



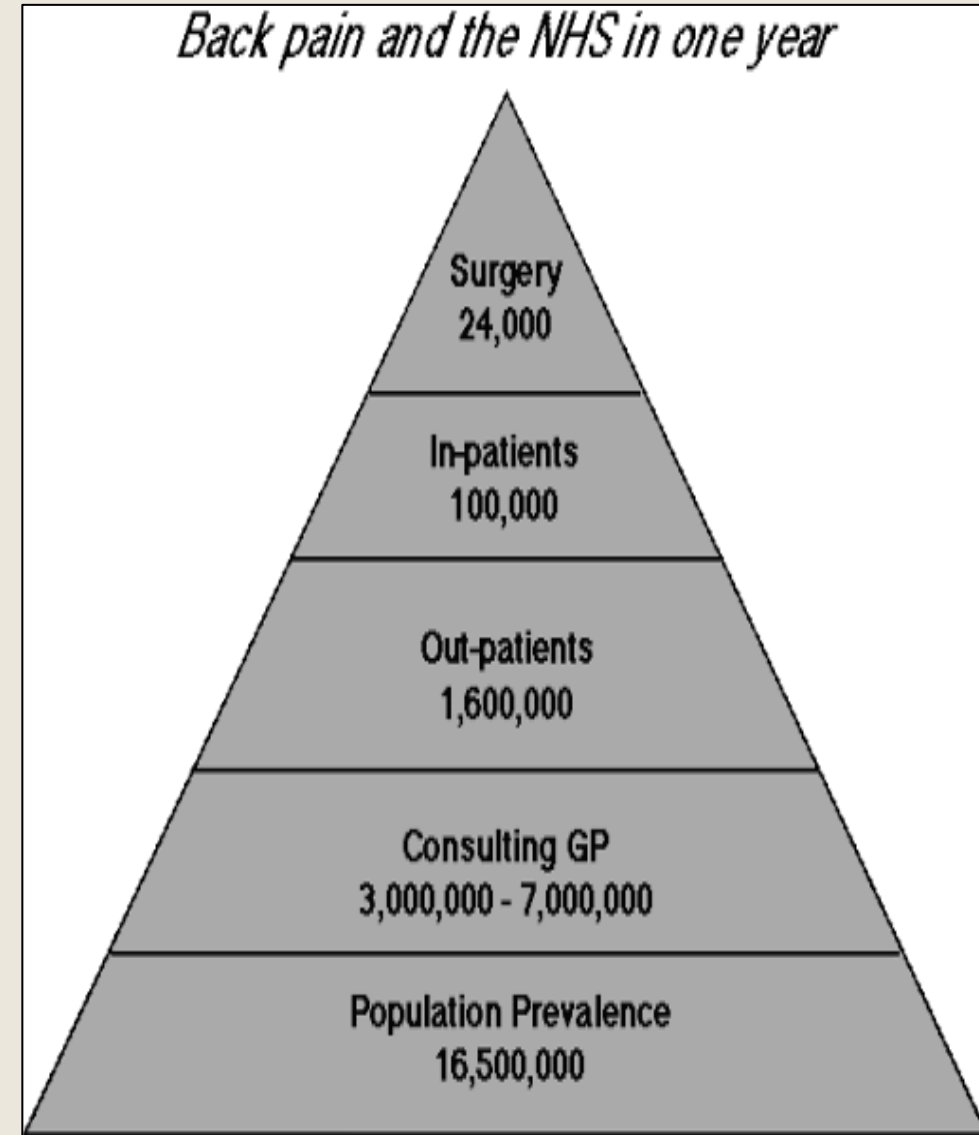
LOW BACK PAIN

Presented by:
Dipika Khanal

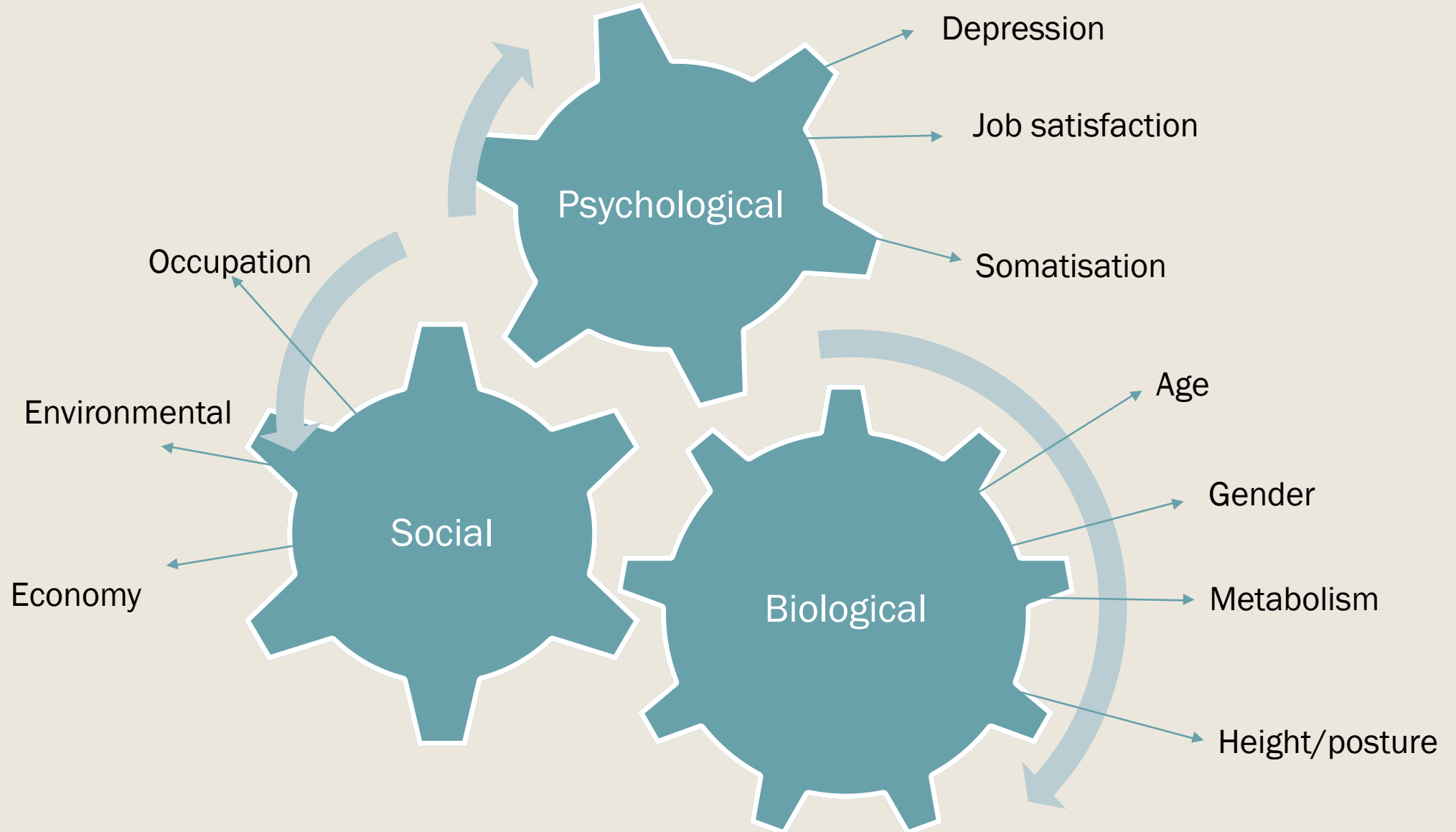


Why a big thing??

- 50-80% of adults reportedly suffer from LBP at some point in their life.
- 2.5 million people are found to experience back pain every day in the UK
- Cost on NHS > £1 billion per year
- Total work absenteeism = 75% to 85%
- Global Burden of Disease Study - low back pain ranked highest in terms of causing disability (Hoy et al. 2015)



Prevalence; factors influencing



Fatoye, Gebrye and Odeyemi, 2019

LBP Definition

Low back pain (LBP) is defined as pain and discomfort localised below the costal margin and above the inferior gluteal folds, with or without leg pain (European guidelines, 2011, NICE, 2018).

Duration of Symptoms	Etiology
Acute < 6 WEEKS	Non-specific (not attributable to a known underlying condition)
Subacute=6-12 WEEKS	Specific (infection, tumor, osteoporosis, cauda equina, inflammatory)
Chronic > 12 WEEKS	
“Hyperacute”-period of 24-48 hours	*MECHANICAL BACK PAIN

*Recurrent LBP- New episode of LBP after a symptom-free period of 6 months

*Acute exacerbation on chronic LBP- Where recurrence takes place in less than 6 months of previous episode.

Recovery period

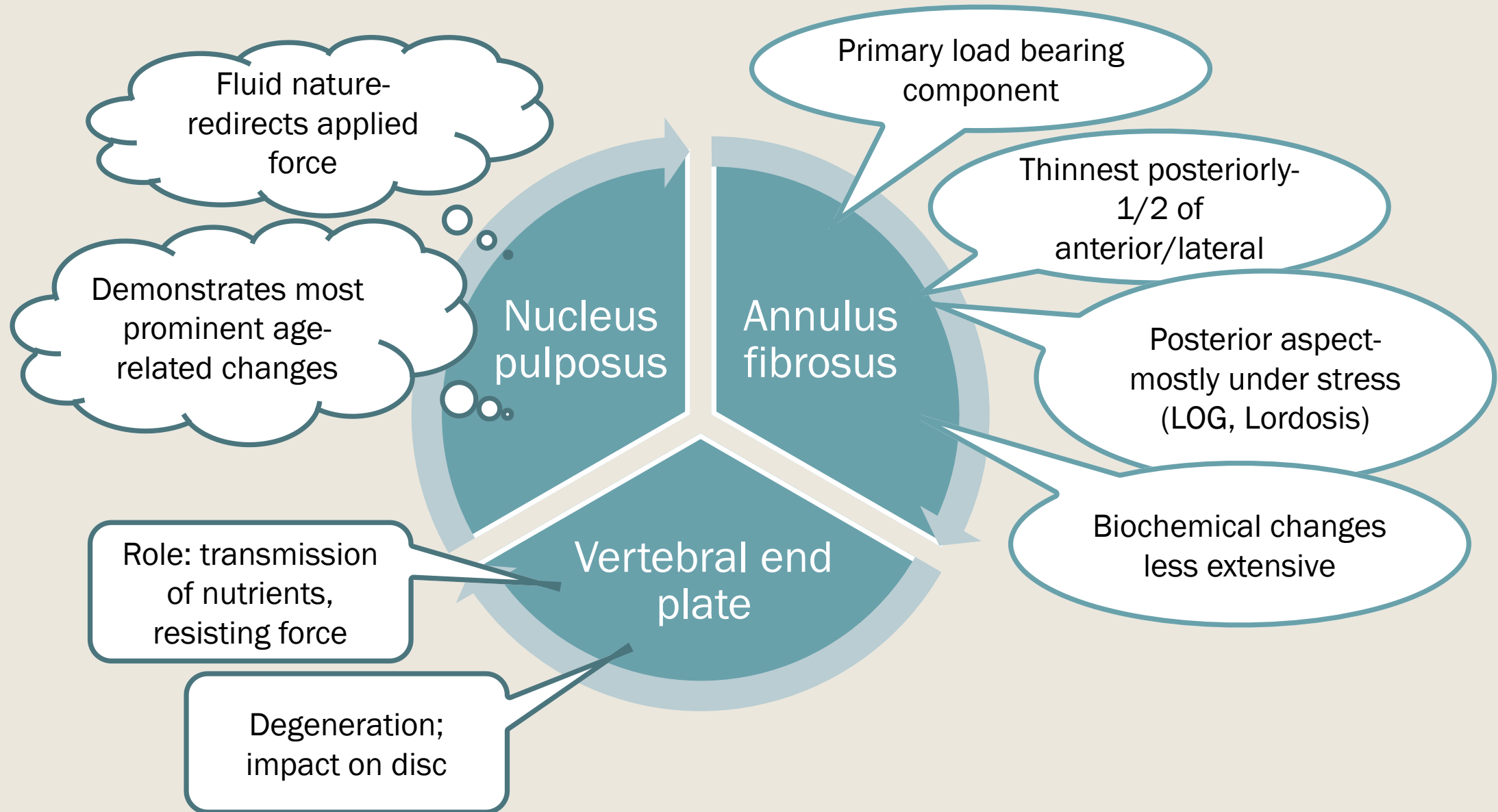
Applied Anatomy

- Typical lumbar vertebrae have several features distinct from those of typical cervical or thoracic vertebrae:
 - ✓ Presence of large vertebral body as they descend; function of supporting the body weight and withstanding pressure of daily activities
 - ✓ L5 (atypical vertebra), Lumbosacral angle
 - ✓ Greatest degree of extension movement of the vertebral column
 - ✓ Orientation of superior articular facets
 - ✓ Mammillary process on the posterior aspect of the superior articular process

Facet joint

- Only true synovial- Diarthrodial joint of spine
- Facet joint carries about 20-25% of the axial load; building up to a 70% with disc degeneration
- Also responsible for 40% of torsional and shear strength
- Keeps a check on rotation ROM
- Controls flexion, side flexion and extension movements
- Close pack position=Extension
- Capsular pattern=Side flexion and rotation equally limited followed by extension
- Injury, degeneration or trauma (facet joint and disc) may lead to conditions such as spondylosis, spondylolysis, spondylolisthesis, retrolisthesis

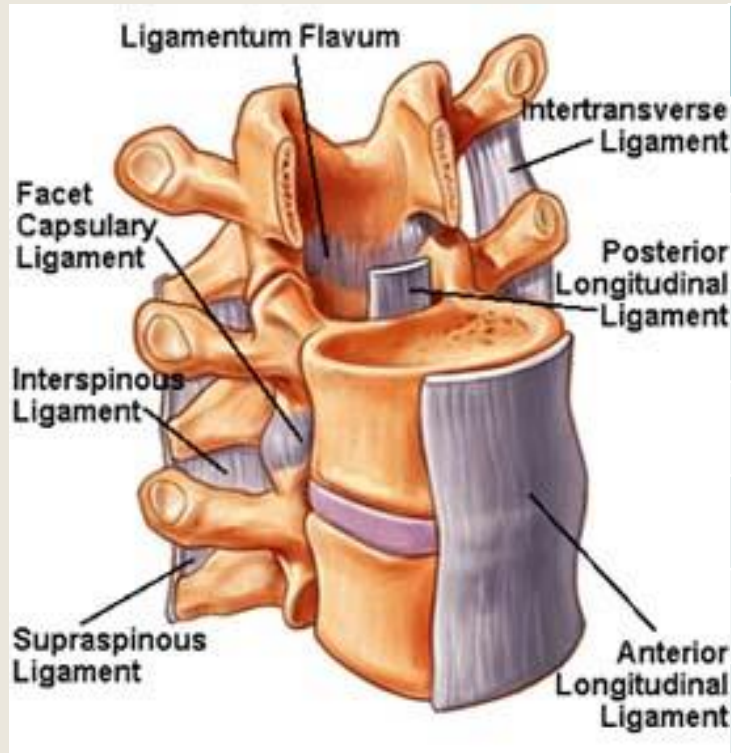
Intervertebral disc (Lundon and Bolton, 2001)



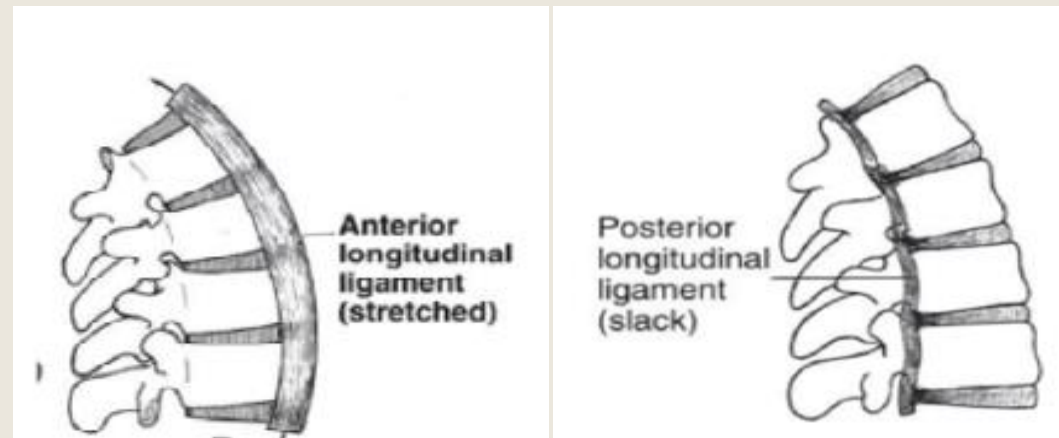
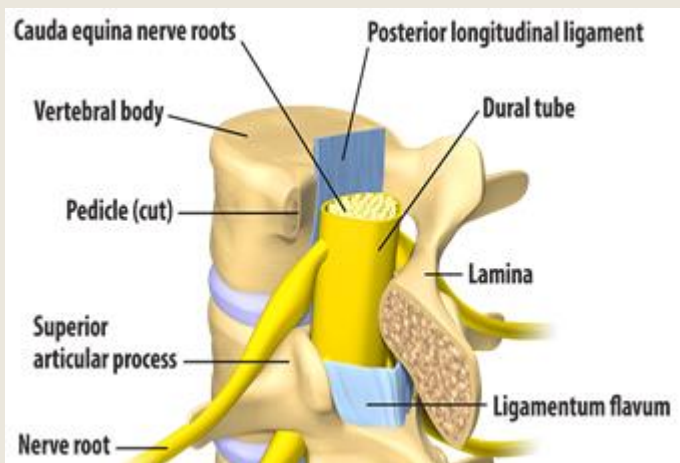
SPINAL CORD AND PLEXUS

- Spinal cord ends at L2 vertebral level, then splits down from this level into cauda equina/ horses' tail
- When the spinal cord travels down the spinal canal, it sends out nerves on each side of the vertebrae called nerve roots
- Vertebral foramen: larger in size than in the thoracic vertebrae, but smaller than in the cervical vertebrae
- 2 spinal nerve roots exit from the spinal segment-through small bony tunnel called neural foramen
- Lumbar spinal nerve roots; named for the upper segment it runs between
- Lumbosacral plexus formed from T12-S3 nerve roots

Ligaments



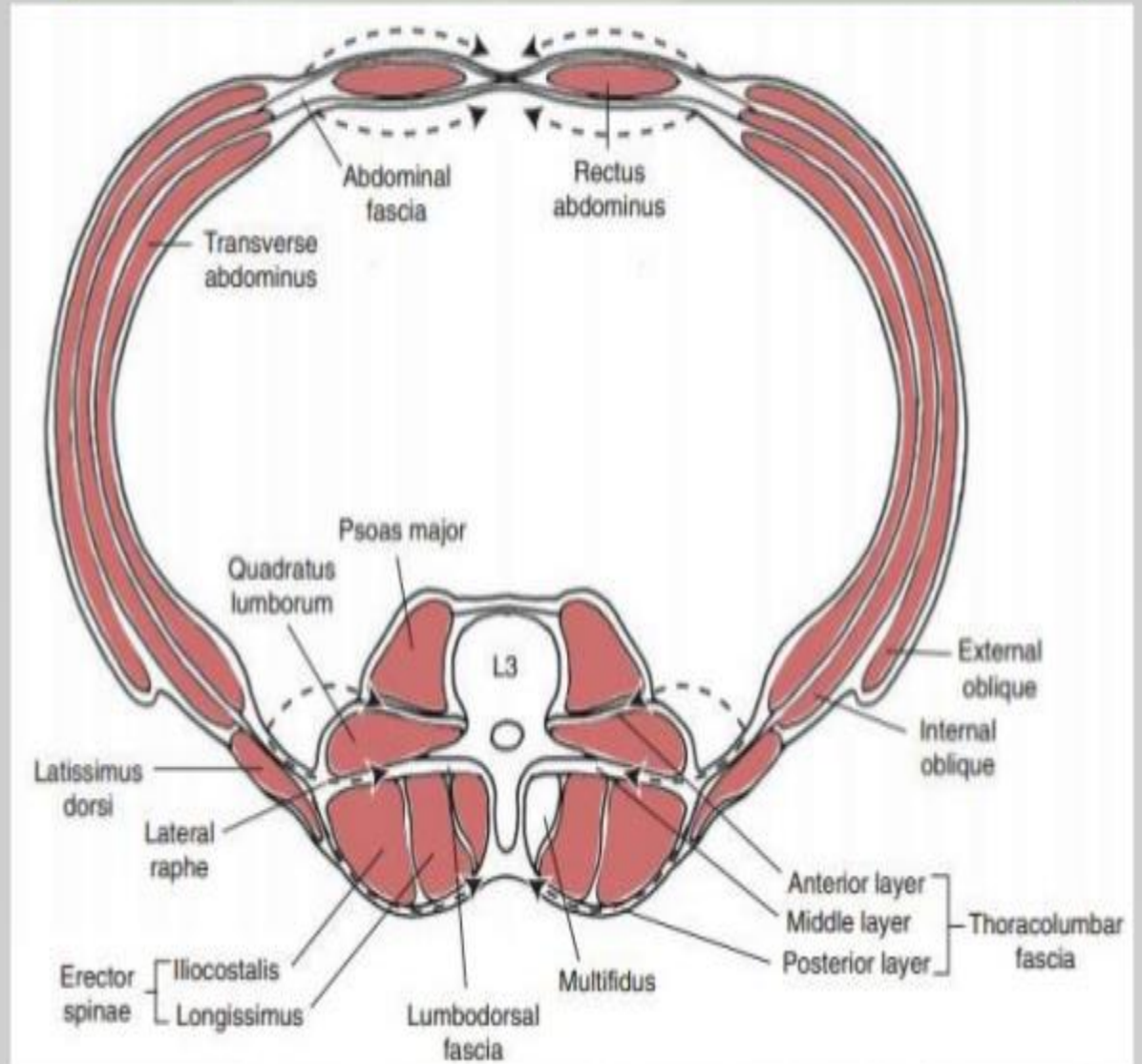
Ligaments	Function
Anterior longitudinal ligament	Limits extension
Posterior longitudinal ligament	Limits forward flexion
Ligamentum flavum	Limits forward flexion
Supraspinous ligament	Limits forward flexion
Interspinous ligaments	Limits forward flexion
Intertransverse ligaments	Limits contralateral lateral flexion
Iliolumbar ligament	Limits anterior sliding of L5 on S1



Muscles

- Role:
 - Producing and controlling movement
 - Stabilising trunk for LL mobility
 - Assist in attenuating extensive forces exerted to this area

MUSCLES OF THE LUMBAR REGION



Lumbar spine movements and structural interaction:

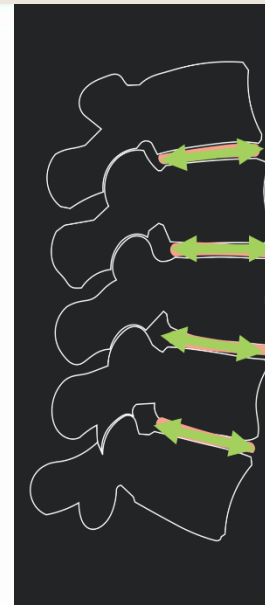
Shear force



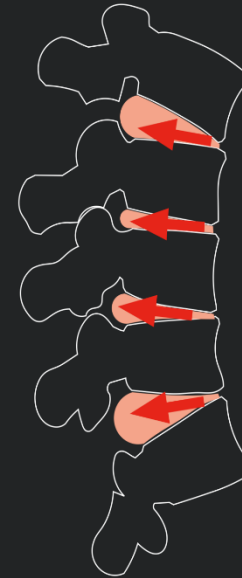
Torsion/ Axial rotation



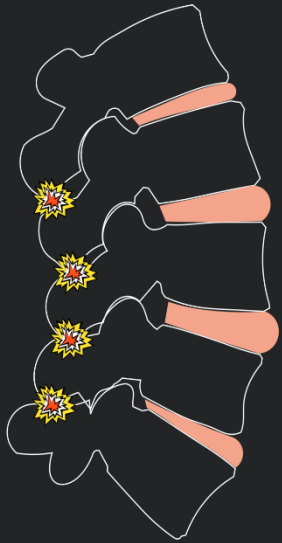
Compression



Flexion



Extension



Flexion=50,
Extension=15,

Lateral flexion=20
Axial rotation=5,

Lumbo-pelvic rhythm

There exists a kinematic relationship between Lumbar spine and hip joints during sagittal plane Movements.

- During flexion:

Lumbar flexion-40 degrees

Anterior tilting of pelvis at hip joint-70 degrees

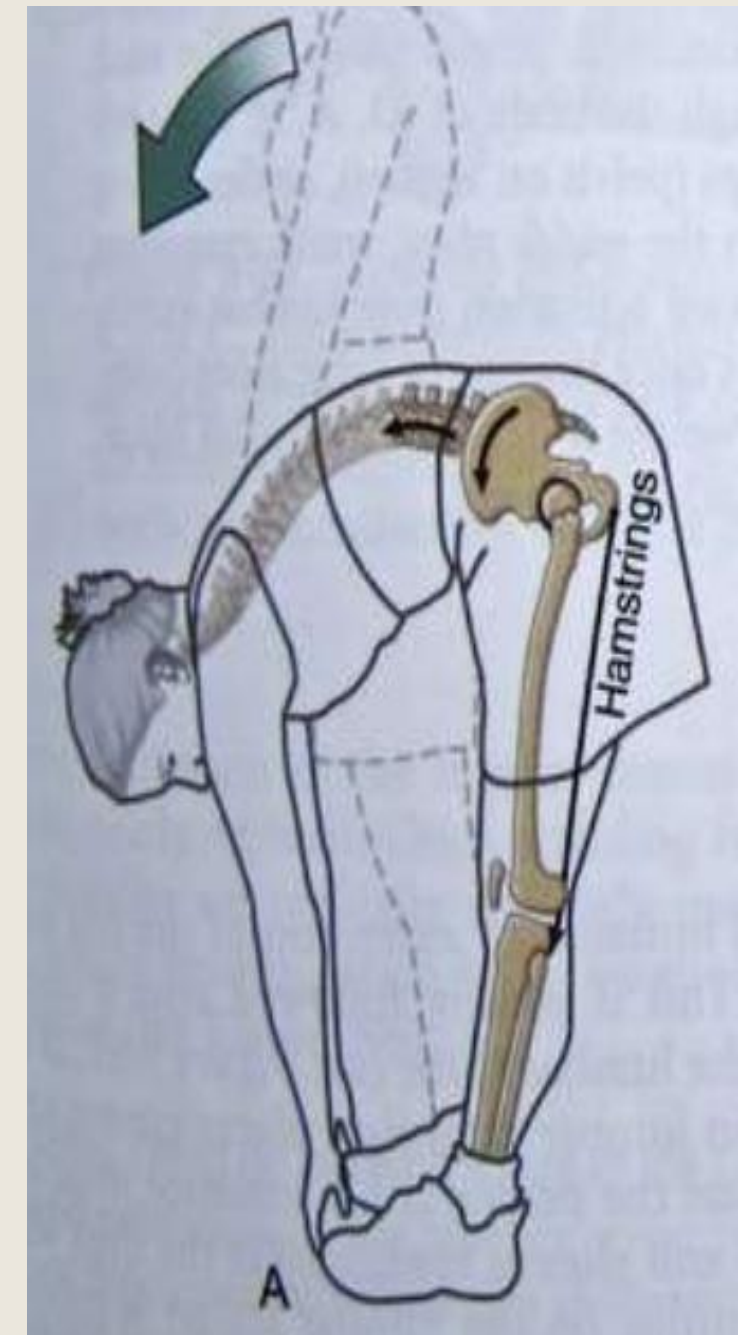
- Returning back to neutral:

Posterior tilting at pelvis at hip joint

Lumbar extension

Significance:

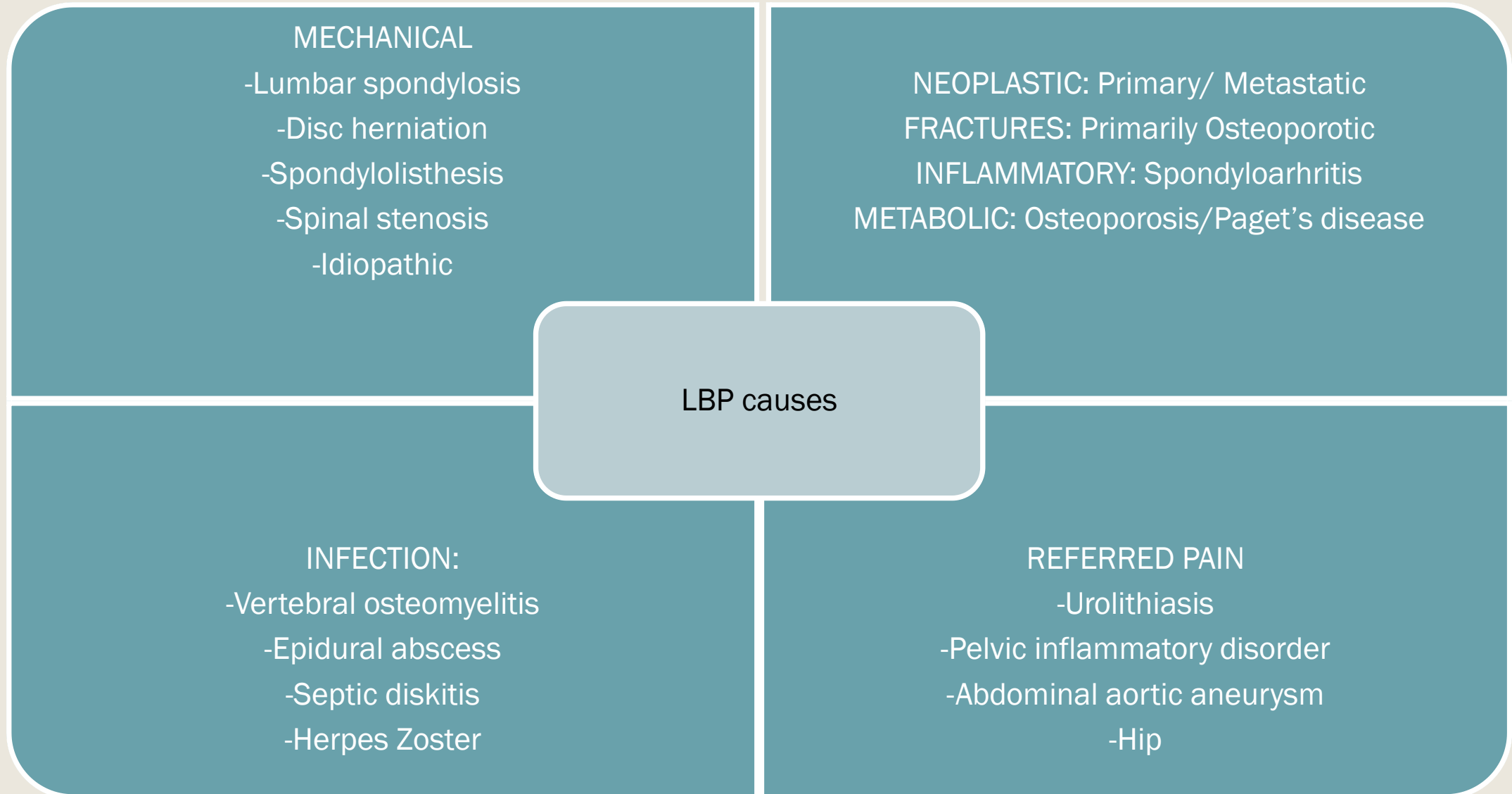
- Increases ROM available to spine
- Reduces amount of movement required at lumbar spine
- Hip joint involvement eliminates need for full lumbar flexion
- Protects disc, posterior ligaments from being fully lengthened



Impact of posture: Lumbosacral loading?

- Lumbar interbody joints-load distribution-80%
- Zygapophyseal facet joints-load distribution-20%
- Lumbosacral loads in erect standing posture-0.82 to 1.18 times body weight
- During level walking-1.41 to 2.07
- Shift of LOG-postural changes-increases lumbosacral loading considerably (Popovich, et al. 2013)
- Forward flexion with knees kept in extension-lifting 20kg, increase in disc pressure (L3)=169%

Causes of low back pain



Back pain causes and case distribution:

(Kindkade, 2007)

Mechanical=97%

- Degenerative disease= 10%
- Herniated disc= 4%
- Spinal stenosis=3%
- Spondylolisthesis= 2%

WHAT ABOUT THE REMAINING PERCENTAGE??



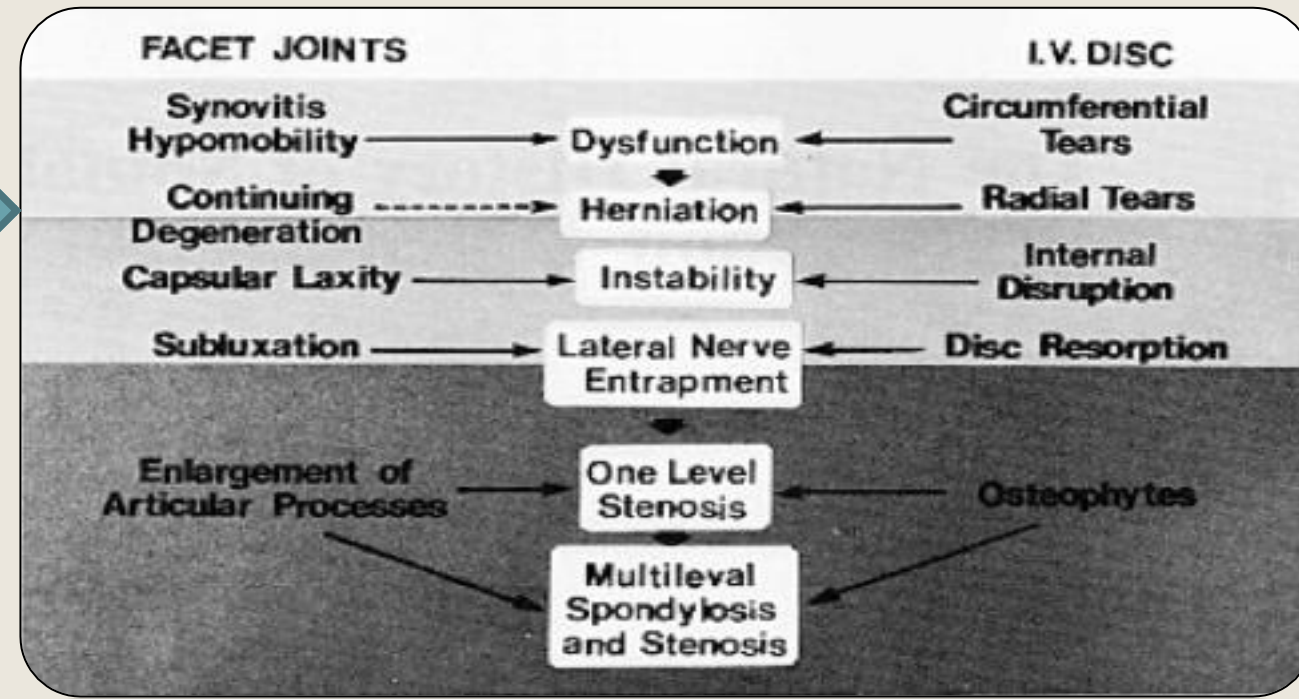
*Majority of presenting back pain cases have “no specific medical” cause: such as biomechanical factors, muscle strain/ ligament sprain=Non-specific mechanical back pain.

SPECIFIC CONDITIONS
&
Presenting symptoms

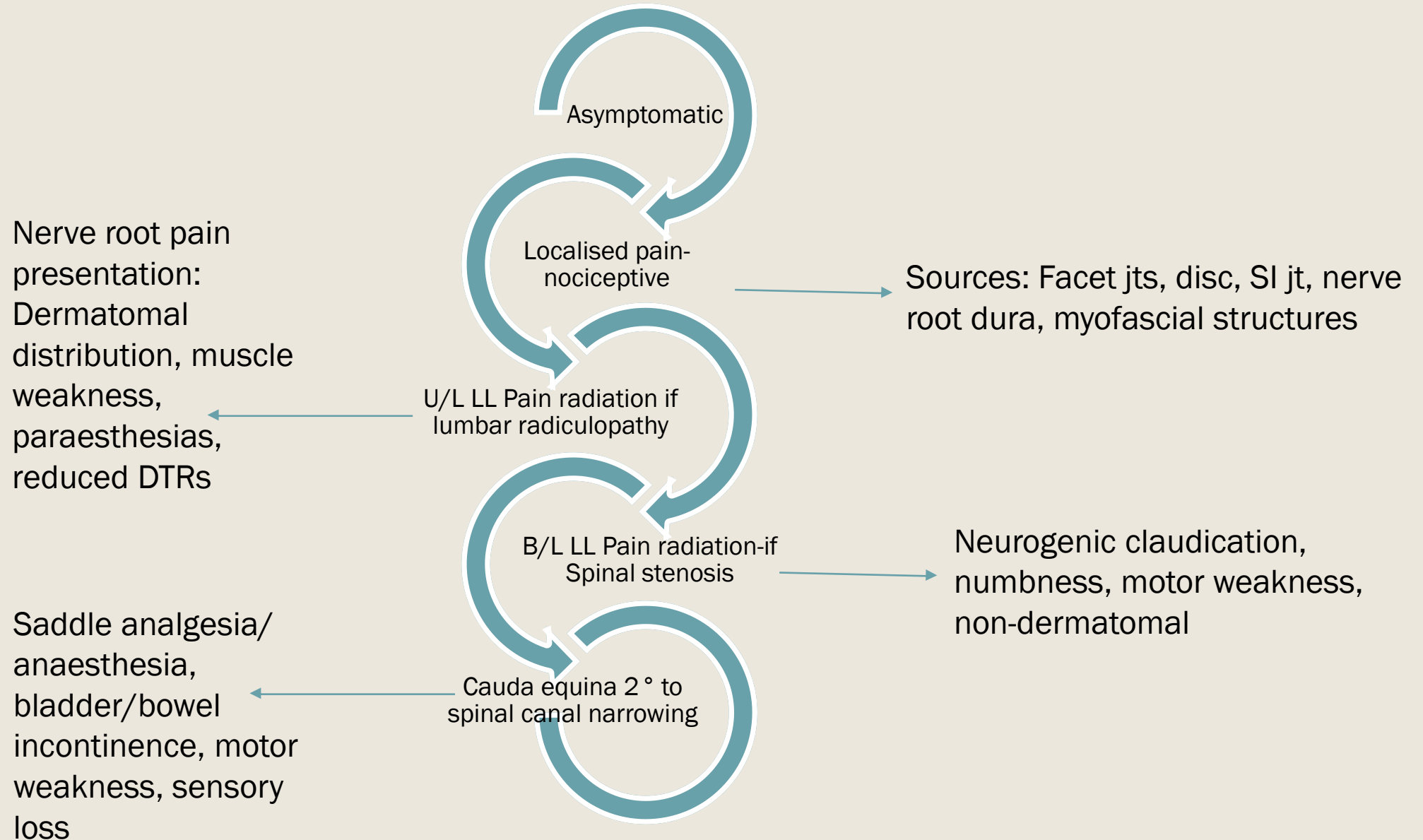
Lumbar spondylosis

- Synonymous terminologies-Spondylitis, arthrosis, arthritis, disc degeneration, degenerative disc disease
- Single term-encompasses anatomical changes to vertebral bodies and intervertebral disc
- Broader definition: Degenerative change and alteration in the dynamic interplay between vertebra, adjacent discs, facets that create the clinical pain syndromes within the axial spine.

Degenerative Cascade



Clinical presentation



BUSTING A MYTH-1



Osteophytes can exist in the absence of other degenerative processes. Alternately, cartilaginous degeneration/damage may exist without corresponding osteophytes



Osteophytes are not always symptom provocative!!!

(Middleton and Fish, 2009)

Facet Joint Pain (Perolat, et al., 2018)

- Facet joints constitute a common source of back pain-15-45%
- Facet arthrosis/ arthropathy is the most frequent form of facet pathology-highest prevalence L4-5 level (Eubanks et al., 2007)
- Diagnostic positive facet joint block can indicate facet joints as the source of pain

PAIN PATTERN:

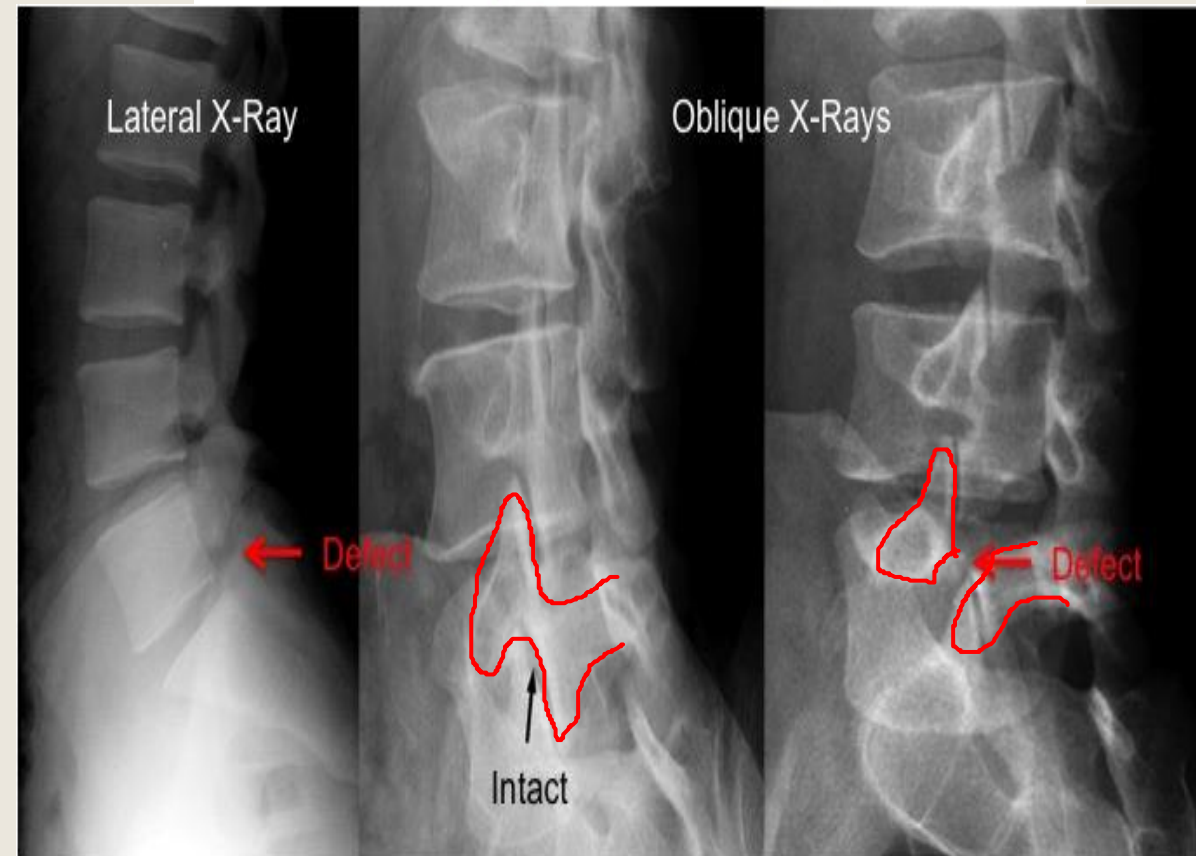
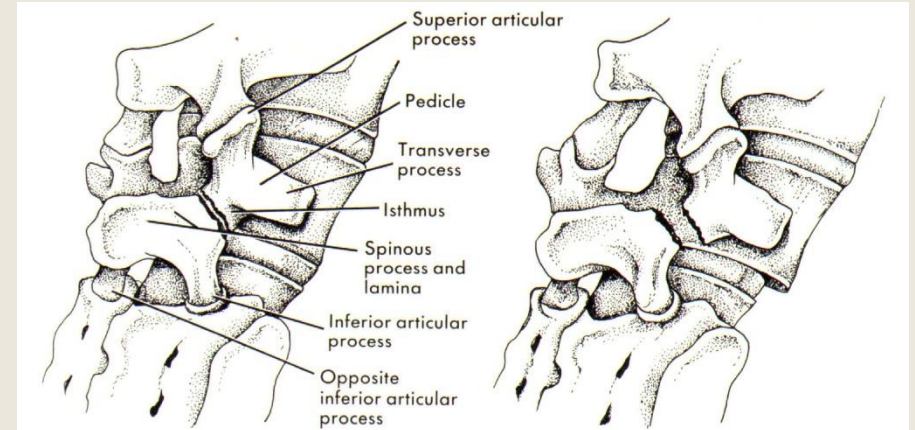
- Localised or “pseudo” radicular pain radiating uni/bilaterally to the buttock, trochanteric region, groin and thighs-ending above the knee.
- Pain associated with no neurological deficits (exception?)
- Pain usually worse in the morning, during periods of inactivity, following strenuous exercise
- Pain aggravated with lumbar extension or rotary trunk movements, standing for length of time

Spondylolysis VS Spondylolisthesis

- A crack/ stress fracture-pars interarticularis	- Anterior/posterior displacement of a vertebrae on the one beneath it
- Most commonly occurs in L5>L4	- Most commonly occurs in L5>L4
- Seen in patients of all age group (children and adolescents>elderly)	-Seen in patients of all age group (children and adolescents>elderly)
- Presents with some degree of listhesis	- It is a progression of spondylolysis (15% cases)
- Localised back pain; feels like muscle strain	- Localised/ radiating back pain, hamstring tightness and lumbar hyperlordosis are often seen in younger patients
- Pain sometimes radiate to buttocks and back of the thighs, worse with activity.	- Physical exam reveals lumbar tenderness, “step-off sign”
	- Often worsened by extension (more commonly)>flexion

Spondylolisthesis grading

Grade	Percentage of slippage
0	0 (spondylolysis)
I	0-24%
II	25-49%
III	50-74%
IV	75-100%
V	Vertebral body completely displaced (spondyloptosis)



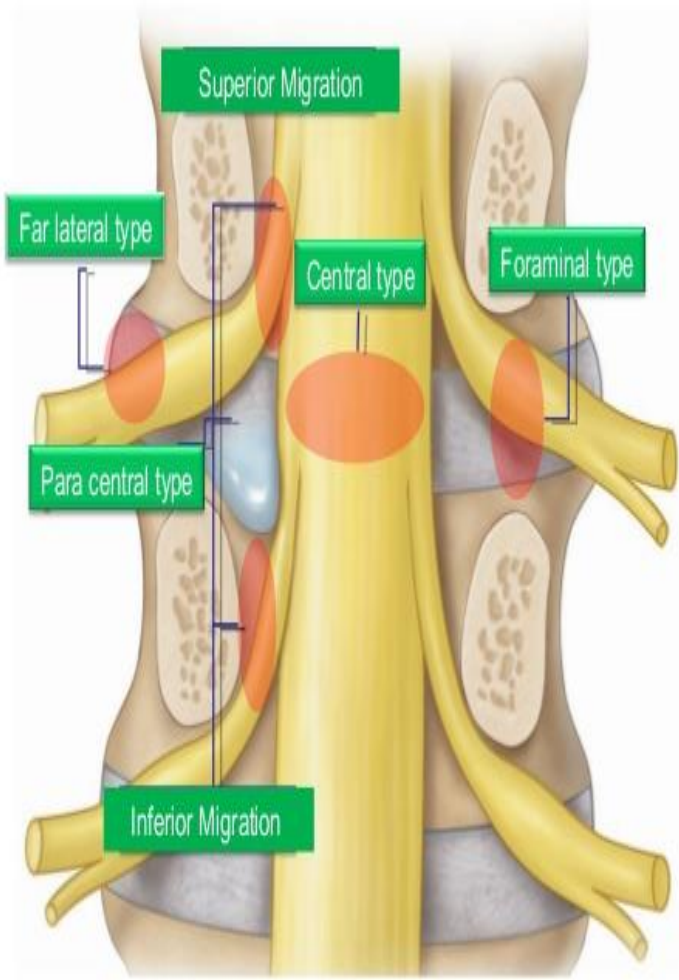
Disc Pathology

- Disc bulge: symmetric, circumferential extension of disc material beyond the disc space
- Disc herniation: focal or asymmetric extension of nucleus pulposus
- Repair time (mostly within 6 months)
- **Disc bulge/ herniation may not be the source of back pain.**
- Over 25% -40% of population without LBP have disc herniation on MRI
- Inflammatory mediators from the nucleus pulposus and pressure created can irritate the nerves and lead to pain
- Only approximately 10% of patients have sufficient pain after 6 weeks of conservative care
- Study of 48,228 patients

Classification: (Hao et. al., 2017)

Location Classification		Anatomic Classification		
<u>Central</u>	<ul style="list-style-type: none"> -Often associated with back pain only -May present with cauda equina syndrome 	<u>Protrusion</u>	<u>Extrusion</u>	<u>Sequestration</u>
<u>Posterolateral</u> (Paracentral)	<ul style="list-style-type: none"> -Most common (90-95%) -PLL is weakest at this point -Affects the descending/lower nerve root 	Eccentric bulging	Disc material herniates through annulus	Disc material herniates through annulus
<u>Foraminal</u>	<ul style="list-style-type: none"> -Less common (5-10%) -Affects upper/ exiting nerve root 	Intact annulus	Remains continuous with disc space	No longer continuous with disc space
<u>Axillary</u>	<ul style="list-style-type: none"> -Can affect both exiting and descending nerve roots 			

Various types of lumbar disc herniation



Normal disc	Bulging disc	Focal Protusion
	Herniation > 50% of circumference	Herniation < 25% of circumference
Broad-based Protusion	Extrusion	Sequestration
Herniation > 25- < 50% of circumference.	Circumference of disc material greater than base	No continuity between disc material and disc

Lumbar radiculopathy

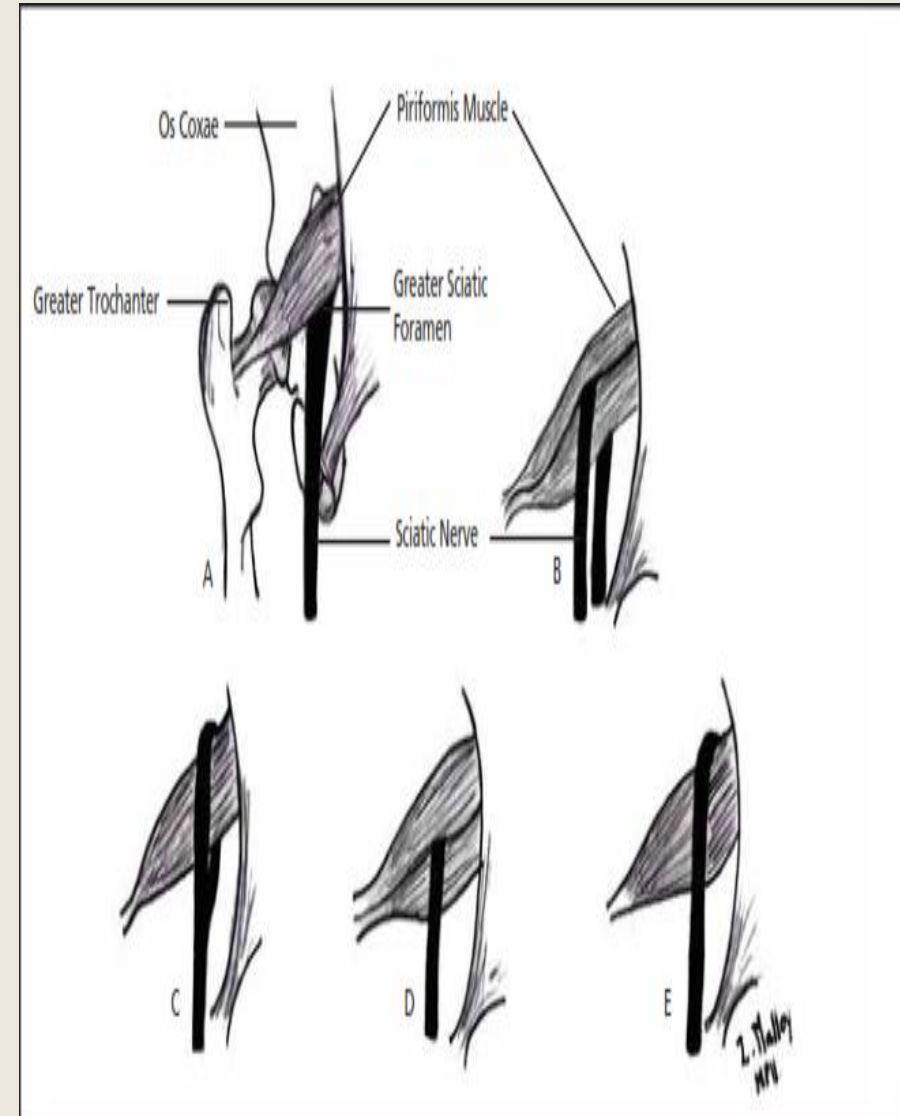
- Lateral recess stenosis that results predominantly from disc pathology in combination with superior articular facet hypertrophy
- Presents with compression of spinal nerve root; radiculopathy defined as disturbance or disease of spinal nerve

Presenting symptoms:

- ✓ Sharp and electrical shooting nature of pain
- ✓ Pain or neurologic symptoms in a dermatomal distribution
- ✓ Unilateral LL pain radiating below the knee
- ✓ Myotomal weakness
- ✓ Reduced DTRs.

Sciatica (Boyajian-O'Neil et al., 2008, Son et al., 2015)

- Peripheral nerve-common entrapment site: Between Greater sciatic notch and Ischial tuberosity
- Piriformis muscle-sciatic nerve correlation?
- Other causes:
 - Post-surgical
 - Trauma/ infection/ Injection
 - Abscess
- Symptoms:
 - Buttock pain, U/L LL radiating pain
 - Painful dysesthesias or paresthesias, painful hypoesthesias
 - Worse with sitting (“wallet-neuritis”)
 - Typical sensory/ motor disturbance-uncommon
 - Chronic cases-trophic changes



Cauda Equina Syndrome

- This is a rare (only occurs in 0.04% of LBP cases) but serious condition that describes extreme pressure and swelling of the nerves at the end of the spinal cord
- Medical emergency

Presenting symptoms:

- ✓ Acute, intense low back pain
 - ✓ unilateral or bilateral radicular pain
 - ✓ saddle (perineal) anaesthesia (75%)
 - ✓ genitourinary dysfunction (90%)
 - ✓ leg paresis which may be asymmetric
-
- Acute onset: Rapid development of sensory and motor deficits within 24 hours
 - Gradual onset: Develops over time, symptoms may come and go over the course of weeks or months. Associated with partial or intermittent loss of bowel/bladder function, as well as recurring LBP

Spinal Stenosis

- Disturbance or disease of the spinal cord-Myelopathy
- With aging, central canal stenosis occurs as a result of degenerative changes
- Is associated with hypertrophy of soft tissues; responsible for 40% of spinal stenosis
- With extension movement, the hypertrophied ligamentum buckles centrally into the canal and worsens the central stenosis
- This explains why extension aggravates patient's symptoms in the case of spinal stenosis and flexion alleviates it

Presenting features

- Primary complaint of pain in the buttocks, thighs and legs
- Paraesthesia might accompany pain symptoms
- NON-DERMATOMAL
- Neurogenic claudication (“*shopping cart sign*”)
- Gait disturbance
- Bowel or bladder incontinence- uncommon
- D/D vascular claudication
- On examination: Patient might present weakness of LLs, reduced reflexes, decreased sensation; BUT NOT ASSOCIATED WITH PARTICULAR NERVE ROOT and OTEN B/L.

Ankylosing Spondylitis

- Inflammatory spondyloarthritis, often associated with enthesitis of Achilles/ plantar fascia or dactylitis, mostly presented before the age of 45.
- Dull back pain; worse in the morning lasting for more than 3 months
- Stiffness which is worse with rest and improves with activity
- Night pain disturbing sleep
- Buttock pain
- Improvement with taking NSAIDs within 48 hours
- Family h/o spondyloarthritis (1st degree relative)
- Current or past arthritis, enthesitis, psoriasis
- Schober's test may be positive
- HLA-B27 positive in 85-95% of cases



If 3 Symptoms-HLA B27

Visceral referred pain

- Referred pain in the back on account of conditions of viscera in the abdominal cavity and pelvic region is not uncommon
- Ovarian cyst/ uterine disorder
- Kidney stones
- Prostate cancer or prostatitis is another important cause for D/D
- Abdominal aortic aneurysm