You!

