

# Differential diagnosis of back pain

## Čtvrtek SIMU Ortopedie a rehabilitace CZ+ENG VLOR7X1c aVLOR7X1

- dvě skupiny po 10 (+- 4) studenti
- dva lektori: Ortopedie FN Brno a FNUSA

### **HARMONOGRAM**

07:30 - 08:45 teorie - artroskopie obecně/entezopatie/bursity+ klinické vyšetření

08:45 - 09:00 pauza

09:00 - 10:00 praxe na simulátoru + case reports

10:00 - 10:15 pauza

10:15 - 11:30 teorie - páteř + klinické vyšetření

11:30 - 11:45 pauza

11:45 - 12:30 praxe na simulátoru + case reports

FNUSA lektor

FN Brno lektor

# Summary

- Definition
- Etiology and Epidemiology
- Risk factors
- Differential diagnosis
- Examination
- Red flags/Yellow flags
- Literature

# Definition

## Back pain is defined by a triad of symptoms:

- pain
- muscle tension
- stiffness tied to a topographically defined area of the body.
- the pain may radiate to the extremities

# According to time

- Acute pain (0 - 6 weeks)

It can be a transient pain (hours - 2 days) that subsides spontaneously, usually without medical intervention. More often it lasts for days to weeks, it can progress together with neurological symptomatology. It can appear repeatedly.

- Subacute pain (6-12 weeks)

- Chronic pain (continuous or recurrent pain for more than 12 w.)

# According to location

## •Neck and arm pain

- trauma
- cervical spondylosis
- metastatic disease / infection
- cervical radiculopathy
- cervical myelopathy
- ankylosing spondylitis

## •Thoracic back and rib pain

- trauma
- metastatic disease / infection
- thoracic disc herniation
- osteoporotic compression fracture
- trauma

## •Low back pain

- muscles strain
- disc herniation / discogenic pain
- degenerative spondylolithesis
- spinal stenosis
- lumbar radiculopathy
- abdominal aortic aneurism

## •Sacroiliac pain

- SI infection
- ankylosing spondylitis

## •Sacral pain

- coccydynia
- sacral insufficiency fracture

# CONSTRUCTING A DIFFERENTIAL DIAGNOSIS

- Most low back pain is caused by conditions that are troublesome but not progressive or life-threatening.
- **Serious back pain** (pain due to a systemic or visceral disease or pain with significant neurologic symptoms or signs)
- **Nonspecific back pain** related to the musculoskeletal structures of the back, called mechanical back pain.

# According to etiology 1/3

1. Back pain due to disorders of the **musculoskeletal** structures
  - A. Nonspecific (mechanical) back pain: no definite relationship between anatomic abnormalities seen on imaging and symptoms
  - B. Specific musculoskeletal back pain: clear relationship between anatomic abnormalities and symptoms
    - A. Lumbar radiculopathy due to herniated disk, osteophyte, facet hypertrophy, or neuroforaminal narrowing
    - B. Degeneration.....Spinal stenosis, spondylolisthesis.....
    - C. Cauda equina syndrome



# According to etiology 2/3

2. Back pain due to **visceral disease** (serious, requires specific and rapid diagnosis and treatment)

## A. Retroperitoneal

- A. Aortic aneurysm
- B. Retroperitoneal adenopathy or mass

## B. Pelvic

- A. Prostatitis
- B. Endometriosis
- C. Pelvic inflammatory disease

## C. Renal

- A. Nephrolithiasis
- B. Pyelonephritis
- C. Perinephric abscess

## D. GI

- A. Pancreatitis
- B. Cholecystitis
- C. Penetrating ulcer

# According to etiology 3/3

## 3. Back pain due to **systemic disease** affecting the spine

### A. Serious and emergent (requires specific and often rapid treatment)

#### A. Neoplasia

- A. (1) Multiple myeloma, metastatic carcinoma, lymphoma, leukemia
- B. (2) Spinal cord tumors, primary vertebral tumors

#### B. Infection

- A. (1) Osteomyelitis
- B. (2) Septic diskitis
- C. (3) Paraspinal abscess
- D. (4) Epidural abscess

### B. Serious but nonemergent (requires specific treatment but not urgently)

#### A. Osteoporotic compression fracture

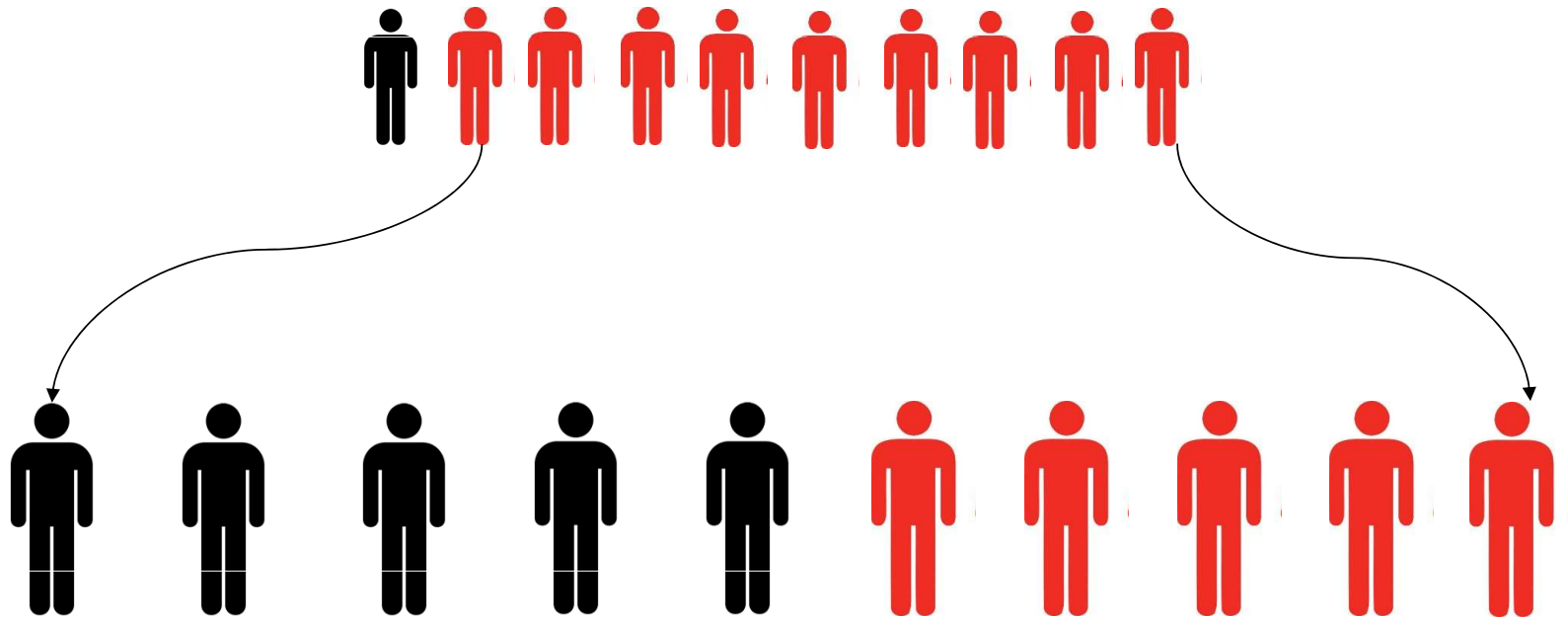
#### B. Inflammatory arthritis

- A. (1) Ankylosing spondylitis
- B. (2) Psoriatic arthritis
- C. (3) Reactive arthritis
- D. (4) Inflammatory bowel disease–associated arthritis

# Epidemiology

- Prevalence 60 – 85%
- Aging population, obesity, sedentary lifestyle

# Epidemiology



## Classification of low back pain (Waddell 1987)

### – **Specific low back pain**

- the cause is an identifiable progressive pathology with possible involvement of nervous structures (15%):
- intervertebral disc herniation
- spondylolisthes
- spinal stenosis
- segmental instability
- fractures, tumors, inflammations

### – **Non-specific low back pain**

- pain without an identifiable specific anatomical or neurophysiological disorder (85%)

## Diagnostic triad (Waddell 1998, Barsa, Häckel 2004, Vrba 2008)

### – I. Simple back pain

- Obvykle muskuloskeletální původ, postižení LS oblasti
- nejčastěji mezi 20- 55 lety, dobrá prognóza konzervativní léčby
- 90% se uzdraví do 6 týdnů

### – II. Root (neurogenic) pain

- typical lateralization with projection to DK with paresthesias
- loss of sensitivity and nerves (motor skills, reflex changes) due to neurological symptomatology.  
Prognosis of conservative treatment worse (50% recover within 6 weeks)

### – III. Pain caused by a serious disease of the spine - “red flags“

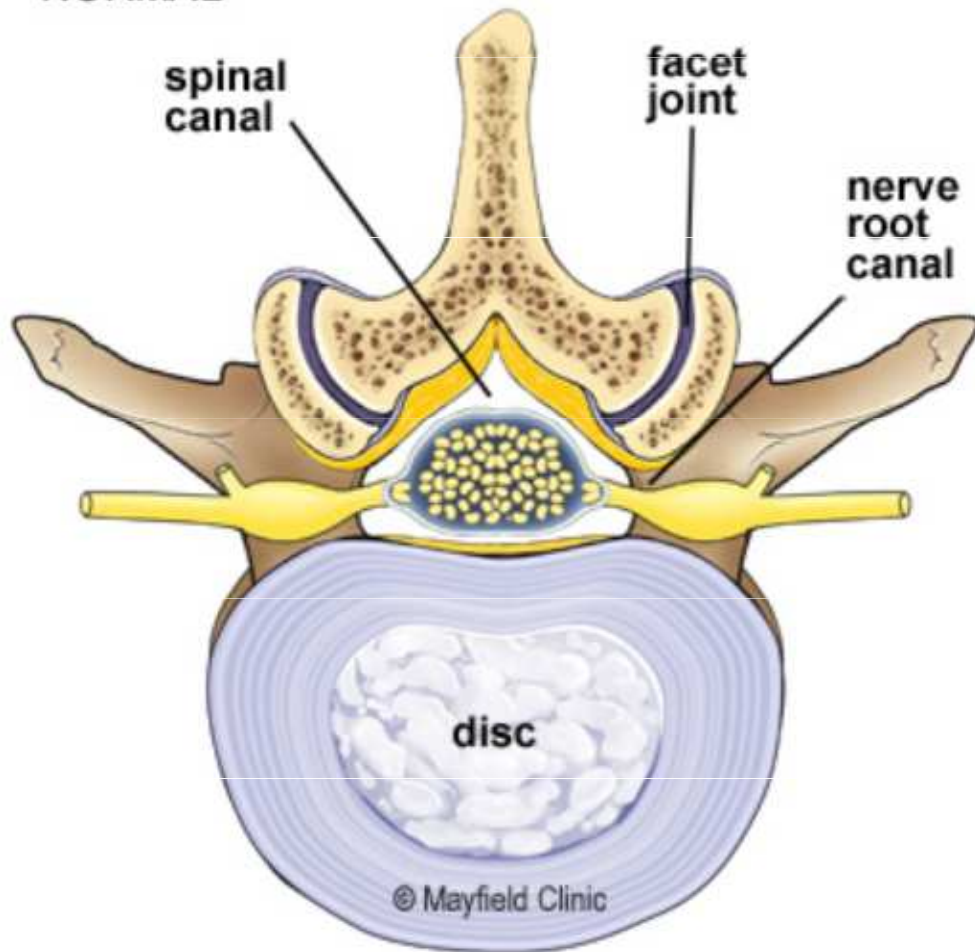
- Tumors, inflammations, fractures-deformities, serious neurological diseases.
- Risk factors: age under 20 and over 55, spinal injury, pain in the thoracic spine and abdomen without obvious causes, pain at rest, permanent and independent of movement

# Mechanical causes

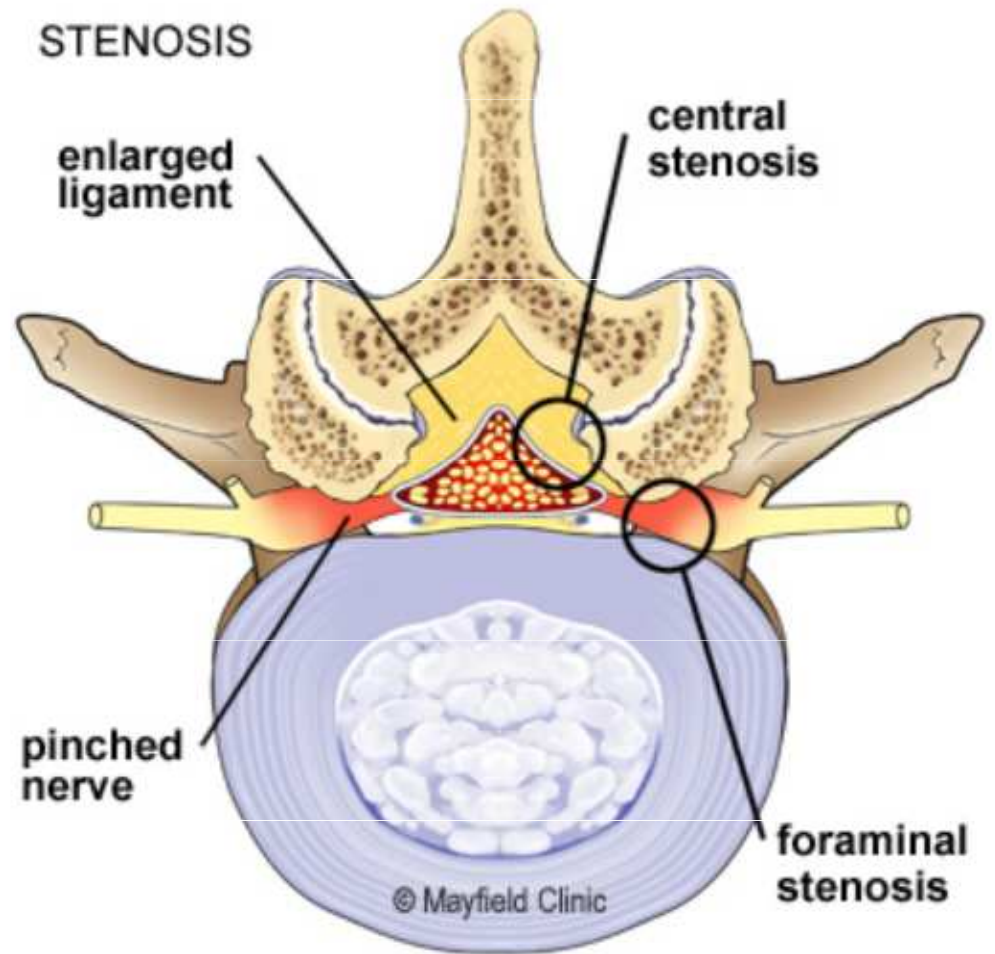
- **Spinal stenosis**
- Spondylosis
- Spondylolysis, spondylolisthesis
- Herniated disc
- Scoliosis
- Trauma



**NORMAL**



**STENOSIS**

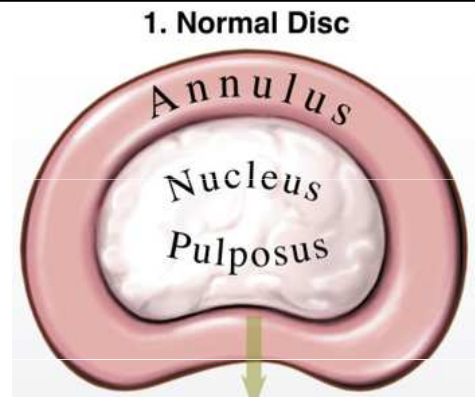




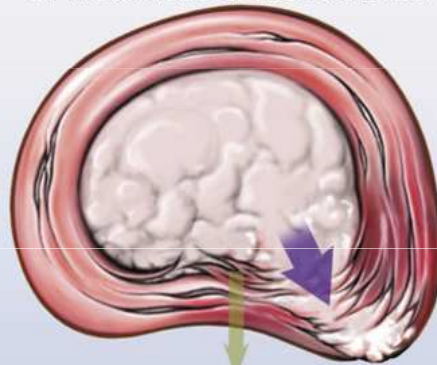
# Mechanical causes

- Spinal stenosis
- **Spondylosis**
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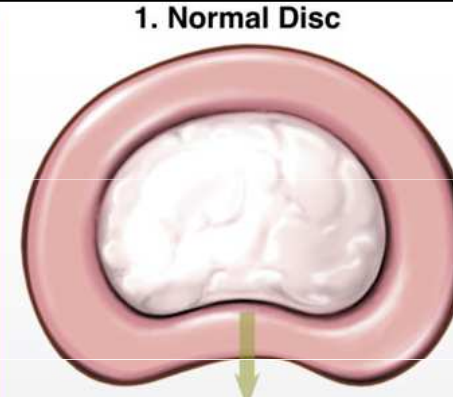




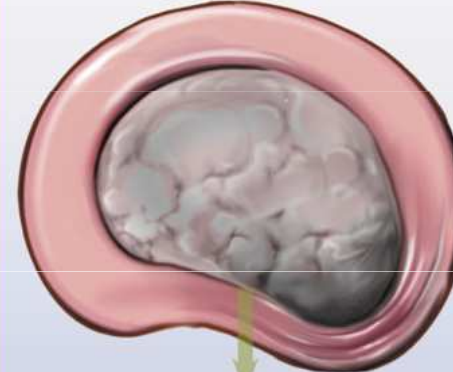
3. Disc Herniation Through Rent or Weakness in the Annulus



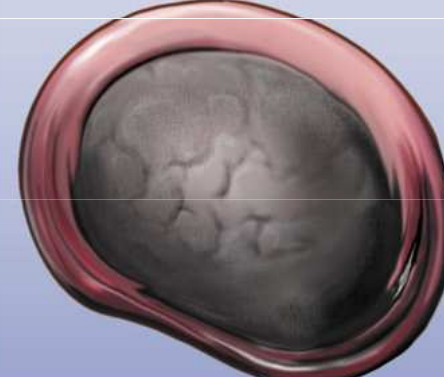
3. Degenerated Disc and Herniation



2. Degenerated Disc

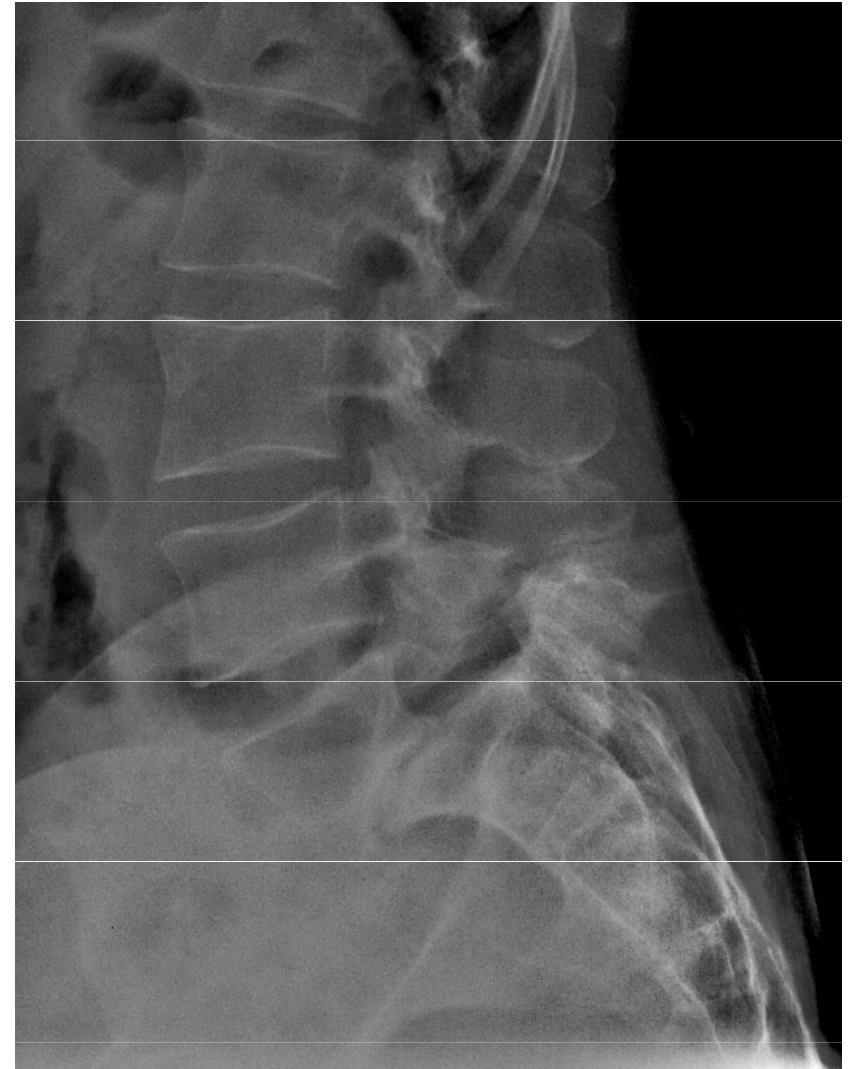


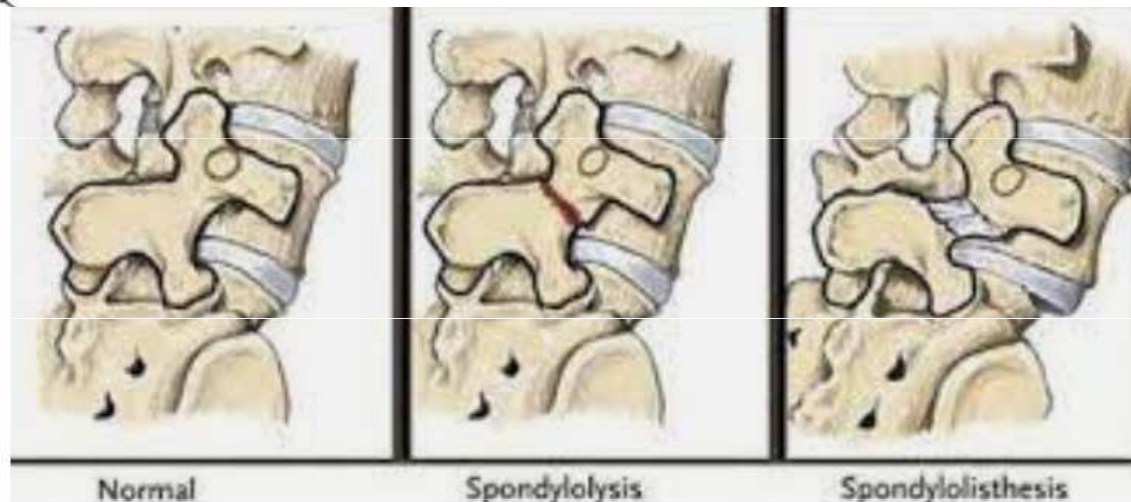
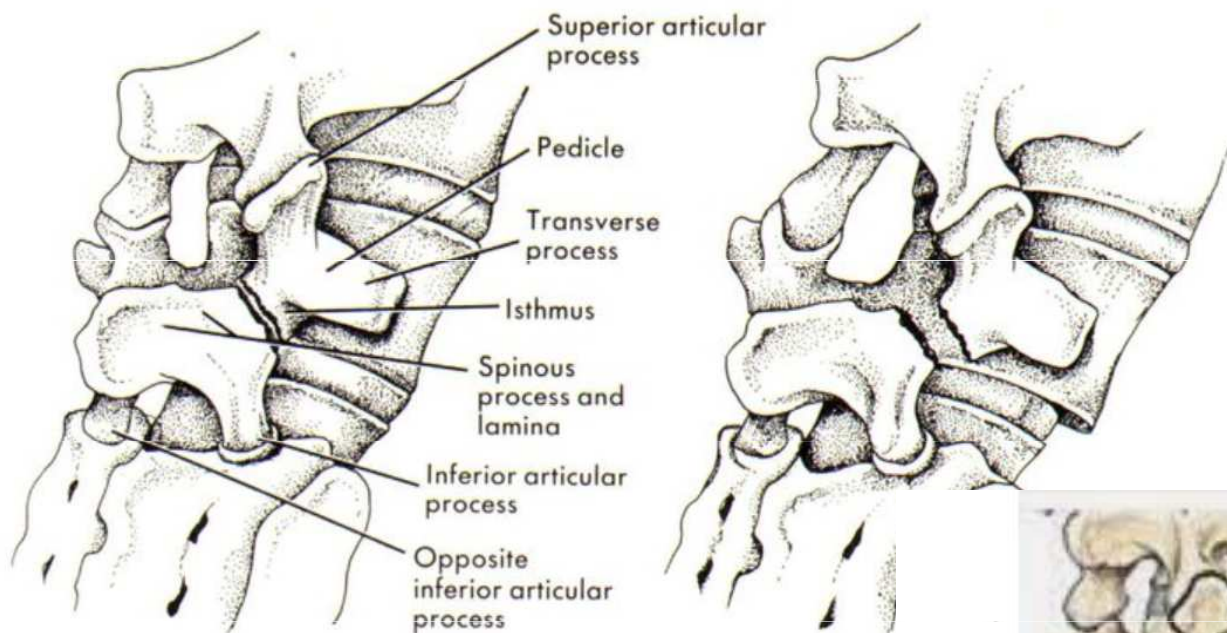
3. Disc Bulge



# Mechanical causes

- Spinal stenosis
- Spondylosis
- **Spondylolysis, spondylolisthesis**
- Herniated disc
- Scoliosis
- Trauma

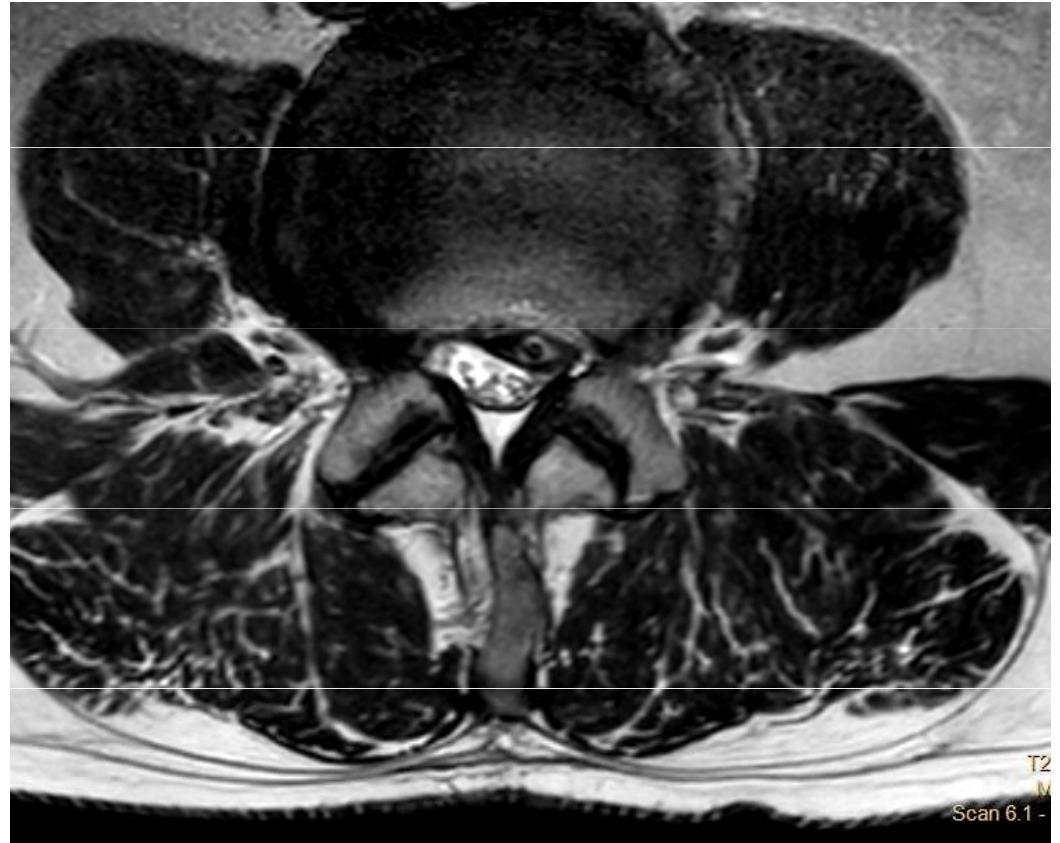






# Mechanical causes

- Spinal stenosis
- Spondylosis
- Spondylolysis, spondylolisthesis
- **Herniated disc**
- Scoliosis
- Trauma



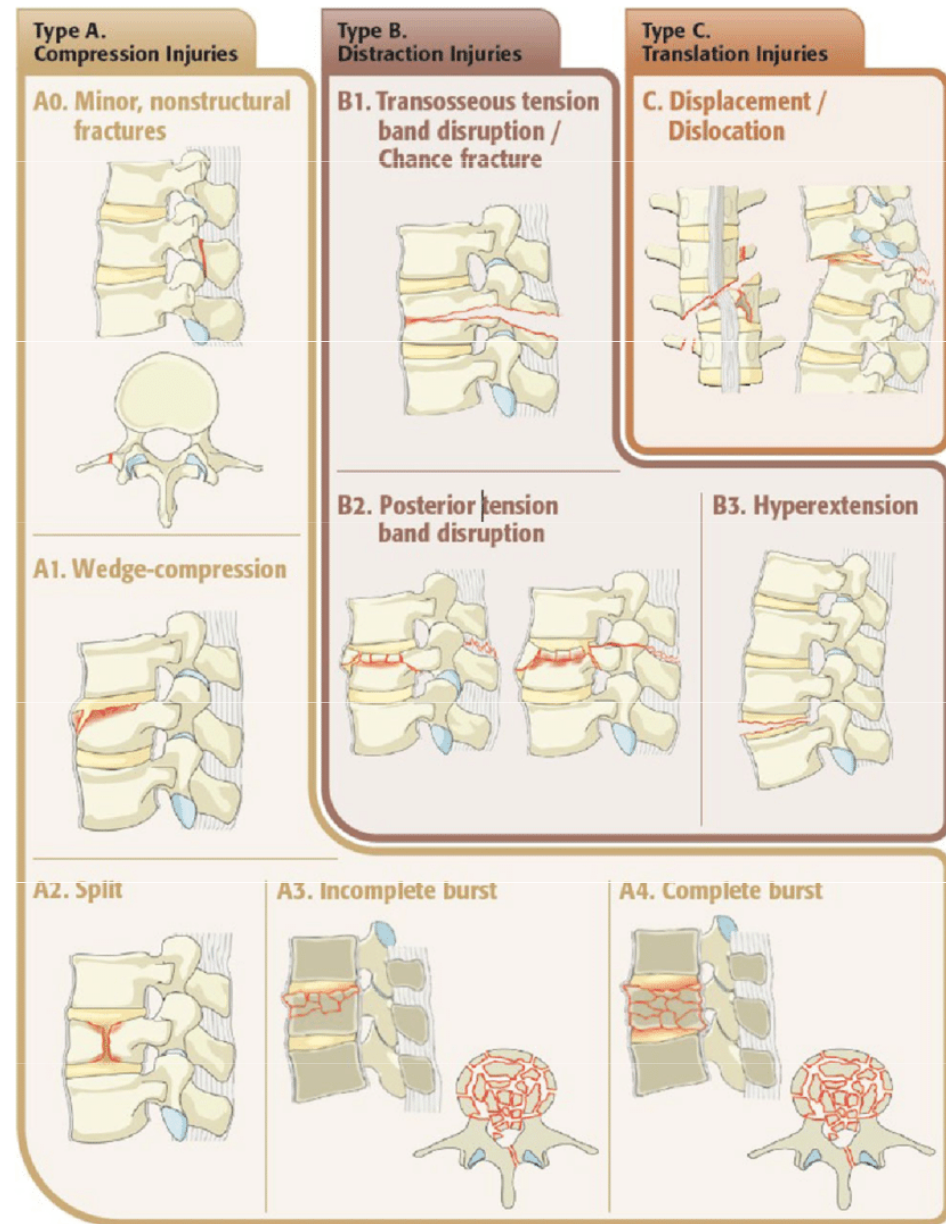
# Mechanical causes

- Spinal stenosis
- Spondylosis
- Spondylolysis, spondylolisthesis
- Herniated disc
- **Scoliosis**
- Trauma



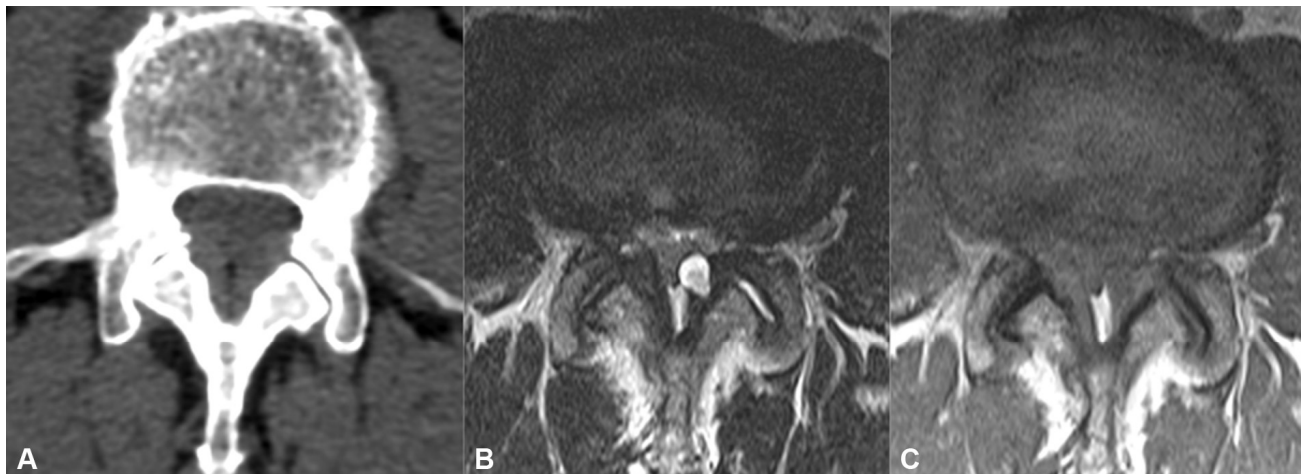
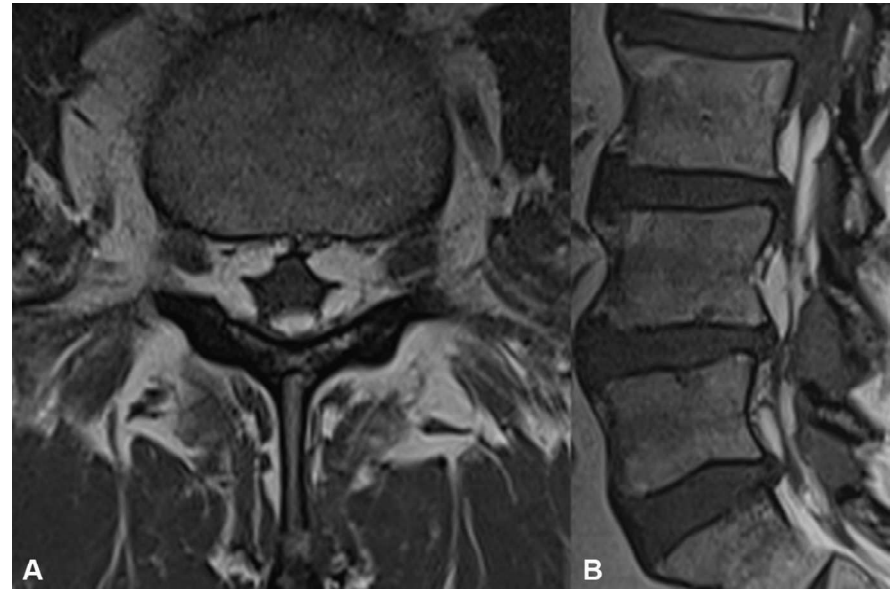
# Mechanical causes

- Spinal stenosis
- Spondylosis
- Spondylolysis, spondylolisthesis
- Herniated disc
- Scoliosis
- **Trauma**

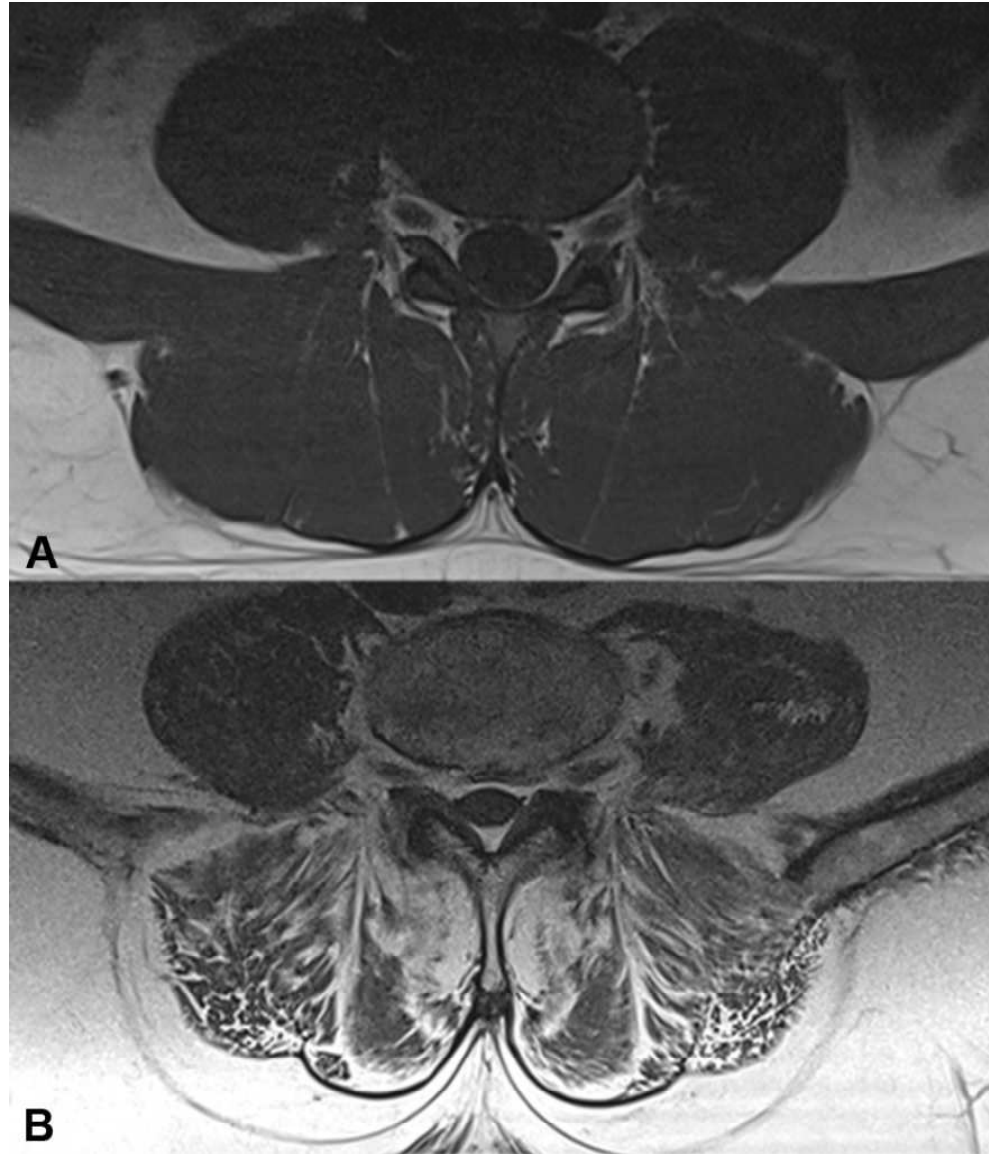


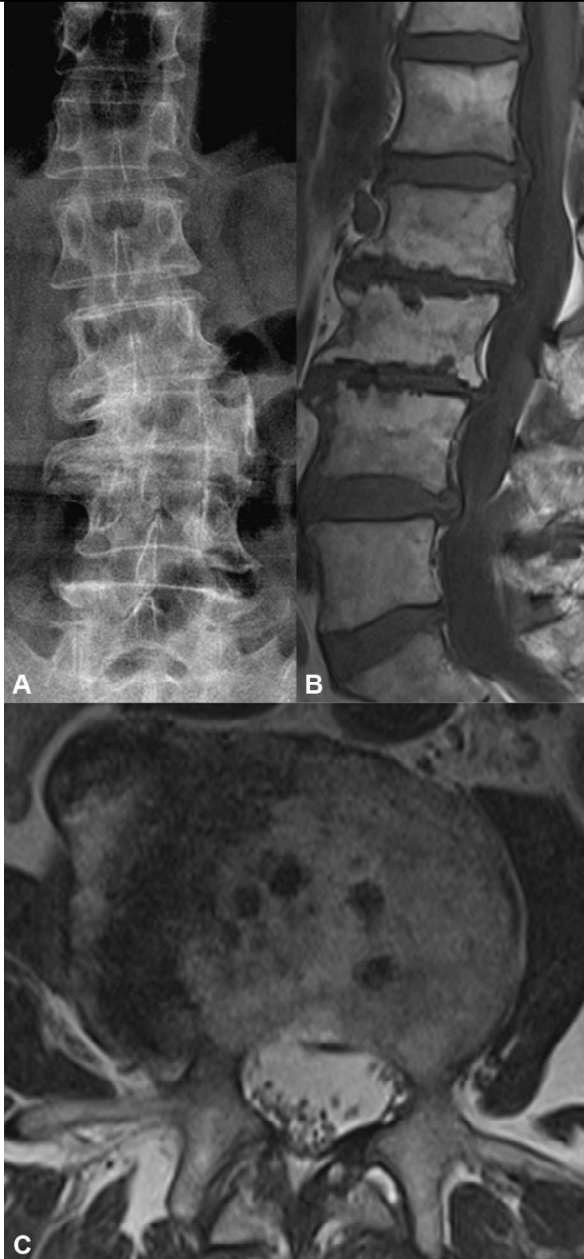
# Mechanical causes

- Other degenerative changes:
  - Facet joints, lateral recess, foramina
  - Osteophytes
  - Synovial cysts
  - Lipomatosis
  - Discogenic pain and endplate changes
  - oPLL









# Spine tumors

Primary (3%)

Secondary (97%)

## Benign (25%)

- Osteoid osteoma
- Osteblastoma
- Aneurysmal bone cyst
- Osteochondroma
- Neurofibroma
- Giant cell tumor
- Eosinophilic granuloma
- Hemangioma

## Malignant (75%)

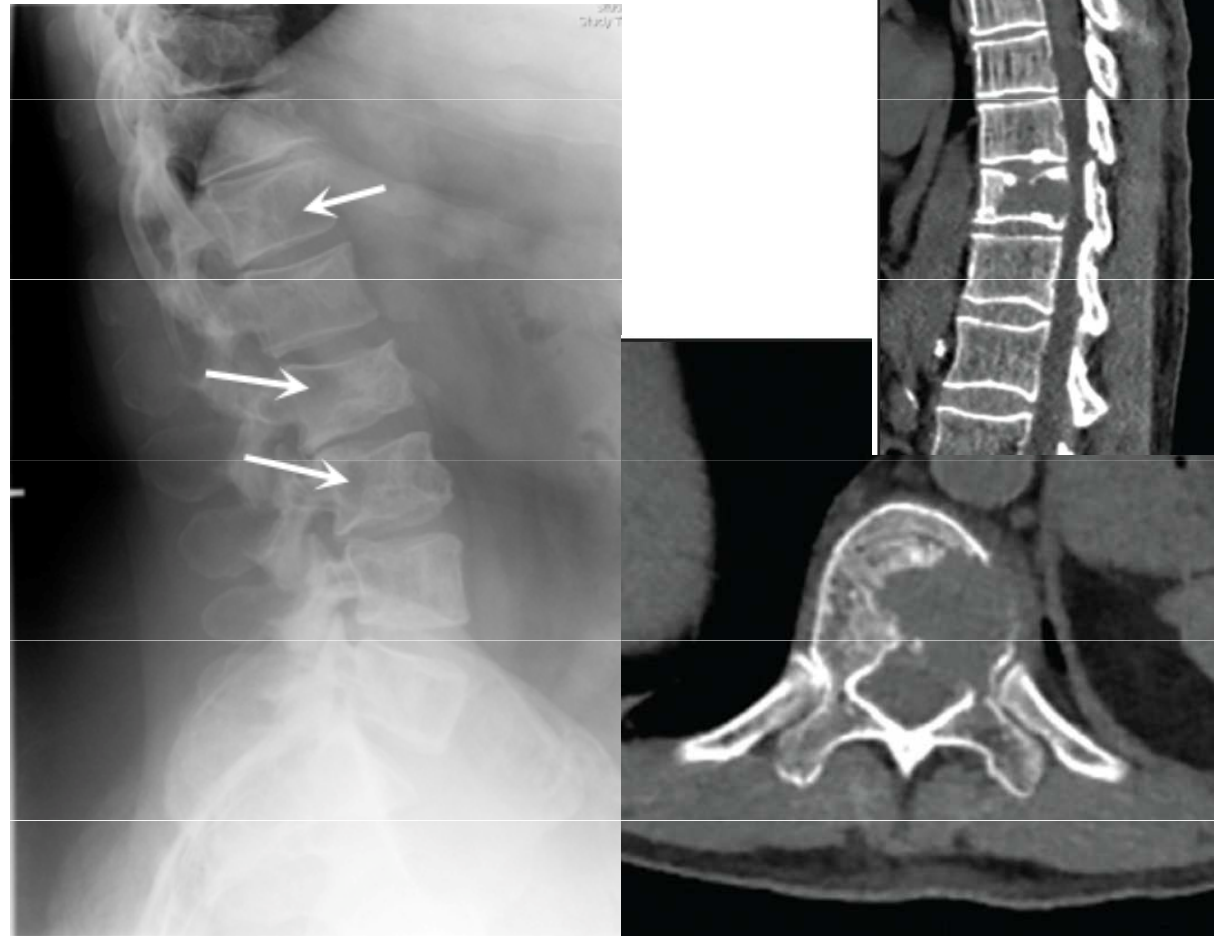
- Osteosarcoma
- chondrosarcoma
- Ewings sarcoma
- chordoma
- fibrosarcoma

- Lungs
- Breast
- Prostate
- Thyroid gland
- Kidneys
- GIT

**Zdroj.:** 1.Ciftdemir M, Kaya M, Selcuk E, Yalniz E. Tumors of the spine. *World J Orthop.* 2016;7(2):109-116. Published 2016 Feb 18. doi:10.5312/wjo.v7.i2.109, 2.DREGHORN, C. R., NEWMAN, R. J., HARDY, G. J., & DICKSON, R. A. (1990). Primary Tumors of the Axial Skeleton. *Spine*, 15(2), 137-140. doi:10.1097/00007632-199002000-00018

# Malignant tumors

- Chondrosarcoma
- Osteogenic sarcoma
- Ewing's sarcoma
- Chordoma
- Multiple myeloma
- Lymphoma
- Metastases - breast, lung, prostate, thyroid, kidney



# Benign tumors

- Osteochondroma
- Osteoid osteoma and osteoblastoma
- Giant cell tumor
- Aneurysmal bone cyst
- **Hemangioma**
- Eosinophilic granuloma



# Infection

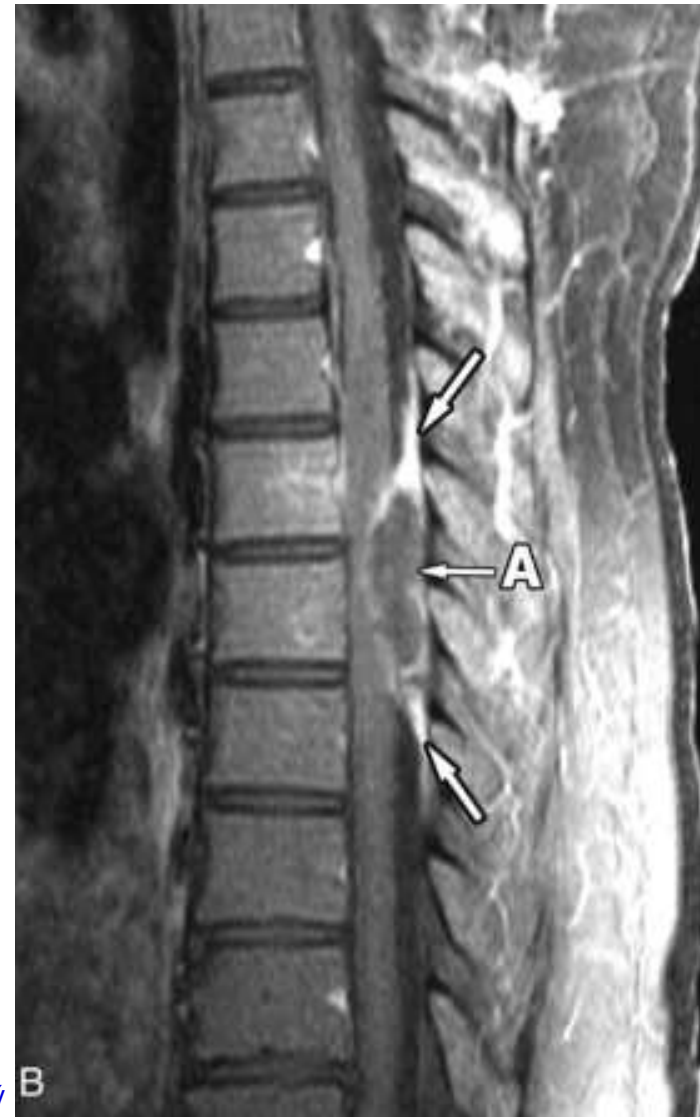
- **Osteomyelitis**
- Epidural abscess
- **Discitis**
- Granulomatous infection
- TBC





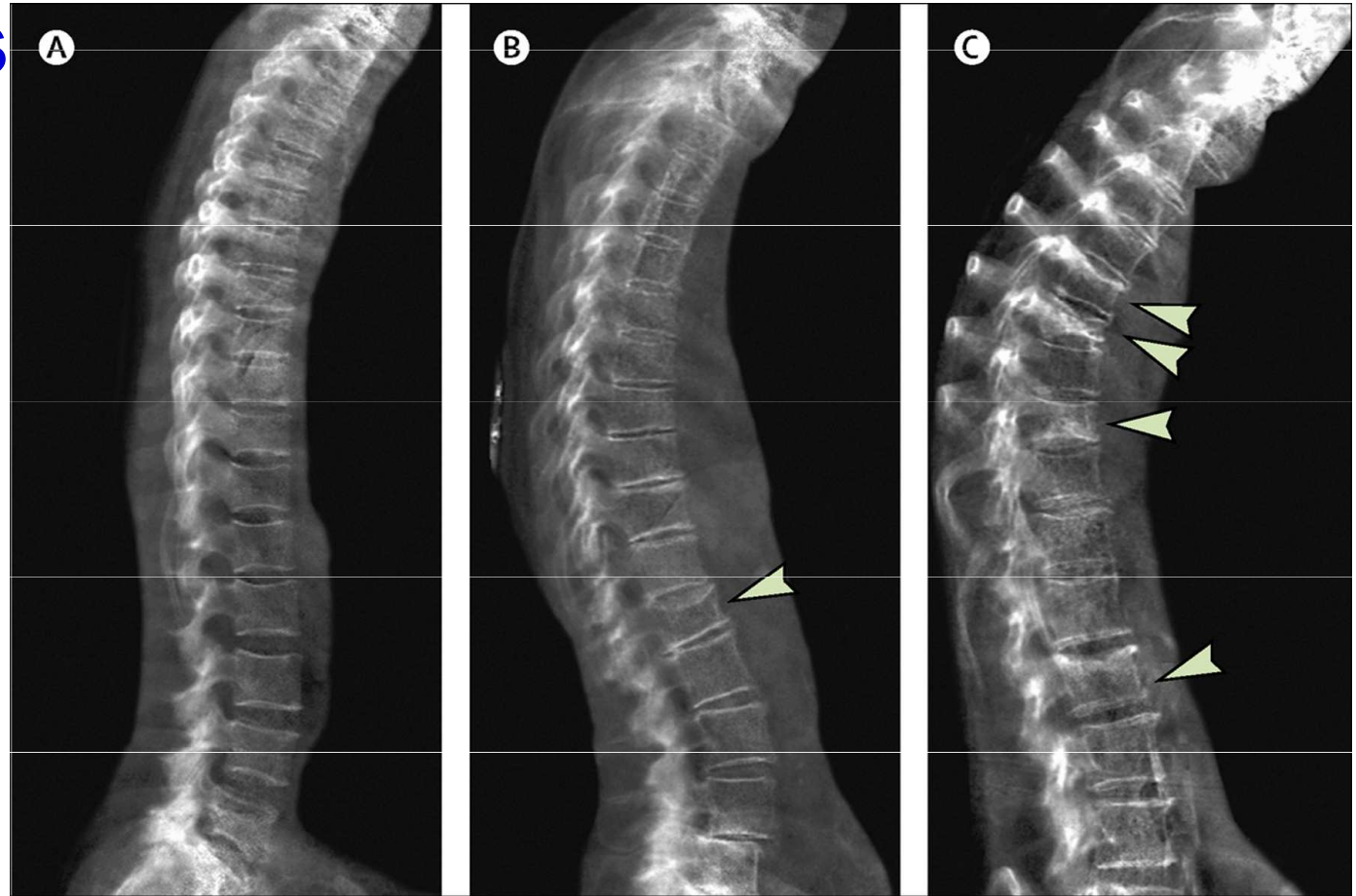
# Infection

- Osteomyelitis
- **Epidural abscess**
- Discitis
- Granulomatous infection
- TBC



# Osteoporosis

- senilní
- postmenopauzální
- farmakologicky induk.

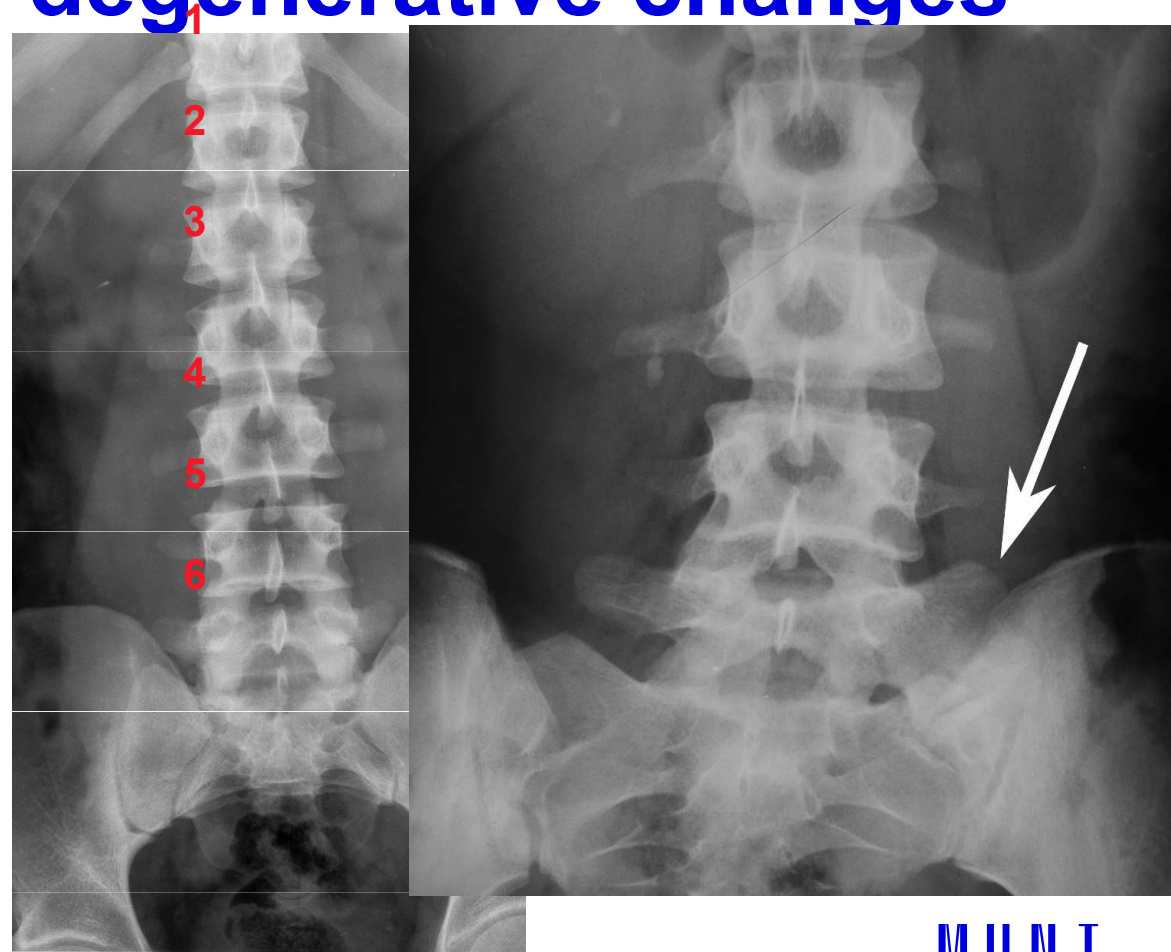


Compston JE, McClung MR, Leslie WD. Osteoporosis. Lancet. 2019 Jan 26;393(10169):364-376. doi: 10.1016/S0140-6736(18)32112-3. PMID: 30696576.



# Congenital and other degenerative changes

- **Sacralization, lumbarization**
- **Bertolotti's syndrome**
- Lumbar hyperlordosis with vertical sacrum
- Baastrup phenomenon



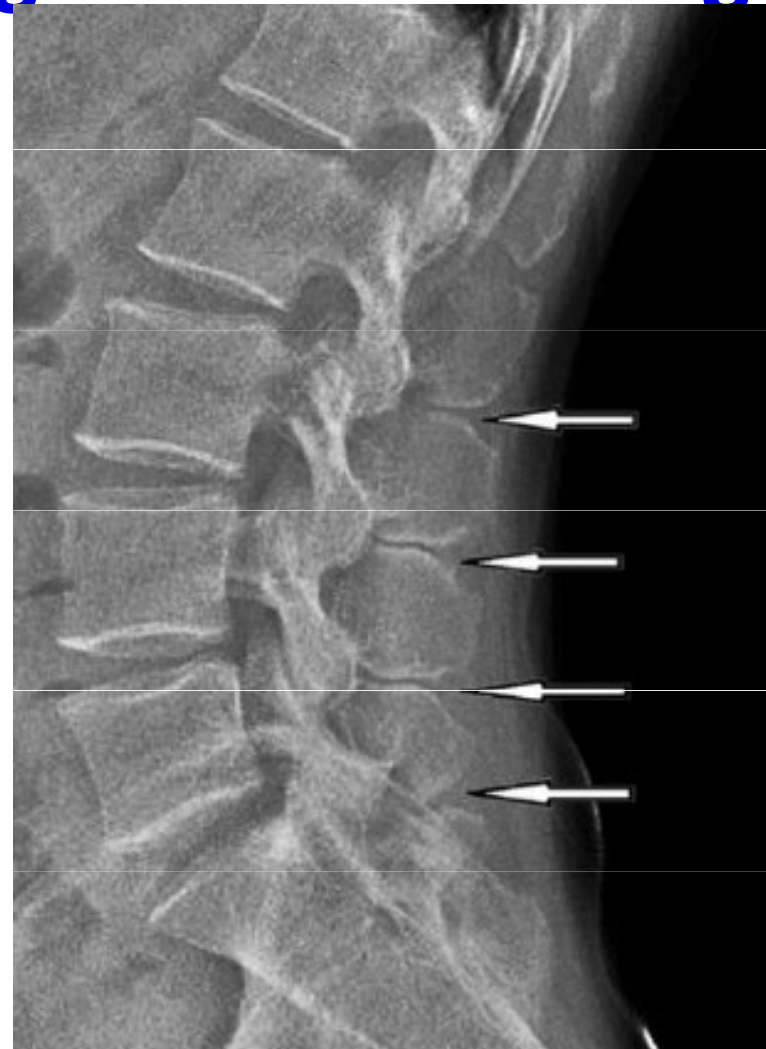
# Congenital and other degenerative changes

- Sacralization, lumbarization
- Lumbar hyperlordosis with horizontal sacrum
- Baastrup phenomenon



# Congenital and other degenerative changes

- Sacralization, lumbarization
- Lumbar hyperlordosis with vertical sacrum
- **Baastrup phenomenon**



# Spondyloarthropathy

- Ankylosing spondylitis – HLA - B27+
- Rheumatoid arthritis



# Spondyloarthropathy

- Ankylosing spondylitis –
- Rheumatoid arthritis



# EXAMINATION

- Anamnestic data– RA, OA, FA, AA, PSA
- Perfect clinical examination and documentation
- XR – standardized images
- CT – acute trauma
- MRI - the gold standard for soft tissue
- Other imaging modalities after MDT
- Consultation of expertise in the case of therapeutic doubts

# Red flags

- **infection x tumor x trauma x cauda equina syndrome**
- New onset back pain age <20, 50+
- Night pain
- Saddle anaesthesia, bladder bowel disturbance
- Fever, loosening weight
- Anamnesis of cancer, steroid use



# BACK PAIN RED FLAGS

<b>AGE</b>	<18 >50	Congenital anomaly Malignancy Infection AAA
<b>IMMUNOCOMPROMISED</b>	Chronic kidney disease Chronic liver disease	Infection (osteomyelitis, discitis, spinal epidural abscess)
<b>INTRAVENOUS DRUG USE</b>	Any IVDU	Infection (osteomyelitis, discitis, spinal epidural abscess)
<b>HISTORY OF CANCER</b>	Any cancer	Tumor Pathologic Fracture
<b>SYSTEMIC SYMPTOMS</b>	Fever/rigors Weight loss	Infection Malignancy
<b>ANTICOAGULATION</b>	warfarin, target specific anticoagulants	Epidural hematoma
<b>TRAUMA</b>	Major in young patients, minor trauma in elderly or those with rheumatologic disease	Fracture
<b>SYMPTOMS OF CORD COMPRESSION</b>	Saddle anesthesia Urinary or bowel incontinence or retention Perineal sensory loss Anal sphincter laxity	Compression via tumor, disc, abscess etc
<b>SEVERE or PROGRESSIVE NEUROLOGIC DEFICIT</b>		Compression via tumor, disc, abscess etc



**MUNI**  
**MED**

# Red flags – TUNA FISH

- Trauma
- Unexplained Weight Loss
- Neurologic Symptoms
- Age over 50
- Fever
- IVDU (IntraVenous Drug User)
- Steroid Use
- History of Cancer

# Yellow flags

- "yellow/warning/flags"
- psychosocial risk factors
- e.g. wrong attitudes and superstitions of the patient about back pain
- unsuccessful diagnostic and treatment results
- behavioral, emotional, family and work problems
- catastrophizing and depression
- passive coping with pain (passive expectation of pain, limitation or exclusion of physical and social activity)
- increase in muscle tension (muscle imbalance)
- signs of protective behavior (taking comfortable positions, limping, overuse of support aids, etc.)

# Literatura

- Benzel, E. C., & Steinmetz, M. P. (2017). *Benzel's spine surgery: Techniques, complication avoidance, and management* (Fourth edition.). Philadelphia, PA: Elsevier.
- COST B13: European guidelines for the management of low back pain. *Eur Spine J* **15**, s125– s127 (2006). <https://doi.org/10.1007/s00586-006-1066-z>
- DUNGL, Pavel. *Ortopedie*. Praha: Grada, 2005. ISBN 80-247-0550-8.