

Low Back Pain

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- An estimated 75-85% of Americans experience some form of back pain during their life.
- Although low back pain can be quite debilitating and painful, in approximately 90% of cases, it is temporary and pain improves without surgery.
- 50% of patients who suffer from episodes of low back pain will have recurrent episodes within one year.
- Low back pain is considered to be chronic when it persists for more than 12 weeks.

Low back pain is extremely prevalent:

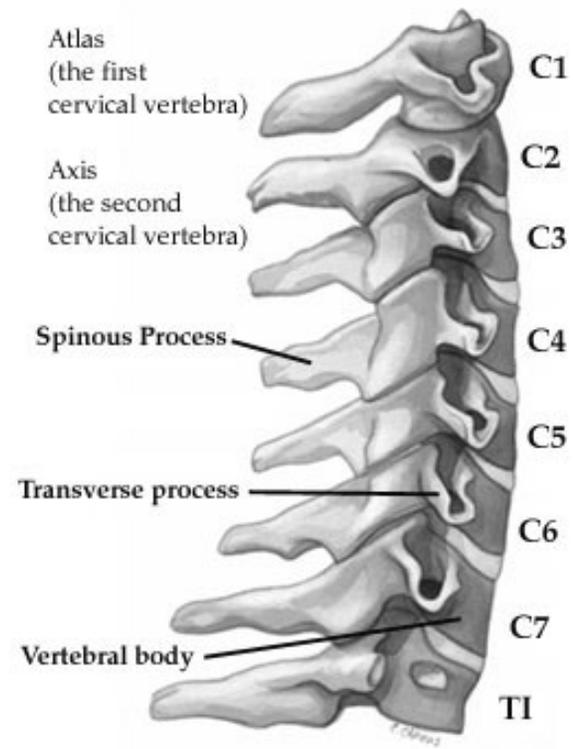
- The second most common reason for people to seek medical attention
- The number two cause for loss of time at work
- Accounts for roughly 15% of all sick leave from work
- The most common cause of disability for people over 45 years of age
- 1% of patients will have nerve root symptoms and only 1-3% have a lumbar disc herniation.
- Initial assessment is geared to detecting “red flags”, these may indicate potentially serious pathology.

- In the absence of red flags, imaging studies and further testing of patient's is usually not helpful during the 1st 4 weeks of low back symptoms.
- Activities may need to be modified, bed rest beyond 4 days may be more harmful than helpful.
- 90% of patients with low back problems will improved within 1 month even without treatment, this includes patients with compressive radiculopathies

Spine Anatomy

Cervical spine

- The seven vertebrae in the cervical spine range from the base of the skull to the top of the shoulders. The smallest within the entire spinal column, these vertebrae provide support for the head, protect the spinal cord, give the neck structure, and support head and neck movements.
- C1 and C2 make up the most mobile section of your entire spine. These vertebrae are responsible for approximately 50% of flexion and 50% of rotation.
- C7 has a longer spinous process than other vertebrae. If you place your hand at the back of your neck, you can feel this bone protruding through the skin.



Thoracic Spine

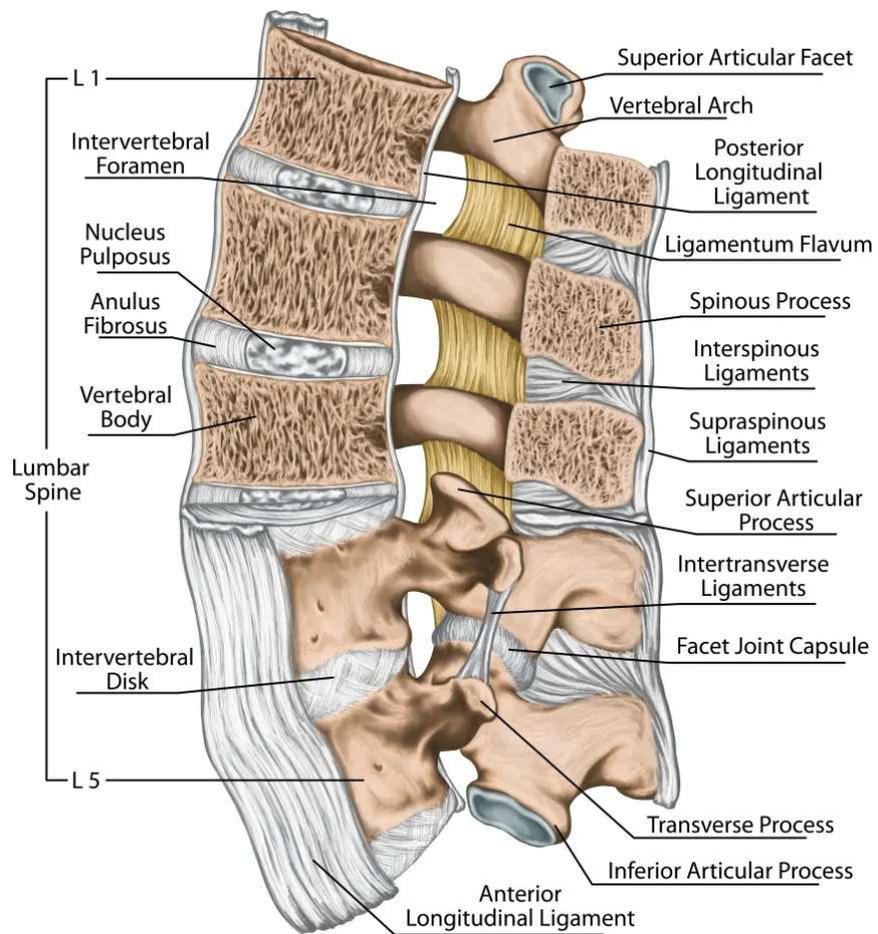
- The thoracic spine has 12 vertebrae stacked on top of each other, labeled from T1 down to T12.
- While the thoracic spine is less mobile than the neck and lower back, the ranges of motion can vary considerably at different thoracic vertebral levels.

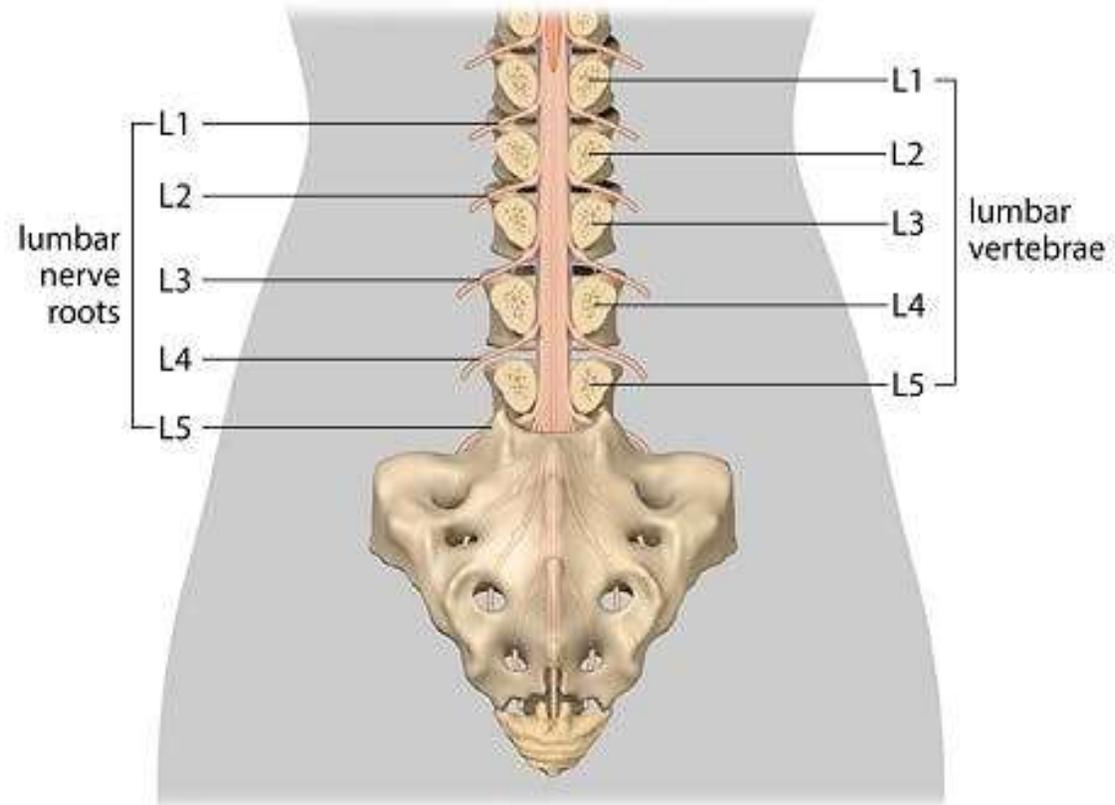


Lumbar Spine

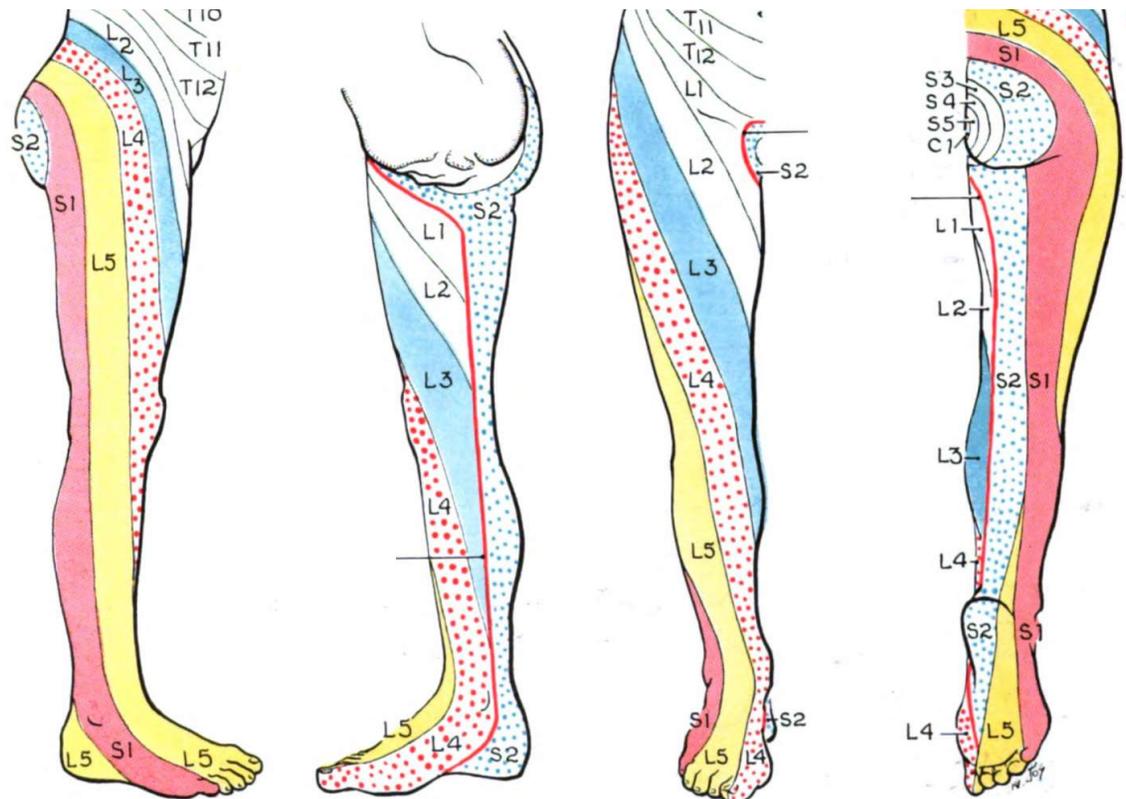
- The lumbar spine is the lower back that begins below T12 and ends at the top of the sacral spine, (S1).
- Most people have 5 lumbar levels (L1-L5), although it is not unusual to have 6. Each lumbar spinal level is numbered from top to bottom—L1 through L5, or L6.
- There are 5 lumbar spinal nerves that progressively increase in size from L1 to L5. These nerves exit the intervertebral foramina **below** the corresponding vertebra. For example, the L4 nerve exits beneath the L4 vertebra through the L4-L5 foramen. These nerves course down from the lower back and merge with other nerves to form the lumbar and lumbosacral plexuses, which innervate the lower limbs.

Lumbar Spine





Lumbar Dermatomes



Working up low back pain

- **History**
 - time of onset
 - inciting event
 - improving, worsening, not changing
 - location and distribution of pain
 - what worsens pain
 - what relieves / improves pain
 - neurogenic claudication symptoms
 - subjective weakness
 - bowel bladder dysfunction
 - treatments- effective or not

History

- age
- history of cancer
- unexpected weight loss
- immunosuppression
- prolonged steroid use
- duration of symptoms
- history of IV drug abuse
- history of infection
- response from previous therapy
- persistent numbness and weakness in the legs
- history of significant trauma
- findings consistent with cauda equina syndrome
 - bladder dysfunction or fecal incontinence
 - saddle anesthesia
 - unilateral or bilateral leg weakness

Red Flags

- **Neurologic deficit**
 - Reflex changes
 - Motor group weakness
 - Cauda equina syndrome
 - Loss of bowel and bladder control
 - Neurogenic bladder
 - Not urinary stress or urge incontinence

Physical Exam

- **Physical exam**
 - ambulate- normal walk across the room
 - heel and toe walking
 - lumbar flexion-extension
 - motor group testing
 - sensory exam
 - Reflexes
 - straight leg raise/ cross straight leg raise

Motor Group Testing

- L2-3: Hip flexors (Iliopsoas)
- L3-4: Knee Extension (Quadriceps)
- L4-5: Ankle dorsiflexion (Tibialis anterior)
- L5: Great toe extension (Extensor hallucis longus)
- L5: Foot dorsiflexion (Extensor digitorum longus)
- L5: Heel walking
- S1: Ankle plantar flexors (Gastrocnemius)
- S1: Toe walking

•Lower Extremity Spine and Neuro Exam				
•Nerve root	•Primary Motion	•Primary muscles	•Sensory	•Reflex
•L1			•Iliac crest and groin	•Cremasteric reflex (L1 and L2)
•L2	•Hip flexion and adduction	•Iliopsoas (lumbar plexus, femoral n.) •Hip adductors (obturator n.)	•Anterior and inner thigh	•Cremasteric reflex (L1 and L2)
•L3	•Knee extension (also L4)	•Quadriceps (femoral n.)	•Anterior thigh, medial thigh and medial knee	•-
•L4	•Ankle dorsiflexion (also L5)	•Tibialis anterior (deep peroneal n.)	•Lateral thigh, anterior knee, and medial leg	•Patellar
•L5	•Foot inversion •Toe dorsiflexion •Hip Extension •Hip abduction	•Tibialis posterior (tibial n.) •EHL (DPN), EDL (DPN) •Hamstrings (tibial) & gluteus max (inf. gluteal n.) •Gluteus medius (sup. gluteal n.)	•Lateral leg & dorsal foot	•-
•S1	•Foot plantar flexion •Foot eversion	•Gastroc-soleus (tibial n.) •Peroneals (SPN)	•Posterior leg	•Achilles
•S2	•Toe plantarflexion	•FHL (tibial n.), FDL (tibial)	•Plantar foot	•-
•S3 & S4	•Bowel & bladder function	•Bladder	•Perianal	•-

<https://www.orthobullets.com/spine/2002/lower-extremity-spine-and-neuro-exam>

Physical Exam

- Reflexes
 - decreased or absent patellar reflex
 - L3 and L4
 - decreased or absent Achilles reflex
 - S1

Physical Exam

- **Straight leg raise**
 - passively elevating the patient's extended right leg, this maneuver stretches the sciatic nerve. If compressed or inflamed, this maneuver will reproduce pain in the sciatic nerve distribution. Note that isolated back pain with this maneuver does NOT mean a positive SLR test.
- **Cross straight leg raise**
 - elevating the unaffected leg passively reproduces pain down the affected leg, this is highly predictive of a radiculopathy and disk herniation

Relief of discomfort is usually best achieved with non prescription pain medications and other conservative treatments

- Rest
- Ice and heat
- NSAIDs
- Massage
- Physical therapy
- Home Exercises and stretches
 - (directed by medical office, chiropractor or physical therapist)
- Chiropractic manipulation

Medication management of low back pain

- Anti-inflammatory medications
 - diclofenac / Voltaren
 - celecoxib / Celebrex
 - meloxicam / Mobic
 - Naproxen
- Muscle relaxers
 - methocarbamol / Robaxin
 - tizanidine / Zanaflex
 - carisrodol / Soma
 - cyclobenzaprine / Flexeril

Medication management of low back pain

- gabapentin / Neurontin
- pregabalin / Lyrica
- methylprednisolone / Medrol
- tramadol / Ultram
- hydrocodone
- oxycodone

Alternative Treatments

- inversion table
- acupuncture
- lidocaine patches
- TENs unit
- balms and ointments
- THC/CBD

4 Ways to Protect Your Low Back

- **Weight loss**- Even a 10-pound loss can help reduce lower back pain.
- **Core muscle strengthening**- The abdominal and lower back muscles work together to form a supportive “girdle” around your waist and lower back. Stronger muscles can help stabilize the lower back and can help reduce injury risk.
- **Tobacco use** Nicotine reduces blood flow to the spinal structures and can accelerate age-related degenerative changes.
- **Proper posture and body mechanics**- Keep your spine erect and lift objects with your legs. Always ask for help to carry heavy objects. Although your lumbar spine is capable of bending and twisting simultaneously, you should avoid doing so.

Ordering Images

- **X-rays**
 - AP and lateral lumbar spine x-rays with flexion and extension views
 - Scoliosis survey if scoliosis present
- **CT scan**
 - not very useful for diagnosing nerve root compression
- **MRI**
 - order without contrast unless there is concern for tumor or infection
- **Lumbar myelogram**
 - helpful if an implanted device precludes MRI

Radiological findings

- **Spondylosis**
 - a degenerative process affecting the vertebral disc and facet joints that gradually develops with age
- **Lumbar spinal stenosis**
 - a narrowing of the spinal canal
- **Foraminal stenosis**
 - narrowing of the neural foramen, can compress the nerves roots
- **Facet arthropathy**
 - degenerative and or arthritic changes of the facets

Radiological findings

- **Spondylolisthesis**
 - spinal disorder in which a vertebra slips forward onto the bone below it
- **Disc degeneration**
 - a group of symptoms that may result from the gradual wear and tear of spinal discs or from an acute spinal injury.
- **Disc bulge/herniation**
 - a condition in which the nucleus (inner portion) of a disc remains contained within the annulus fibrosus (outer portion)
 - a herniated disc involves the nucleus leaking out of the disc

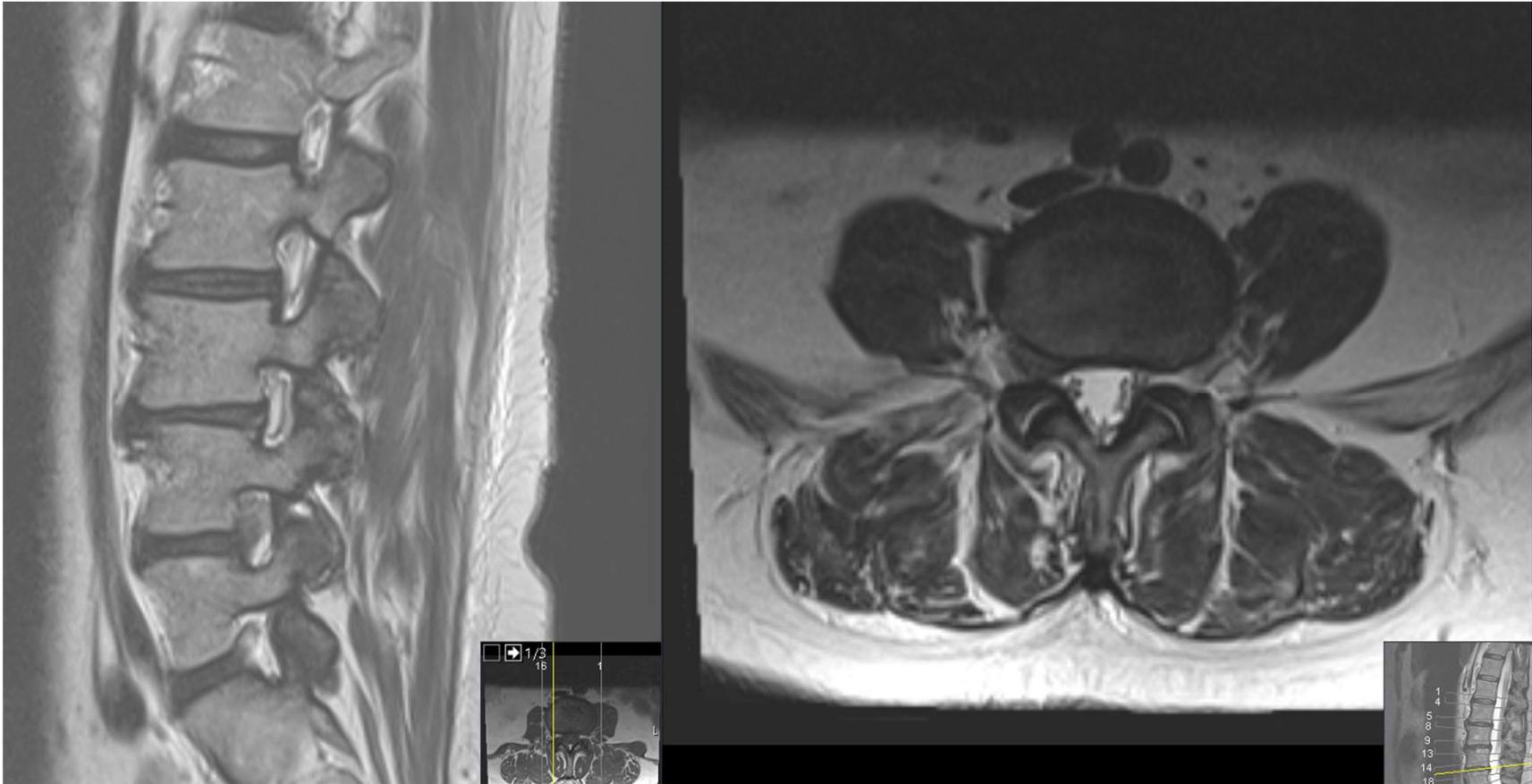
Radiological findings

- **Pars defect**
 - a unilateral or bilateral overuse or fatigue stress fracture involving the pars interarticularis of the posterior vertebral arch
- **Lumbar instability**
 - occurs when a spine injury or degenerative changes lead to structural changes, abnormal movement and abnormal load transfer within the spine

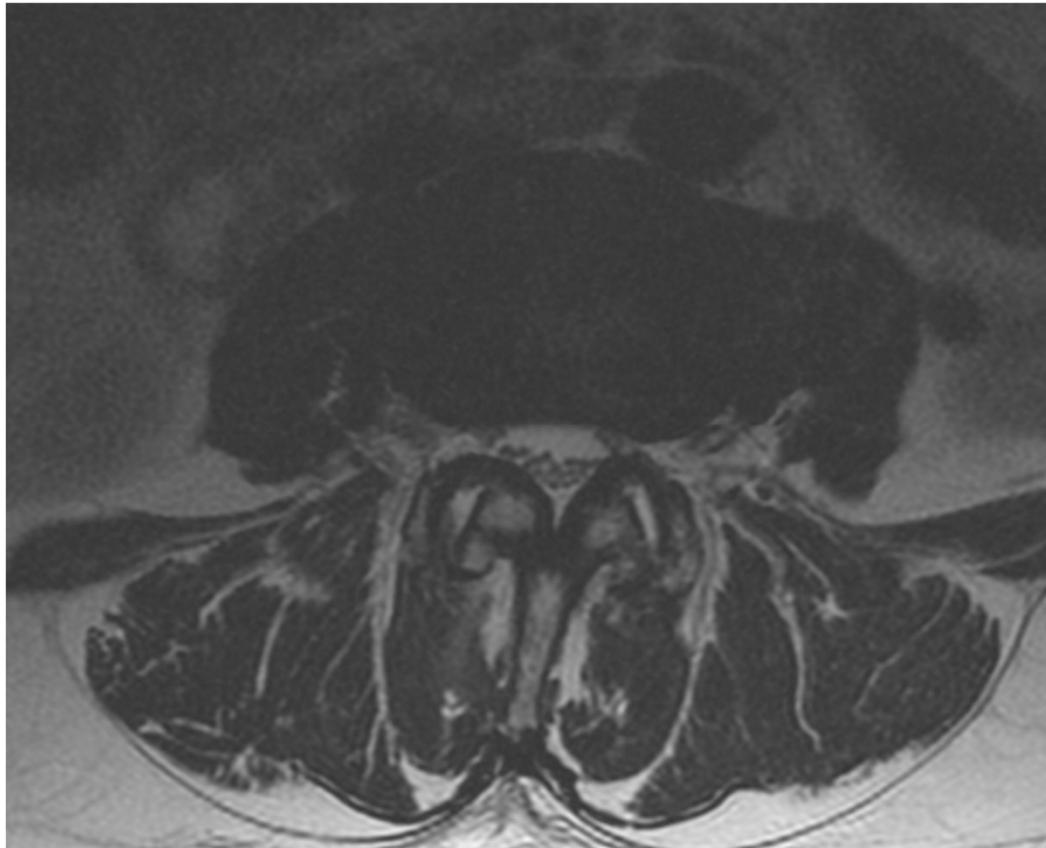
Lumbar spinal stenosis



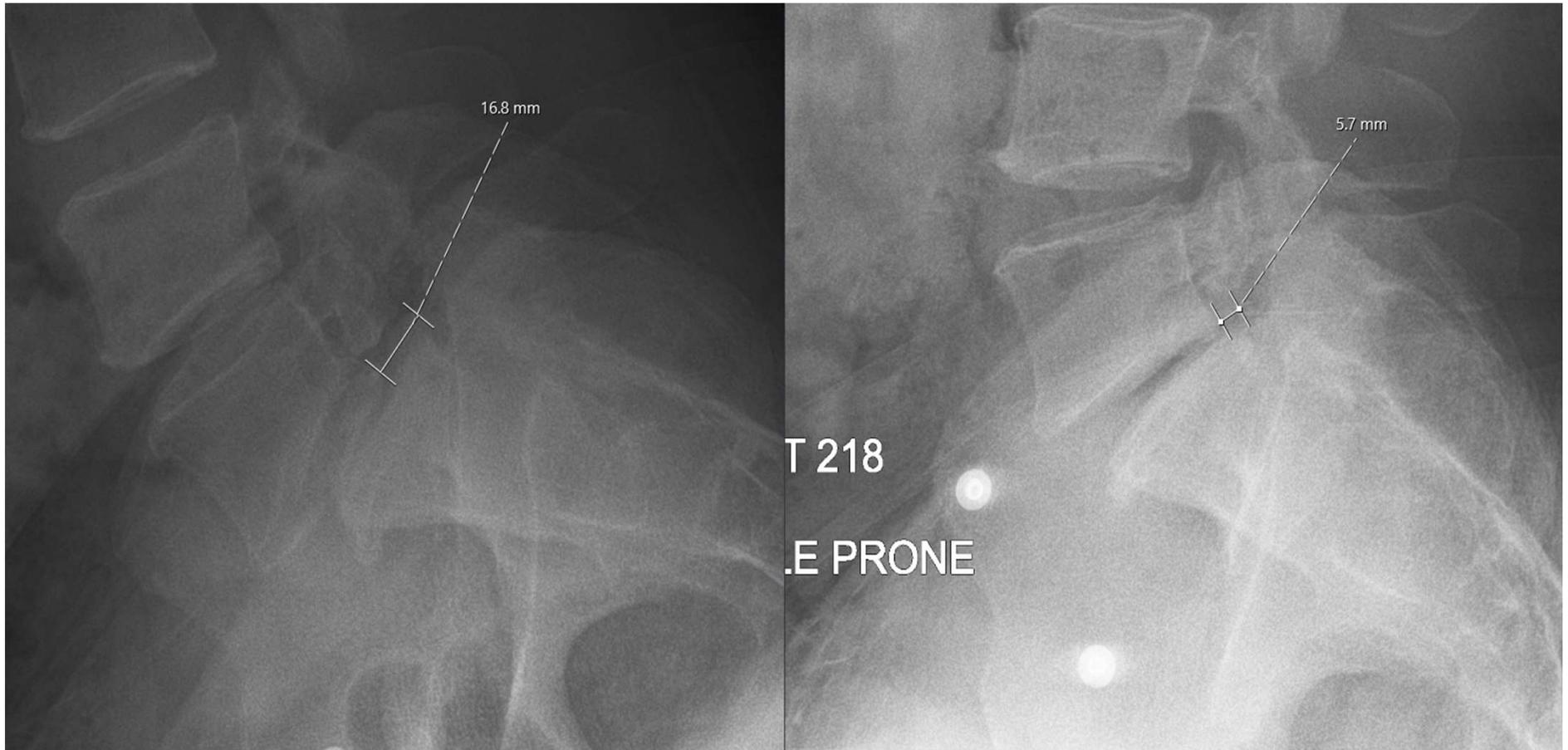
Lumbar foraminal stenosis



Facet arthropathy

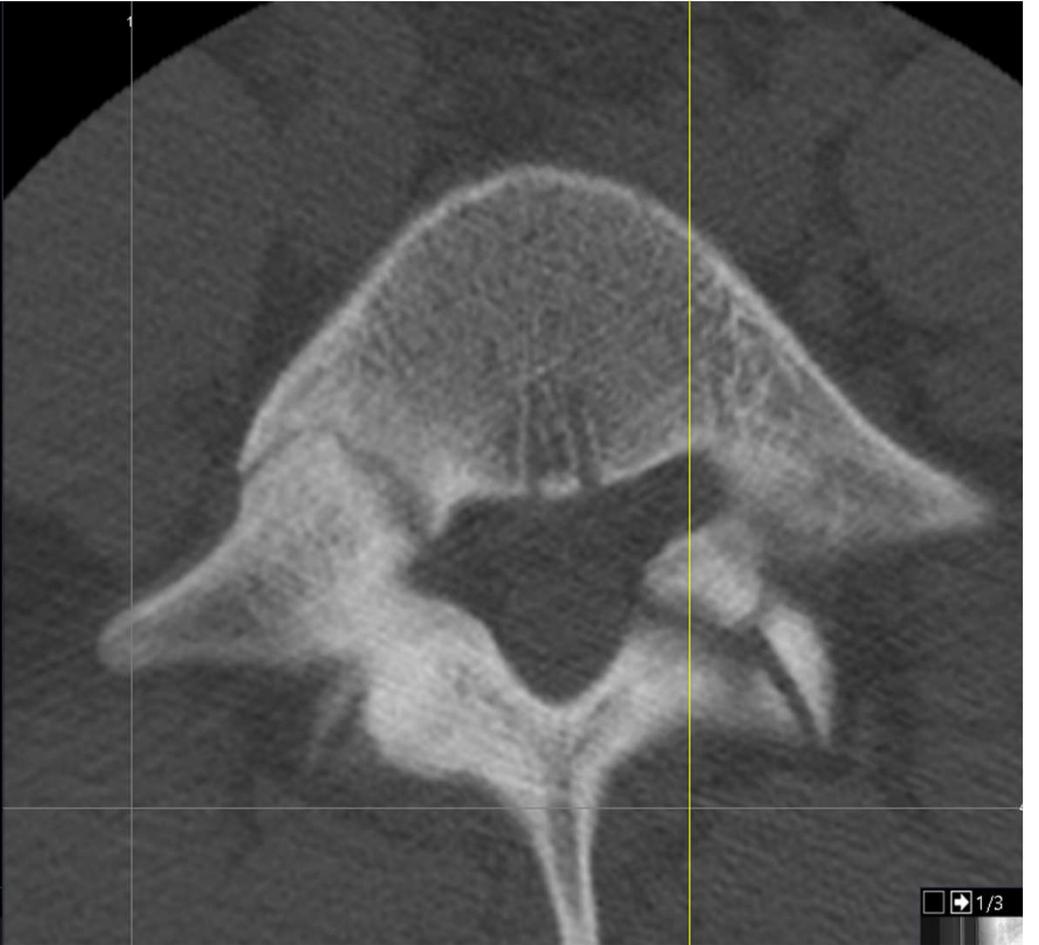


Lumbar instability



Pars defect





Lumbar disc herniation





Facet arthropathy with synovial cyst

