WHAT EVERY INTERNIST SHOULD KNOW ABOUT LOW BACK PAIN

Subhadra Nori, MD

Department of Rehab Medicine

Regional Director

Queens Health Network

Associate Professor

Icahn School of Medicine at Mount Sinai

WHAT EVERY INTERNIST SHOULD KNOW ABOUT BACK PAIN .

- Magnitude of the problem
- Clinical evaluation
- Diagnostic work up
- Treatment options
- New strategies

Is This Really A Problem?

- 80% of adults in industrial countries have at least one episode of disabling back pain
- By the 3rd decade 50% of people have experienced an episode of LBP that required alteration in activity.
- In spite of “optimal management” 5% of acute back pain progresses to chronic and disabling endpoint.

Spengler 1986

Is Back Pain a Problem?

- 86 million Americans suffer chronic pain
- 66 million are partially disabled from back pain
- 8 million are totally disabled from back pain
- There are 65,000 cases of pain related permanent disability diagnosed each year

Medical Data International

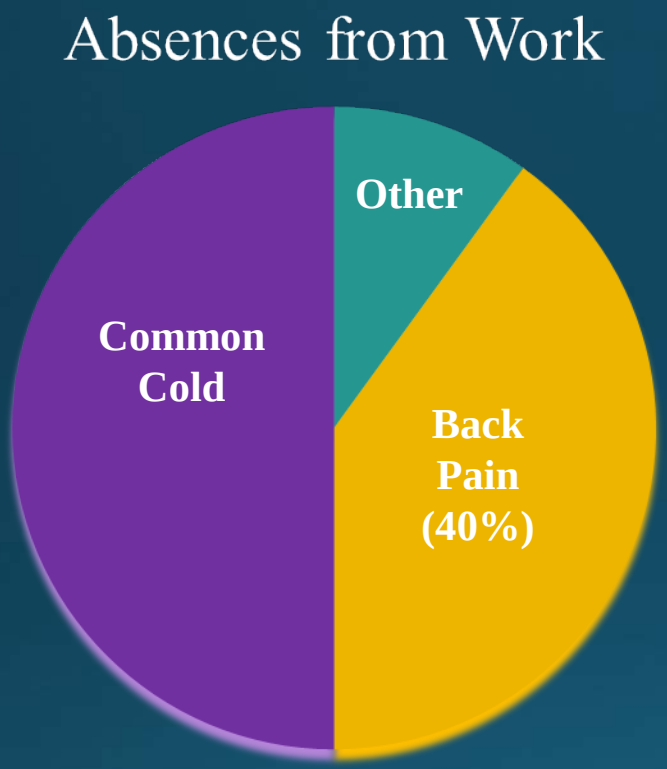
Is Back Pain a Problem?

Pai found in 2004[1] that in the U.S. low back pain was the

- Second leading symptomatic cause for physician visits
- Third most common cause for surgical procedures
- Fifth most common reason for hospitalization

[1] Pai S, Sundaram LJ. Low back pain: an economic assessment in the US. *Ortop Clin N Am.* 2004; 35*:* 1-5

Is Back Pain a Problem at Work?



In 1999, back pain accounted for 40 percent of absences from work, second only to the common cold.

Guo HR, Tanaka S, Halperin WE, Cameron LL. Back pain prevalence in US industry and estimates of lost workdays. *AM J Public Health.* 1999;89: 1029-1035

METRICS

- **Cost of back pain ;American Academy of pain Medicine**

recent report by the Institute of Medicine ;

the annual value of lost productivity in 2010 dollars ranged between $297.4 billion to 335.5 billion

based on three estimates: days of work missed (ranging from $11.6 to $12.7 billion);

hours of work lost (from $95.2 to $96.5 billion);

and lower wages (from $190.6 billion to $226.3 billion).(1)

In 2004 was 193.9 B

Increased by 49%

- - AAOS
- Aching backs impact cost, disability
- *www.aaos.org/news/aaosnow/jano9/research6.asp*

Duration of Symptoms

It is generally useful to break back pain into three categories according to duration of symptoms:

- Less than eight weeks duration
- Eight weeks-six months duration
- Greater than six months duration

Common Back Issues

- Mechanical low back pain
- Lumbar strain
- Degenerative disease

  Discs (spondylosis)

  Facet joints (osteoarthritis)
- Spondylolisthesis
- Herniated disc
- Spinal stenosis
- Osteoporosis
- Fractures
- Congenital disease
  - Severe kyphosis
  - Severe scoliosis
  - Possible type II or type IV transitional vertebra*
- Possible spondylolysis
- Possible facet joint asymmetry

Non-mechanical Spine Disease

Neoplasia

- Multiple myeloma
- Metastatic carcinoma
- Lymphoma and Leukemia
- Spinal cord tumors
- Retroperitoneal tumors

Infection

- Osteomyelitis
- Septic discitis
- Paraspinous abscess
- Epidural abscess

Inflammatory arthritis (often HLA-B27-associated)

- Ankylosing spondylitis
- Psoriatic spondylitis
- Reactive arthritis
- Inflammatory bowel disease

Scheuermann disease (Osteochindrosis)

Paget disease

Visceral Disease

Pelvic organic

- Prostatitis
- Endometriosis
- Chronic pelvic inflammatory disease

Renal disease

- Nephrolithiasis
- Pyelonephritis
- Perinephric abscess

Gastrointestinal disease

- Pancreatitis
- Cholecystitis
- Penetrating ulcer

Aortic aneurysm

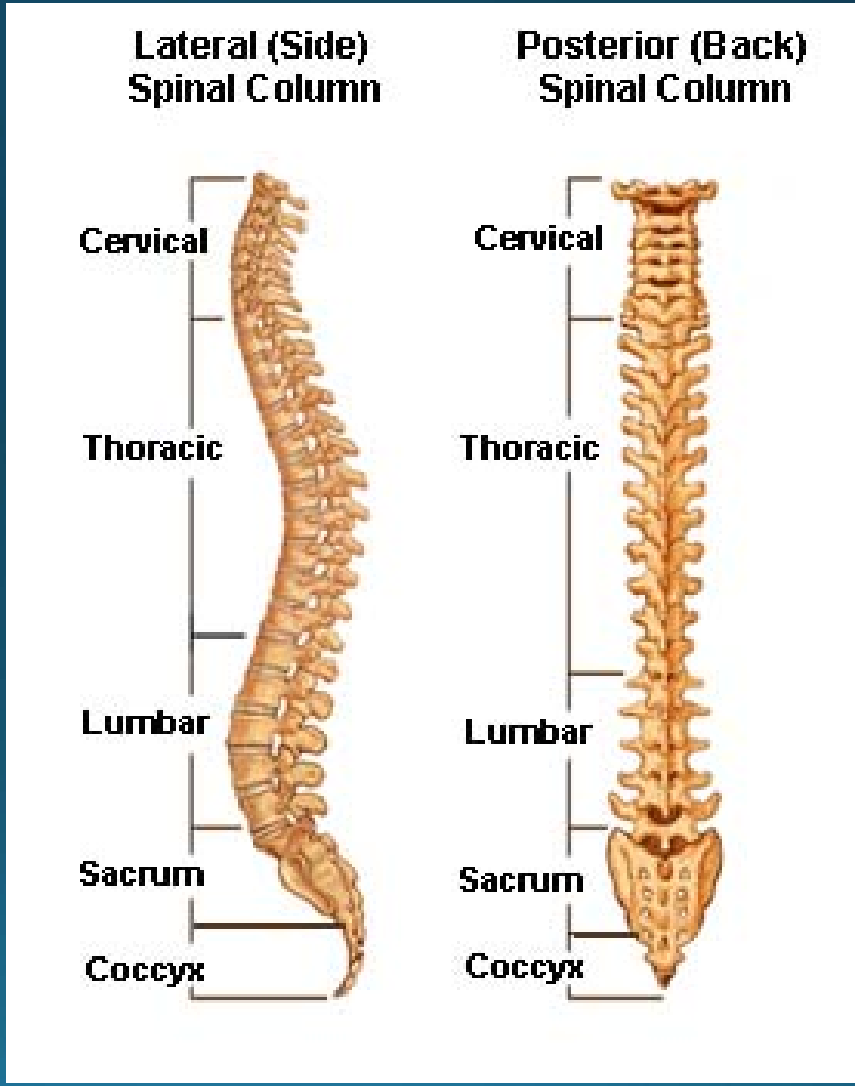
Fat herniation of Lumber Space

QUIZ:

1. Which nerve root exits between L4 and L5?
2. What is the difference between spondylosis and spondylotisthesis?
3. Which muscles support the back?
4. What is the importance of disc bulge?
5. What causes foot drop?
6. What is the difference between Myelopathy and Radiculopathy?

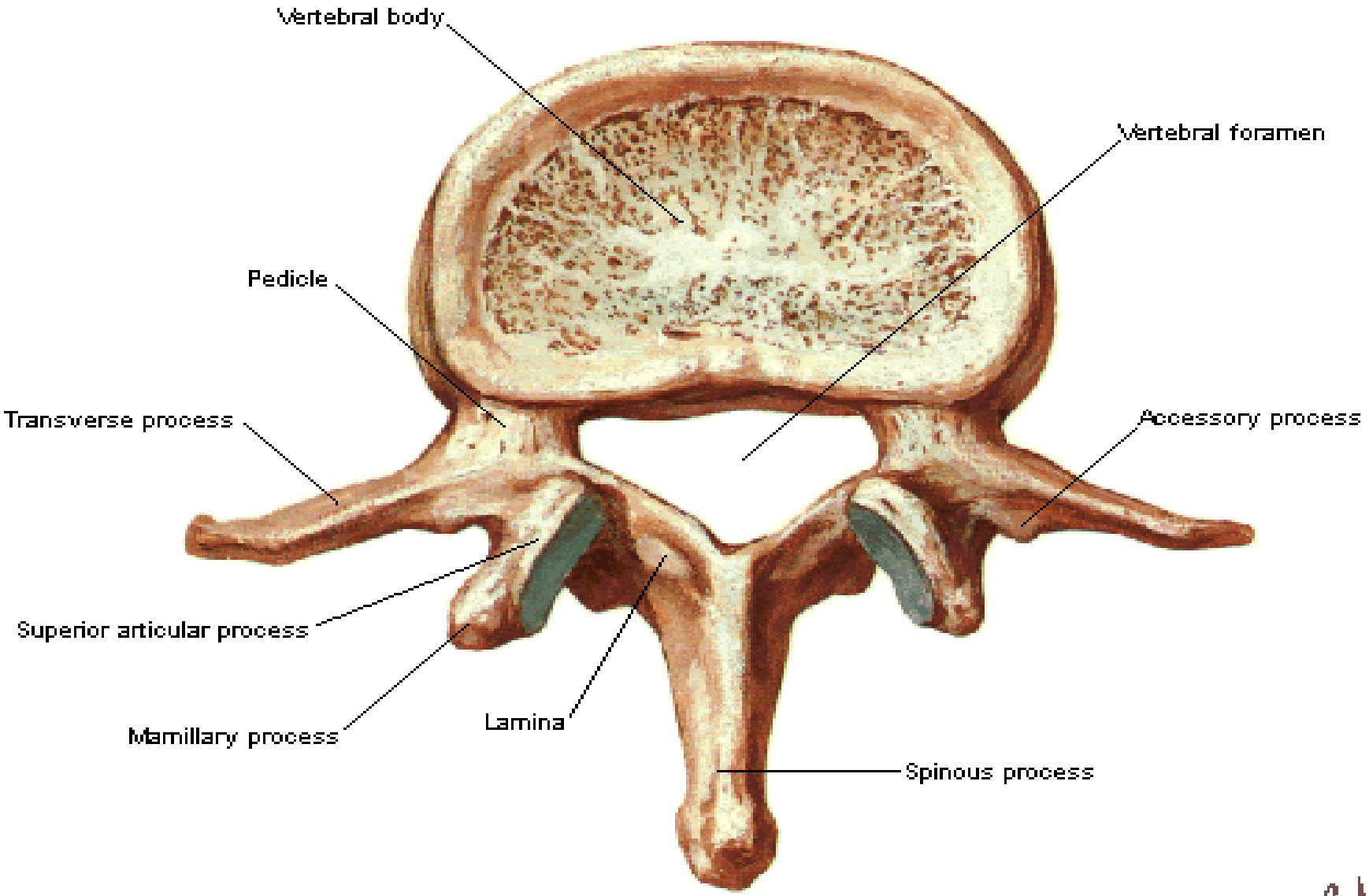
Four Regions of Spine

- Cervical – C_1-C_7
- Thoracic – T_1-T_{12}
- Lumbar – L_1-L_5
- Sacral – 5.
- coccygeal

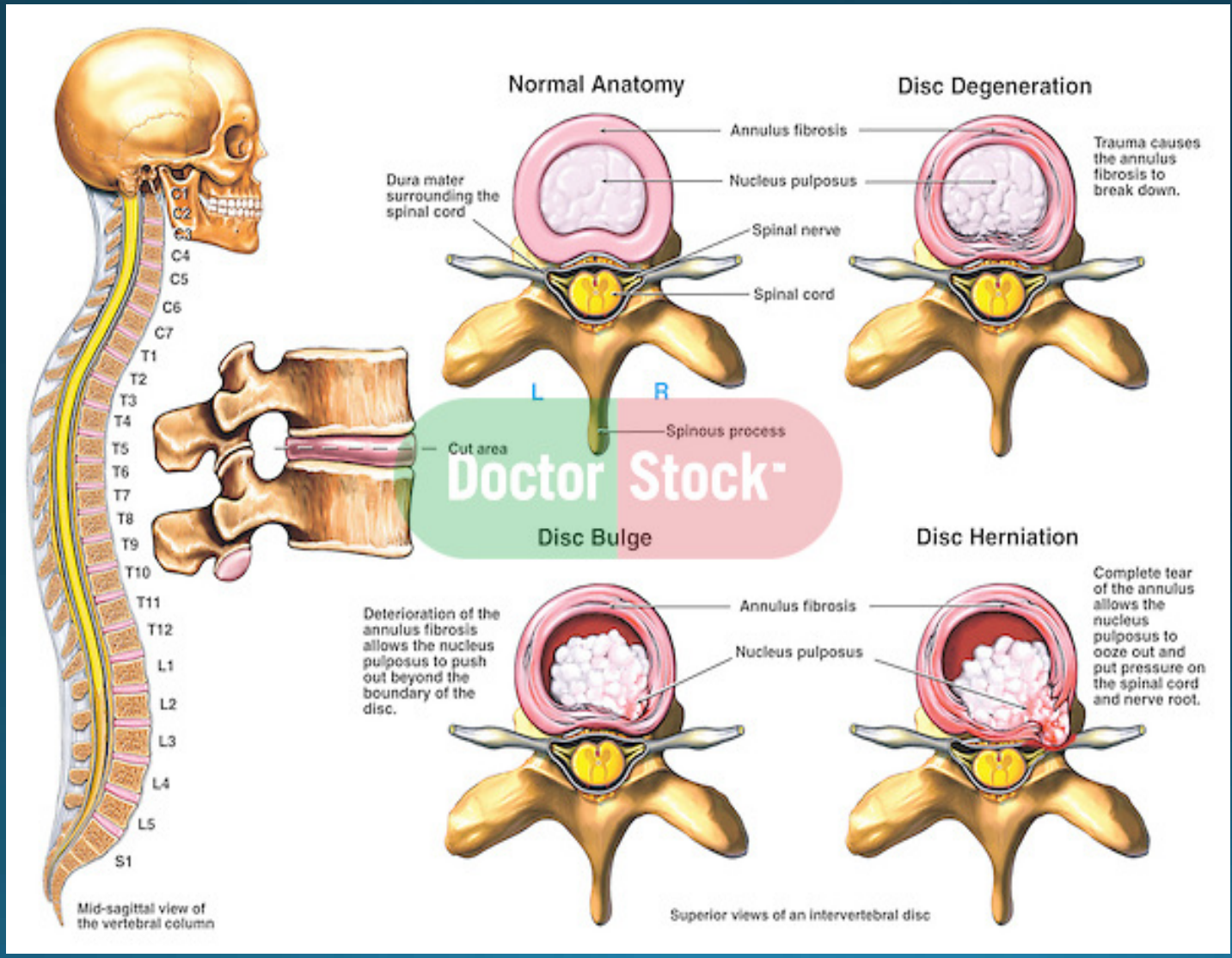


Lumbar Vertebrae [L2]

Superior View

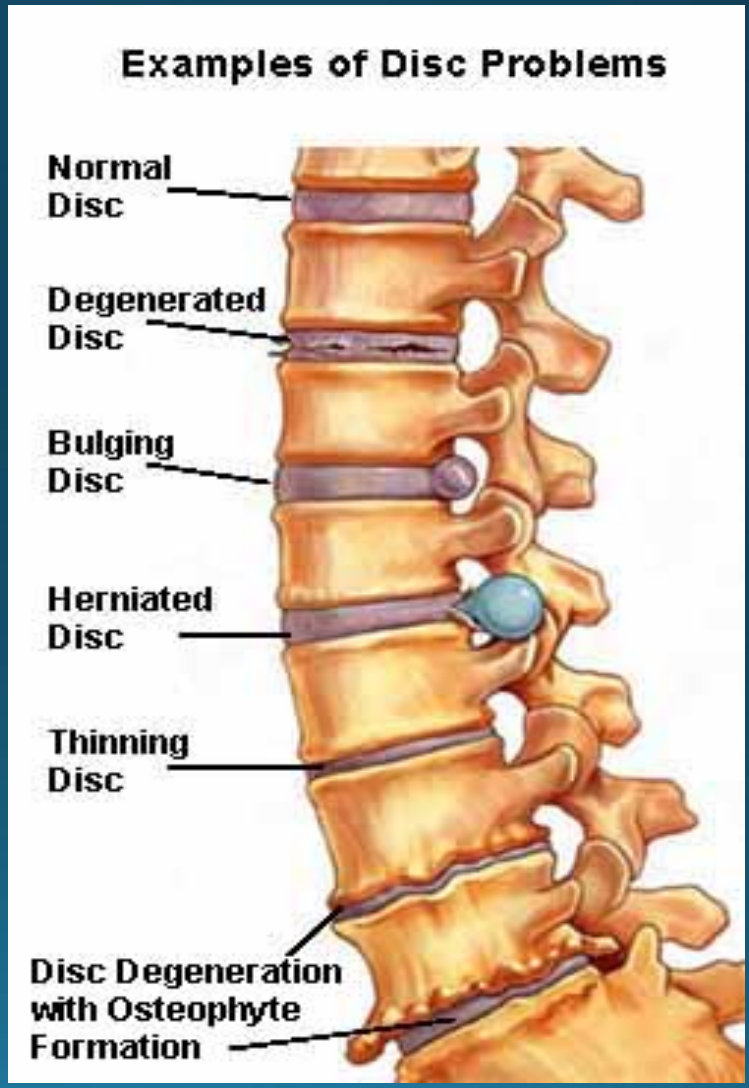


INTERVERTEBRAL DISC

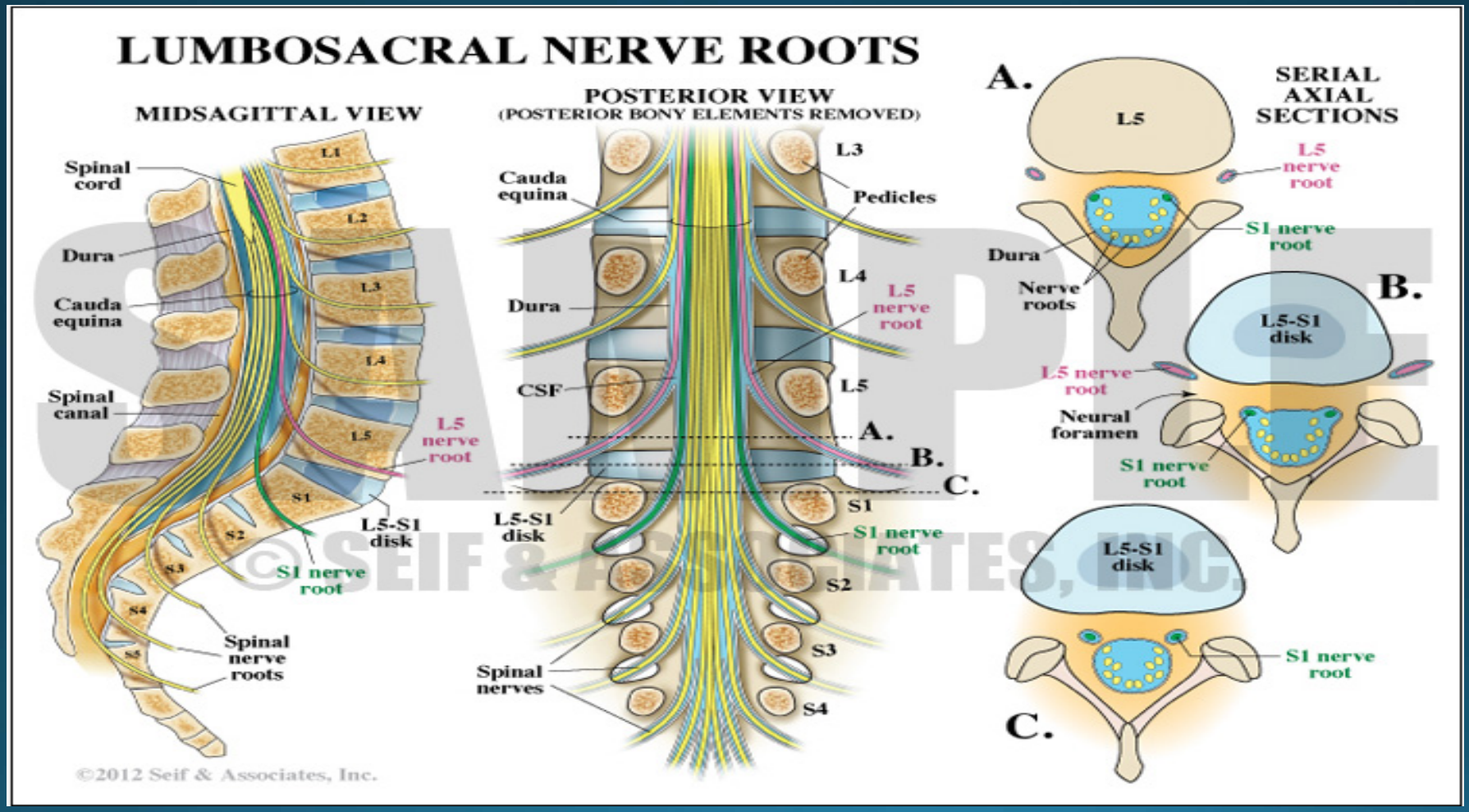


Examples of Disc Problems

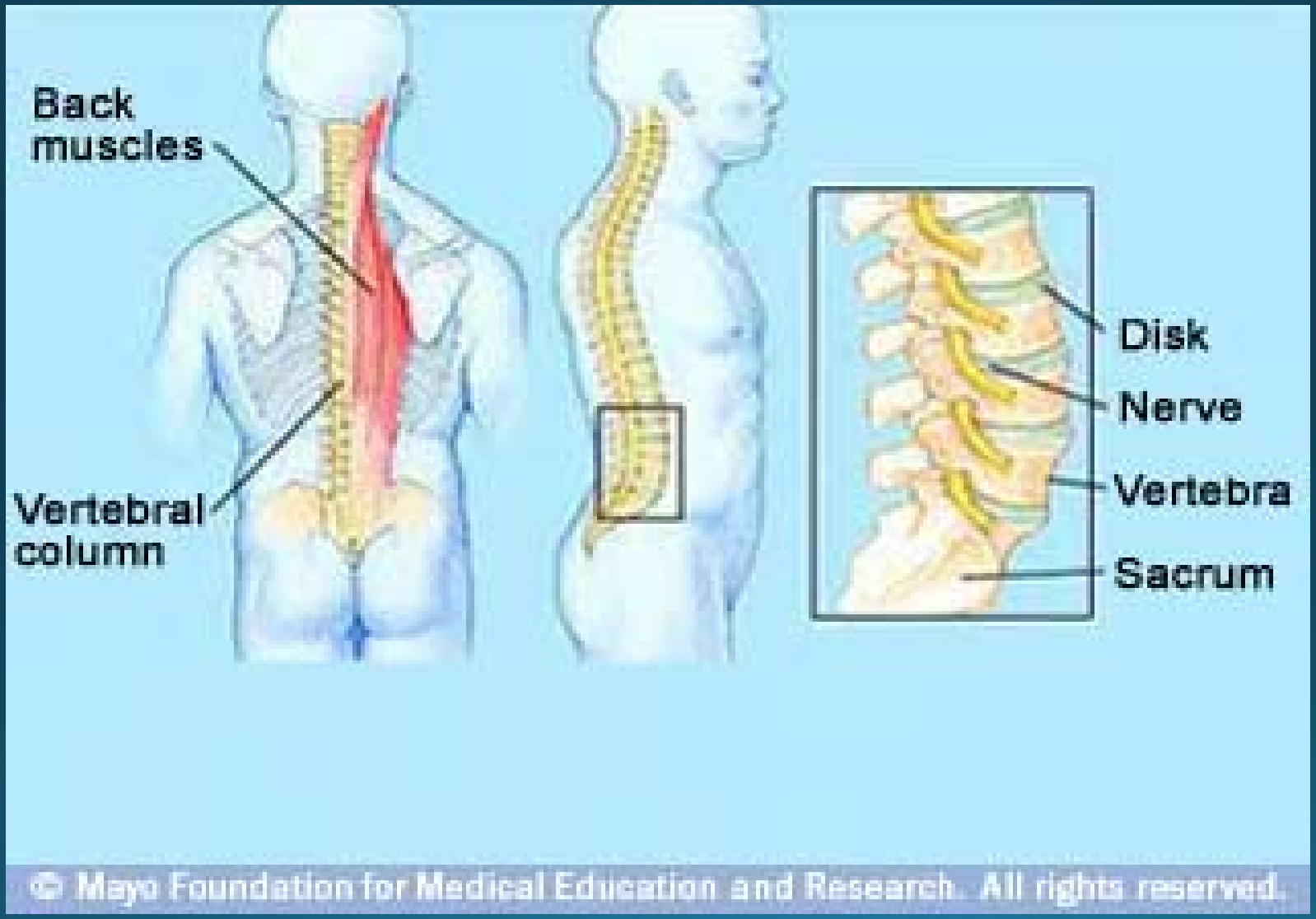
- Normal Disc
- Degenerated Disc
- Bulging Disc
- Herniated Disc
- Thinning Disc
- Disc degeneration with Osteophyte formation



NERVE ROOTS



Anatomy



Spondylolysis: A fracture in the pars interarticularis where the vertebral body and the posterior elements protecting the nerves are joined. Seen radiographically as disc space narrowing and arthritic changes of the facet.

Spondylolisthesis: Anterior displacement of a vertebra on the one beneath it. A radiologist determines the degree of slippage upon reviewing spinal radiographs. Slippage is graded I through IV:

- Grade I – 1 to 25% slip
- Grade II – 26 to 50% slip
- Grade III – 51 to 75% slip
- Grade IV – 76 to 10% slip

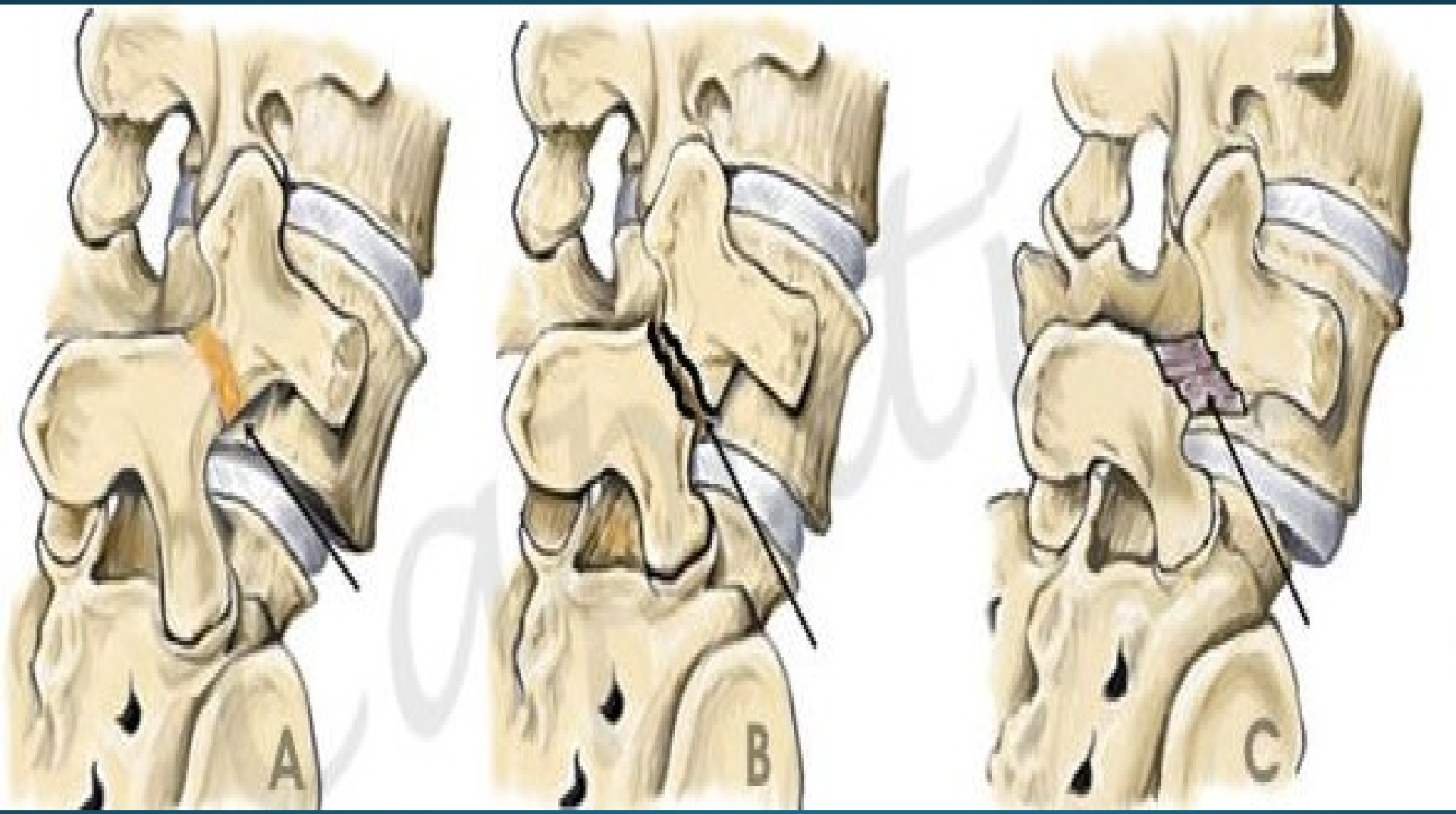
Generally, Grade I and Grade II slips do not require surgical treatment and are treated medically.

Grade III and Grade IV slips, may benefit from surgery if persistent and disabling symptoms and present.

Spinal stenosis: Local, segmental or generalized narrowing of the vertebral canal by bone or soft tissue elements, usually bony hypertrophic changes in the facet joints and by thickening of the ligamentum flavum.

Radiculopathy: Impairment of a nerve root, usually causing radiating pain, numbness, tingling, or muscle weakness that corresponds to a specific nerve root.

Sciatica: Pain, numbness, tingling in the distribution of the sciatic nerve, radiating down the posterior or lateral aspect of the leg, usually to the foot or ankle.



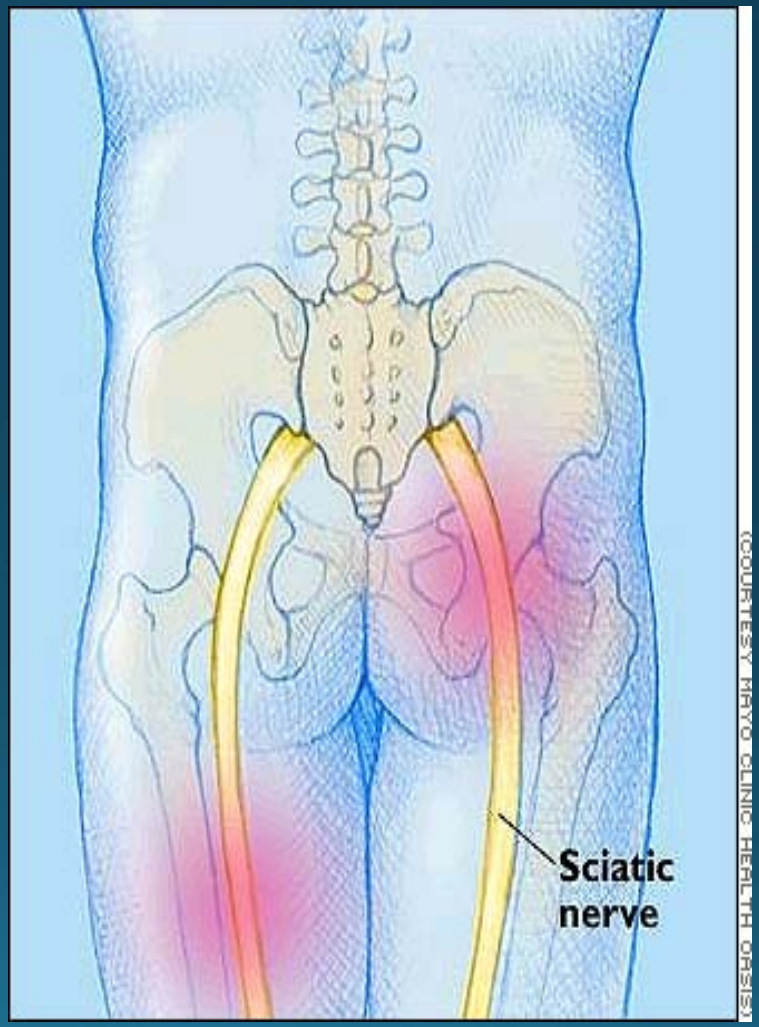
Cauda equina syndrome: Loss of bowel and bladder control and numbness in the groin and saddle area of the perineum, associated with weakness of the lower extremities. This condition can be caused by abnormal pressure on the bottom-most portion of the spinal canal and spinal nerve roots, related to either bony stenosis or a large herniated disc.

Lordosis, kyphosis, scoliosis:

- Kyphotic curves refer to the outward curve of the thoracic spine (at the level of the rips)
- Lordotic curves refer to the inward curve of the lumbar spine (just above the buttocks)
- Scoliotic curving is a sideways curvature of the spine and is always abnormal.

Conditions Associated with Back Pain

- Cauda Equina Syndrome
- Spinal degeneration
- Sciatica
- Spinal stenosis
- Osteoporosis-post menopausal
- Fibromyalgia



Clinical Evaluation

Diagnoses We Don't Want to Miss:

- Tumor (of bone or viscera)
- Infection
- Fracture
- Any process in severe compromise of nervous issue
- Systemic illnesses affecting joints
- Leaking abdominal aortic aneurysm

Clinical Evaluation

Things We Don't Want to Miss Physical Exam

Neurological signs such as:

- Loss of reflex in the area of pain
- Profound focal weakness
- Profound diffuse proximal weakness
- Up going toes
- Clonus at the ankle
- Hyperreflexia
- Patulous sphincter tone

Clinical Evaluation

Things We Don’t Want to Miss Physical Exam

- The patient can’t walk or sit due to back or leg pain.
- Severe pain with movement lasting for more than one week
- Severe muscle spasm lasting more than one week
- Extreme and localized tenderness to percussion over the spinous processes or other bony prominences
- Joint effusions, redness, synovial bogginess, tenderness

Red Flags

How Not to Miss Them

History: the *nine* red pain flags

1. Prominent neurological symptoms of weakness, numbness, loss of bowel or bladder control, difficulty walking
2. Pain is much worse at night
3. Fever
4. Other constitutional symptoms that always worry us
5. Patient cannot sit or stand due to pain

Red Flags

How Not to Miss Them

History: the *nine* red pain flags

6. Pain following a fall in the elderly or in a patient at risk for osteoporosis
7. Leg pain is much worse than back pain
8. History of cancer in the last five years, particularly breast, lung, prostate, thyroid, renal
9. Polyarthralgias

Physical Examination

- 4 positions
- Standing
- Sitting
- Walking
- Lying down
- Inspection of back and posture
- Palpation of spine
- Walk on heels, toes, asymmetry, LLD
- Palpation of pulses
- SLR, cross SLR, abdominal palpation
- Waddell' signs
- Motor, sensory, reflexes
- Muscle wasting

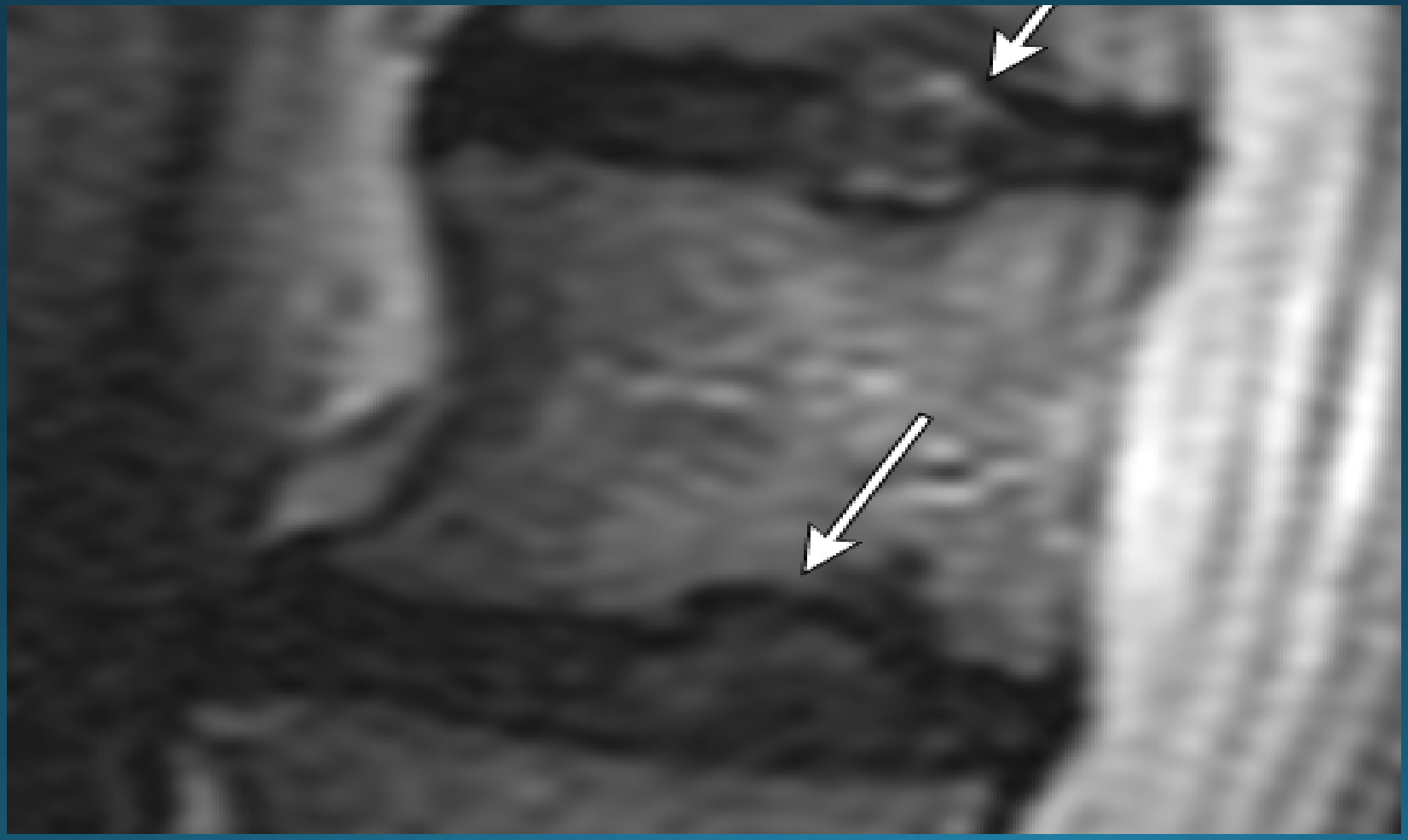
Testing for lumbar nerve root compromise

Nerve root	L4	L5	S1
Pain			
Numbness			
Motor weakness	Extension of quadriceps	Dorsiflexion of great toe and foot	Plantar flexion of great toe and foot
Screening examination	Squat and rise	Heel walking	Walking on toes
Reflexes	Knee jerk diminished	None reliable	Ankle jerk diminished

Data from: Bigos S, Bowyer O, Braen G, et al. Acute Low Back Problems in Adults. Clinical Practice Guideline, Quick Reference Guide Number. 14. Rockville, MD: U.S. Department of Health and Human Services, Public Health Service, Agency for Health Care Policy and Research, AHCPR Pub. No. 95-0643. December 1994.

MRI vs RADIOGRAPH

Sagittal Image From A Spine MRI Shows Intraverebral Disc



Electromyogram (EMG)

- Electrical activity of the muscle and nerve
- Extension of P.E.
- Confirms radiculopathy
- R/O other causes, e.g., polyneuropathy

All That Radiates to The Leg is Not Disease of The Nerve Root

- Occasional, Usually bilateral radiation to the feet with disc pain
- Hip joint osteoarthritis can be confused with L3 and L4 radiculopathy
- Trochanteric bursitis can be confused with L5 radiculopathy
- Sciatic nerve entrapment and S1 radiculopathy can look identical

Management

General management, according to duration of symptoms

0-8 wks 8wks-6mo >6 mo

- Most people recover from an acute episode within 8 weeks
- Conformity: The NASS guidelines defines “the initials phase of care” as lasting about 8 weeks[1]
- Patients remaining symptomatic after six months have a poor prognosis for significant improvement[2]

[1] Phase III Guidelines for Multidisciplinary Spine Specialists, North American Spine Society. 2000

[2]Mayer TG, pg 3-9 in Contemporary Conservative Care for Spine Disorders

Management

0-8 weeks

Symptom palliation

To support progress toward resumption of activity

- Analgesics, paying particular close attention to good analgesia.
    1. At night to help the patient sleep
    2. To help the patient stay at work
- Short-term muscle relaxants
- Physical therapy modalities: TENS, ultrasound, hot packs, massage
- Acupuncture
- Trigger point injections
- Epidural steroid injection for radiculopathy and for the “acute disc’ with mostly back pain.

Management

0-8 weeks

Symptom palliation

When leg symptoms predominate

- Oral steroids or
- Early referral for epidural steroid injection[1]
- Imaging and early referral if neurological red flags are present on history or exam

[1] Phase III Guidelines for Multidisciplinary Spine Specialists, North American Spine Society. 2000

EPIDURAL STEROIDS

INJECTIONS

Indications

- Annular tears
- Central disc herniations
- Trigger point injections

Role of The Physical Therapist

Cognitive

- Patient education
- Assessment and reporting of progress towards functional goals
- Identify barriers to recovery in communicate these to the physician

Is there evidence that early referral to a physical therapy program for patient education and monitoring of progress is effective?

- 2004 primary care study of >600 patients with acute LBP a national health care settings
- Early “hand-off” to physical therapy for evaluation, treatment, patient education and monitoring progress with reporting to MD.
- Treatment outcomes were as good as MD management, **but lost work days reduced and PCP return visits and specialist referrals were drastically reduced**.

Pennington MA Fam Pract. 2004 Aug

BACK - 1 On Elbows (Prone)

Rise up on elbows as high as possible, keeping hips on floor. Hold 10 seconds.

Repeat 20 times per set. Do _____ sets per session.
Do 2 sessions per day.

BACK - 2 Press-Up

Press upper body upward, keeping hips in contact with floor. Keep lower back and buttocks relaxed. Hold 10 seconds.

Repeat 20 times per set. Do _____ sets per session.
Do 2 sessions per day.

BACK - 3 Upper Body Extension

With pillow supporting abdomen, clasp hands behind back and lift upper body from floor. Keep chin tucked while lifting.

Repeat 20 times per set. Do _____ sets per session.
Do 2 sessions per day.

BACK - 4 Hip Extension (Prone)

Lift left leg _____ inches from floor, keeping knee locked.

Repeat 20 times per set. Do _____ sets per session.
Do 2 sessions per day.

BACK - 5 Arm / Leg Lift: Opposite (Prone)

Lift left leg and opposite arm _____ inches from floor, keeping knee locked.

Repeat 20 times per set. Do _____ sets per session.
Do 2 sessions per day.

BACK - 16 Lower Trunk Rotation Stretch

+ one leg crossover

Keeping back flat and feet together, rotate knees to left side. Hold 20 seconds.

Repeat 10 times per set. Do _____ sets per session.
Do 2 sessions per day.

CHIROPRACTIC

HomeRehab

Lumbar & Sacroiliac Stretches

Tips for stretching

- Move slowly into a *gentle* stretch.
- Hold stretch steady. Don't bounce.
- After 15 seconds, gently increase your stretch.

Caution

- If stretching causes pain, discontinue and consult your chiropractor.

☐ GLUTEUS MAXIMUS

Pull your knee to your chest. Repeat on opposite side.

HOLD _____
REPEAT _____

☐ GLUTEUS MEDIUS

Pull your knee to the opposite shoulder. Repeat on opposite side.

HOLD _____
REPEAT _____

☐ SUPINE PIRIFORMIS

Pull your left knee toward your right shoulder. Hold your ankle, but do not pull it toward you.

Repeat on opposite side.

HOLD _____
REPEAT _____

☐ CHILD POSE

Relax in the position shown.

HOLD _____
REPEAT _____

☐ DOUBLE KNEE PULL

Pull both knees to your chest.

HOLD _____
REPEAT _____

☐ ELBOW LEAN

Raise into the position shown. Let your low back relax comfortably toward the floor.

HOLD _____
REPEAT _____

☐ SUPINE QUADRATUS

Cross your left knee over your right knee. Then use your left leg to pull your right knee down to the left.

Repeat on opposite side.

HOLD _____
REPEAT _____

Dr. Gregg Gittins, D.C.
(541) 484-0360

Oakway Health Center
2704 Delta Oaks, Eugene, OR 97408

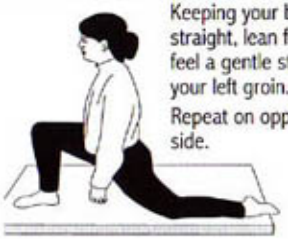
☐ SUPINE PSOAS

Lie on the edge of your bed or a bench. Drop your left leg off the edge until you feel a stretch in your left groin.

Repeat on opposite side.

HOLD _____
REPEAT _____

☐ LUNGE PSOAS



Keeping your back straight, lean forward to feel a gentle stretch in your left groin.

Repeat on opposite side.

HOLD _____
REPEAT _____

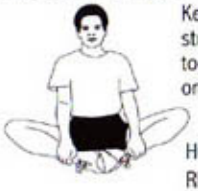
☐ SIDE BENDS

Bend to the right, then to the left side until you feel a stretch in the opposite side.

Repeat on opposite side.

HOLD _____
REPEAT _____

☐ ADDUCTORS

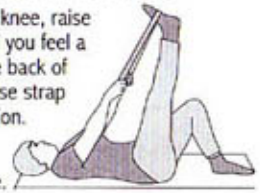


Keeping your back straight, pull your heels together to feel stretch on inner thighs.

HOLD _____
REPEAT _____

☐ LOWER HAMSTRING

With straight knee, raise your leg until you feel a stretch in the back of your thigh. Use strap to hold position.



Repeat on opposite side.

HOLD _____
REPEAT _____

☐ GASTROCNEMIUS

Lean into a wall. Keep your right knee straight and heel on the ground. Bend your left knee to feel stretch in right lower leg.

HOLD _____
REPEAT _____

☐ TFL

Hold a bannister. Then lean your hips away from the bannister until you feel a stretch in the side of your hip.

Repeat on opposite side.

HOLD _____
REPEAT _____

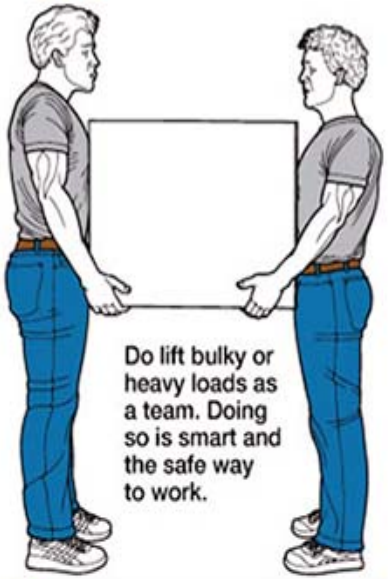
☐ TWISTER

Start with your feet facing away from a wall. Then twist to face the wall.

HOLD _____
REPEAT _____

LIFTING DO'S & DON'TS

DO LIFT AS A TEAM



Do lift bulky or heavy loads as a team. Doing so is smart and the safe way to work.

DO TURN WITH LEGS

Do move your legs and feet when turning or lowering the load. Avoid twisting at your waist.

DO USE YOUR LEGS

Do lift the load using your powerful leg and buttocks muscles. Your feet should be wide apart, head and back upright. Keep abdominal muscles tight and the load in close.

DO USE EQUIPMENT

Do use equipment like hand trucks, dolly's, or forklifts to do the heavy lifting. It's much less work and less risk of injury.

DON'T LIFT BULKY LOADS ALONE

Don't lift bulky or heavy loads alone. Doing so puts great stress on your low back muscles and spine.

DON'T TWIST WHEN LIFTING

Don't twist when lifting, lowering, or carrying any load as this increases your risk of back injury.

DON'T USE YOUR BACK

Don't lift the load with your rear end high and your lead low. Use your leg muscles, not your weaker low back muscles.

DON'T LIFT HEAVY LOADS

Don't lift heavy loads when you can use equipment. It is less work and less stress on your low back.

Eight Weeks-Six Months

Re-Evaluation

- A known diagnosis, not yet treated?
  - Managed-care, patient has not been triaged to appropriate care, geography
- A known diagnosis, the nature of which is chronic?
- A missed medical diagnosis? (includes the patient who shows up for first evaluation two months into the pain)
- Are psychosocial factors contributing significantly to disability?

Predominantly Back Pain

- Discogenic pain (annular tear)
- Painful osteoarthritis of the facet joints
- Structural pathology
  - Congenital or degenerative kyphosis/scoliosis
- Compression fracture
- Spondylolysis/spondylolisthesis
- Inflammatory spondylitis
- Visceral pathology

Predominantly Leg Pain

- Herniated nucleus pulposus
- Spinal stenosis

Back Pain Without Radiculopathy

8 weeks – 6 months

Further Evaluation

- Plain x-ray, with flexion extension in elderly patients and patients with significant sharp sudden pain with movement.
  - Fracture, instability,
  - infection, tumor, inflammatory spondylitis
  - ESR

Back Pain Without Radiculopathy

8 weeks – 6 months

Further Evaluation for the ‘missing diagnosis”

- Neuroimaging: MRI recommended for initial screening of persistent back pain, over CT and Bone scan
  - Infection, tumor, stress fracture or visceral pathology are suspected but not seen on plain x-ray (sensitivity of x-ray about 42%).

Treatment of Back Pain Eight Weeks-Six Months

Integrate medical and physical medicine efforts designed to help your patient COPE effectively with what may be chronic problem

- Provide good analgesia to support optimal rehab
- Cardiovascular conditioning and specific exercise
  - Stabilization through strengthening “core” trunk muscles
- Manual therapy (one small RCT)
- Job site assessment and modification

Procedural possibilities

- Chronic opioid therapy
- Intra-discal electrothermal annuloplasty-“IDETT”
- Disc replacement
- Radiofrequency rhizotomy/ablation
- Intrathecal pumps

IDETT

Original Conductive Technique

Modified RF Technique

Surgery For Chronic Low Back Pain (*Excluding Spinal Stenosis*)

Intervention	Population	Net Benefit	Graded Recommendation	Comments
Interbody fusion	Nonspecific low pain or degenerative disc disease with presumed discogenic low back pain	Moderate versus standard physical therapy supplemented by other nonsurgical therapies, no benefit versus intensive rehabilitation	Suggested (for highly selected patient population) (2B)	Inconsistency between trials may be related to use of different comparator interventions
Artificial Disc Replacement	Nonspecific low back pain or degenerative disc disease with presumed discogenic low back pain	No evidence	Suggest not performing (2C)	One trial found Charite artificial disc noninferior to fusion and one on trial found Prodisc-L-artificial disc superior to fusion.

SUMMARY AND RECOMMENDATIONS

- Most patients who present with back pain to primary care settings will have non specific back pain
- A focused history and physical examination are sufficient to evaluate most patients .
- If symptoms persists beyond 6 weeks consider specific etiologies (eg, vertebral compression fracture,malignancy radiculopathy, or spinal stenosis).
- Consider appropriate imaging studies.
- Early intervention with PM&R referrals will favorably impact outcomes and quality

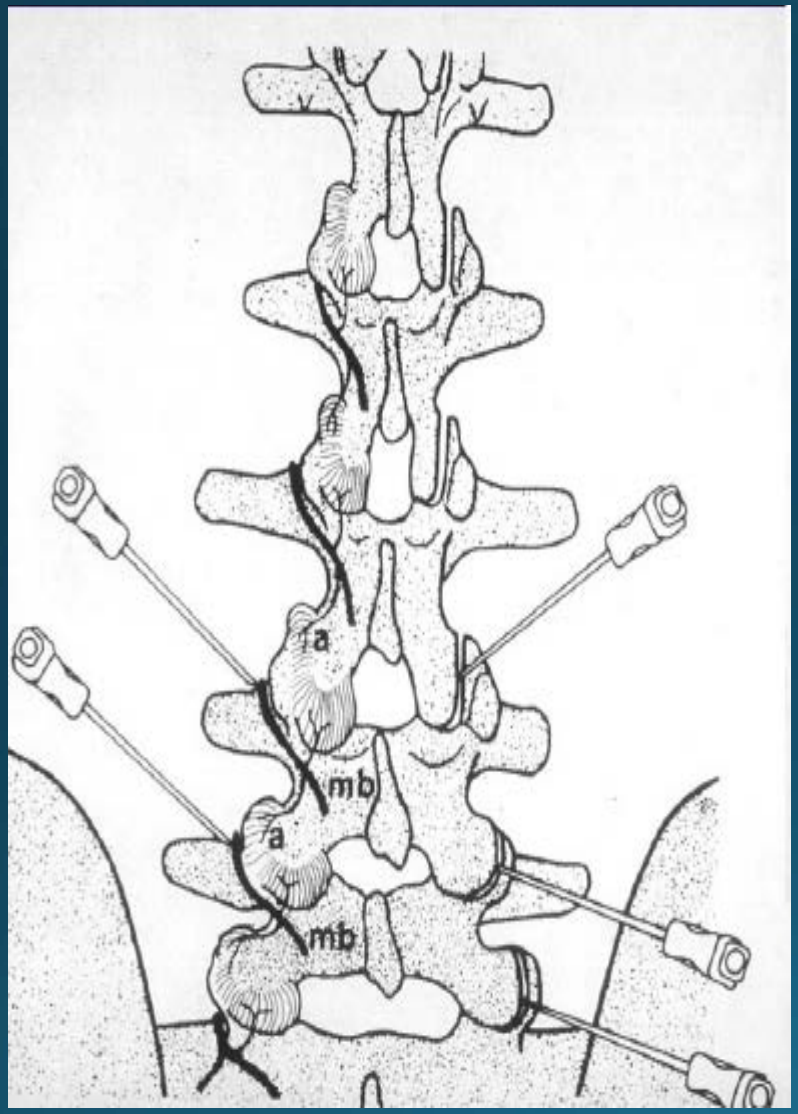
  of life.

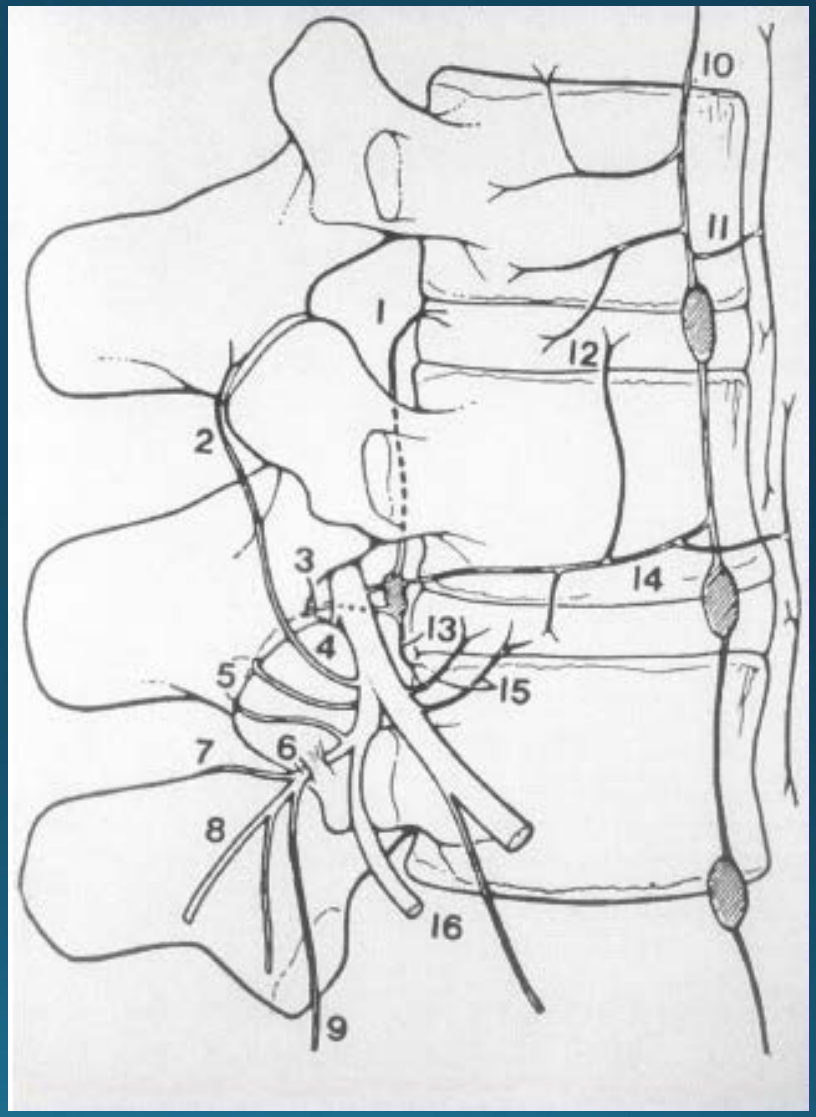
THE END

Disc and facet pain: Degenerative Cascade

Stage 3 (Stabilization)

- Facet
  - Severe cartilaginous damage, eroded joint surfaces
  - Joint hypertrophy and bone spurs
  - Canal and foraminal spinal stenosis and nerve root compression
- Disc/annulus
  - Increased annular tears and loss pf elasticity
  - Increased nuclear degeneration and loss of proteoglycans
  - Disc resorption and loss of disc height
  - End plate irregularities
  - Annular buckling
  - Osteophytic ridging along annulus





Lumbar Instability

- Congenital or traumatic “lytic” Spondylolysis
  - Incidence of this condition with listhesis: 5-9%
- Degenerative disease
- Post-operative
  - When more than 50% of the facet joint is removed
  - Flexion-extension films may be normal, instability may be rotational

Phase III Guidelines for Multidisciplinary Spine Specialists, North American Spine Society. 2000

Lumbar Instability

- L4-L5 is the most common level in degenerative instability, followed by L3-L4 and less common L5-S1
- L5-S1 is the most common level affected in younger patients with spondylolsis

Action to take when instability is identified and no neurological signs or symptoms are present:

- External bracing is not effective for mid lower lumbar spine instability
- Push trunk strengthening (core stabilization)
- Consider referral for treatment of possible facet component
- Monitor over time with repeat history, exam and radiographs
- Surgical stabilization

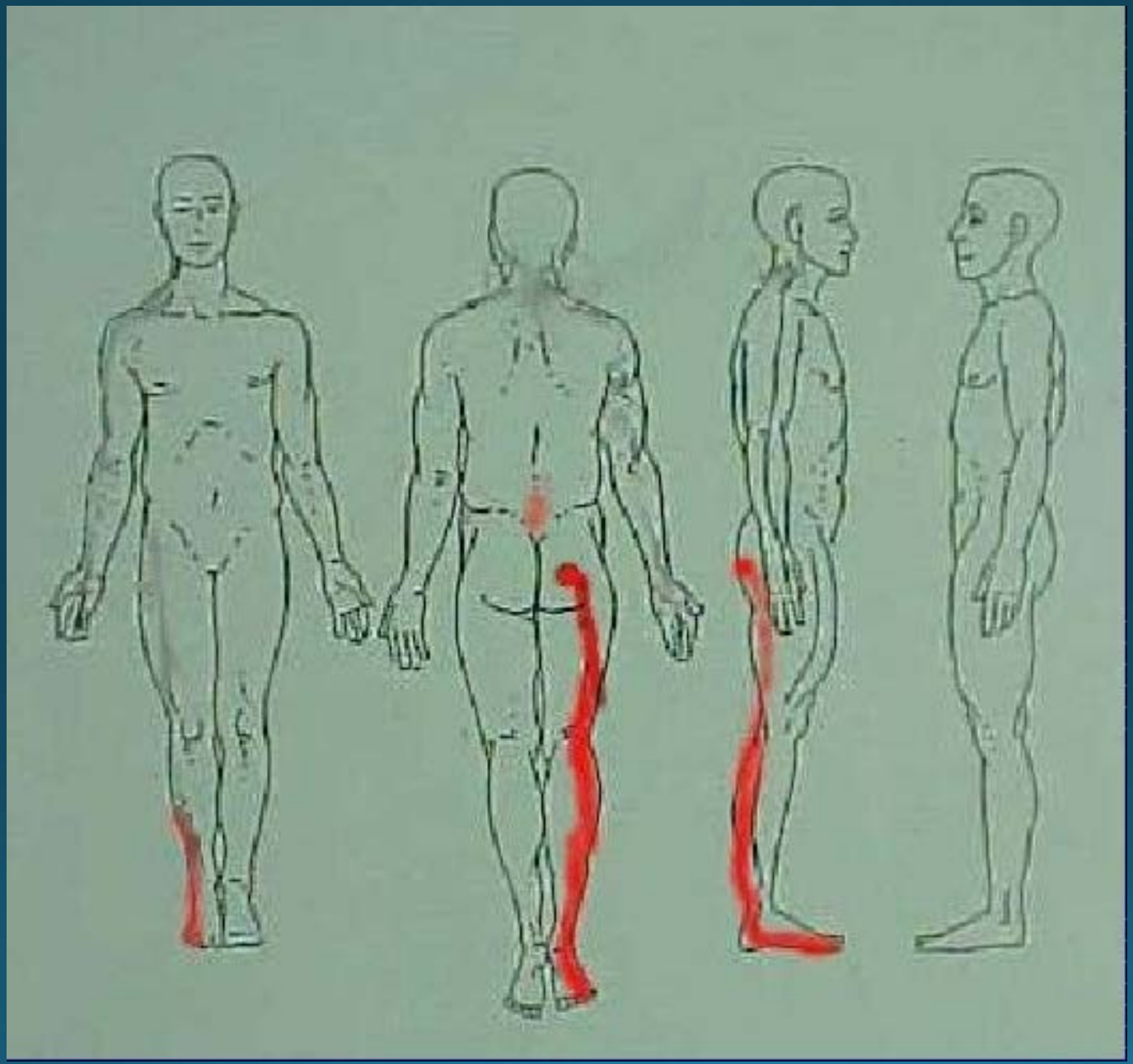
Lumbar Instability

- Possible cause of pain in athletic younger patients
- Some sports present particular risk
  - Gymnastics
  - Weight lifting
  - Wrestling
  - Offensive linemen
  - Dancers
  - High jumpers
  - Pole Vault

Compression Fracture

Vertebroplasty/kyphoplasty

- Appropriate for fractures with at least 30% retention of the people height
- Vertebroplasty is most effective in the first several months following fracture
- Vertebroplasty is worth considering even in the first several weeks one patient is severely debilitated pain



Pain Arising From The Hip Joint

- Always a groin component
- Often lower outer buttock pain as well
- Radiates to anterior thigh and knee
- Worse with many of the activities that aggravate radiculopathy

Proposed Mechanisms of Action

- Denaturation of collagen fibrils produce a new contracted state
  - "Debulking of the disc: decreases tissue volume of disrupted disc with decreased intra discal pressures.
- Tightened annulues may enhance the structural integrity of a damaged disc and stabilize annular tears,
- Thermal disruption of nociceptors in the outer annulus fibrosis (or maybe endplate?)

Facet Pain: a Note a History and Exam

- No one piece of information is useful
- "Revel Criteria" 5 of the 7 predict relief with median branch blocks
  - Age > 65
  - Better with lying down
  - No increase in pain with coughing
  - Not worse with forward bend
  - Not worse with extension
  - Not worse with rising from forward bend
  - Not worse with extension-rotation

Revel *Spine 1998*