

# بسم الله الرحمن الرحيم

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August 15,  
2023



# LUMBAR PAIN

## INFECTIVE - METABOLIC

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ARUMS

# Infectious spondylodiscitis

# Infectious spondylodiscitis

- ➔ Infection of intervertebral  
disc and two adjacent  
vertebral bodies

# Routes of contamination

- Hematogenous
- Contiguous
- Direct implantation
- Post operative

# Infectious spondylodiscitis

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- ▶ Staphylococcus aureus
- ▶ Streptococcus
- ▶ Gram negatives
- ▶ Mycobacteria
- ▶ Brucella
- ▶ Fungus
- ▶ ...

# Clinical findings

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- Back or neck pain
- 10% of patients describe pain in the chest, abdomen or on extremity
- Fever, weight loss, night sweating, loss of appetite
- Percussion over the involved vertebra elicits tenderness

# Clinical findings

- Limitation of motion on involved vertebra
- Spasm of the paraspinal muscles
- Abscesses formation
- Neurologic abnormalities

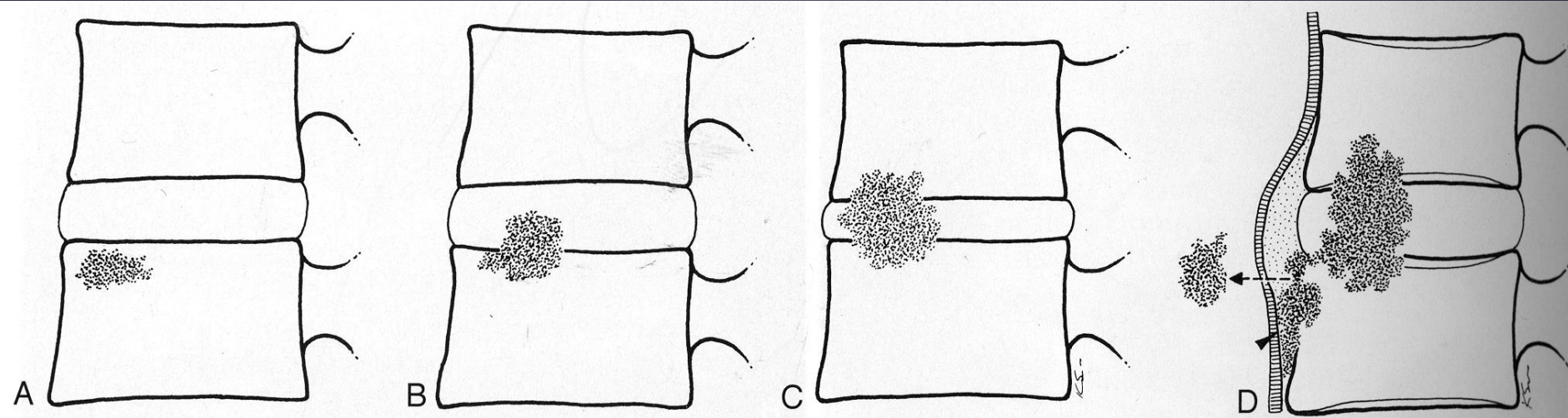


# Radiology

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- Decrease in height of the intervertebral disc.
- loss of normal definition of subcondral plate.
- destruction of the vertebral body
- Sclerosis or eburnation in the bone



**FIGURE 60-9.** Spinal infection: Sequential stages.

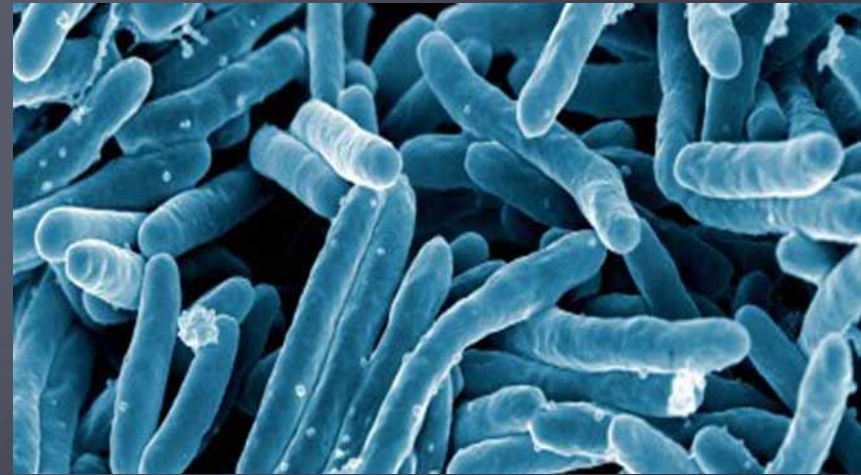
**A** An anterior subchondral focus in the vertebral body is typical.

**B** Infection may then perforate the vertebral surface and reach the intervertebral disc space.

**C** With further spread of infection, contamination of the adjacent vertebral body and narrowing of the intervertebral disc space are recognizable.

**D** With continued dissemination, infection may spread in a subligamentous fashion and erode the anterior surface of the vertebral body (arrowhead) or perforate the anterior ligamentous structures (arrow).

# Mycobacterial Infection

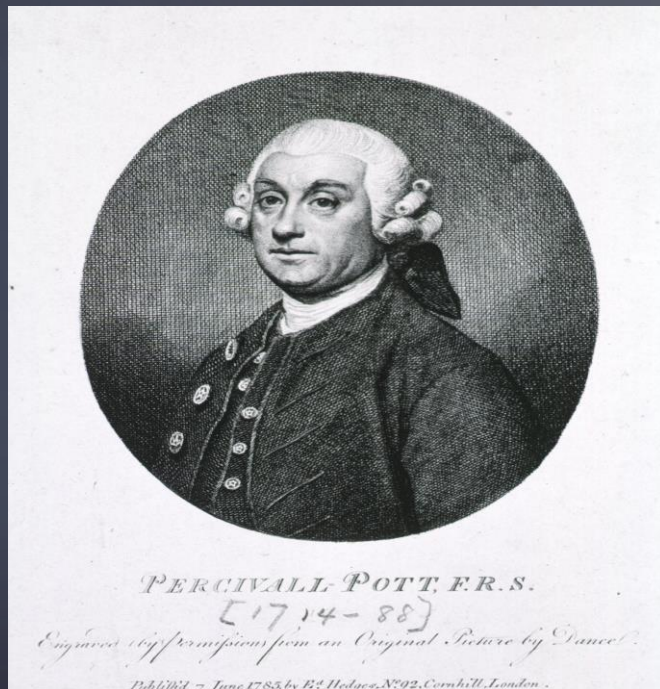




# HISTORY OF TUBERCULOSIS

Oldest human infection known

Percival Pott described the first case of spinal TB in 1779



# Introduction

- ▶ Skeletal TB (STB) contributes to around 10-35% of Extra pulmonary tuberculosis
- ▶ 2% of all TB cases
- ▶ 50% - spine
- ▶ In nonendemic areas, elderly, debilitated patients, solitary osteolytic lesions
- ▶ In endemic areas children and young to middle-aged adults multifocal skeletal involvement

# Introduction

- ▶ Anti-TNF → increase in TB
- ▶ In developing countries, the HIV pandemic increases in osteoarticular TB co-infection
- ▶ Effective anti-retroviral therapy ↓: TB
- ▶ Less than 50% of osteoarticular TB presents with evidence of active or past pulmonary disease

# Risk factors

- ▶ Genetic risks

Mutations that interfere with IFN-gamma and IL-12 production and signaling

- ▶ Chronic granulomatous disease

- ▶ Immunosuppression

- ▶ Malnutrition

- ▶ Malignancy

- ▶ Diabetes mellitus

- ▶ Chronic renal disease

- ▶ Advanced age

# Involvement of the Musculoskeletal System

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- ▶ Spondylitis (50-60%)
- ▶ Osteomyelitis
- ▶ Septic arthritis
- ▶ Reactive arthritis (Poncet's disease)
- ▶ Tenosynovitis

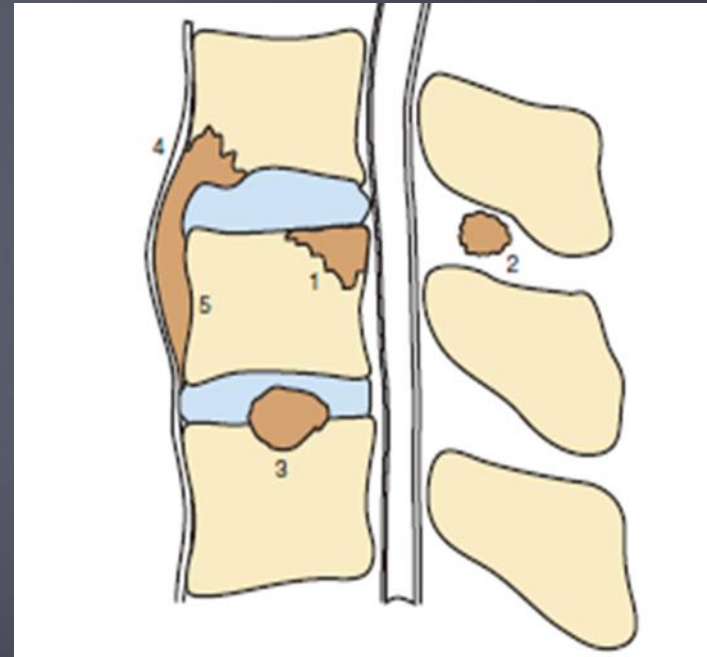


# Spondylitis (Pott disease)

- ▶ In HIV- patients → lower thoracic and thoracolumbar spine
- ▶ In HIV+ patients → lumbar spine

# Patterns of Vertebral Involvement

- ▶ Vertebral body
- ▶ Posterior(rare)
- ▶ Intervertebral disk
- ▶ Prevertebral tissue
- ▶ Subligamentus



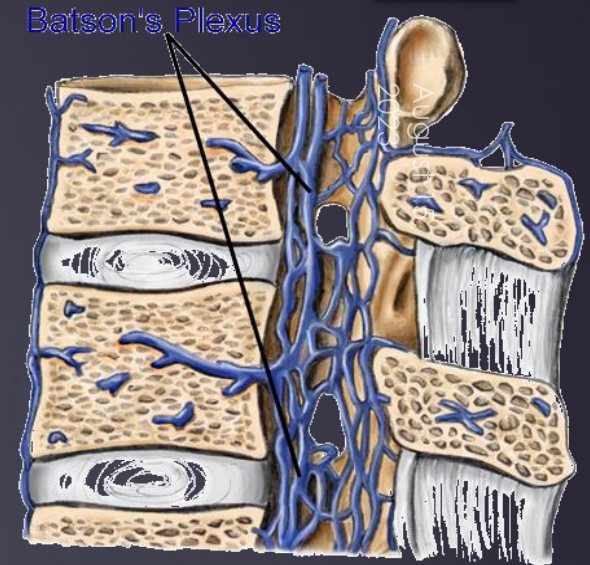
# Pathophysiology of Spinal TB

- ▶ Hematogenous
- ▶ spread from the lungs or direct inoculation

# Pathophysiology of Spinal TB

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- ▶ venous plexus of Batson
- ▶ Anterior **subchondral** bone of a single vertebra adjacent to the intervertebral disk
- ▶ Progression occurs from **2 to 5** months  
extension from cancellous to cortical bone  
across the disk space to adjacent vertebrae



# CLINICAL MANIFESTATIONS

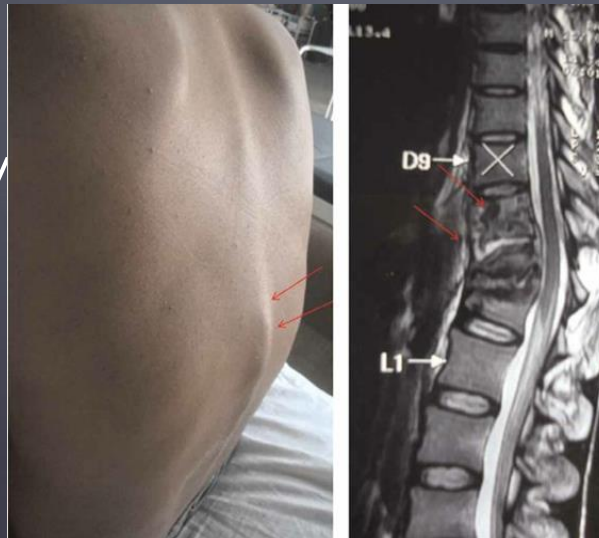
- ▶ The clinical presentation of spinal TB usually consists of localized pain
- ▶ low-grade fever, weight loss, chills, and nonspecific constitutional symptoms

# CLINICAL MANIFESTATIONS

- ▶ Neurologic deficit, Paraparesis and paraplegia 1% to 27%



- ▶ gibbus deformity





- ▶ Atypical spinal lesions, 10% of cases may delay diagnosis and treatment
- ▶ Multiple vertebrae may be involved, either in continuity or as skipped lesions



# Paravertebral abscess

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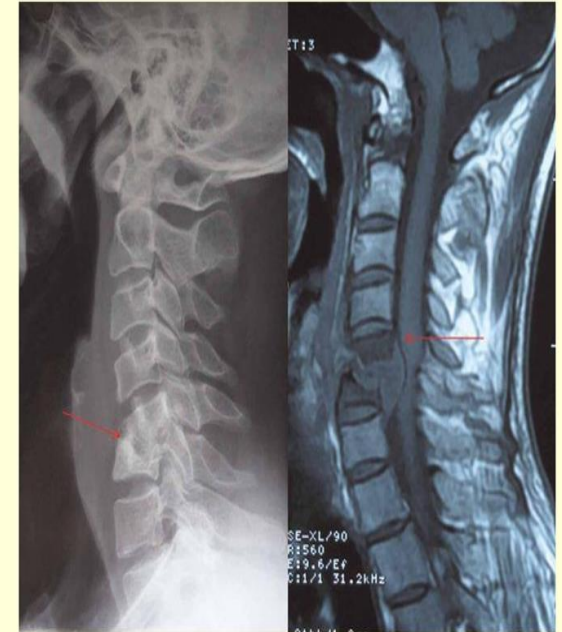
- ▶ Thoracic spine extend into the pleural space and lung parenchyma
- ▶ lumbar spine, a cold abscess characteristically produces lateral displacement of the psoas muscle
- ▶ Subligamentous TB(cervical spine)





# Cervical spine

- ▶ Rare only 0.4% to 1.2% of cases in the United States
- ▶ neck pain ,stiffness, hoarseness, dysphagia, torticollis, fever, anorexia, and neurologic disorders
- ▶ Atlantoaxial dislocation

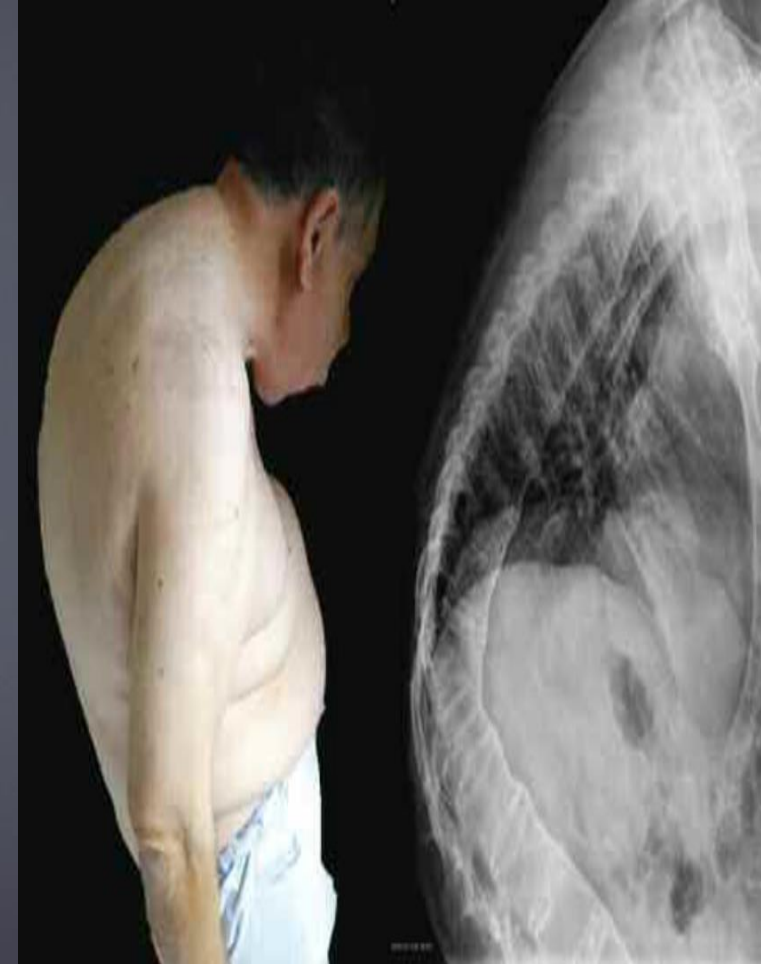


X-ray of cervical region which shows spinal tuberculosis of cervical six to seven vertebrae and a retropharyngeal abscess (left). T1-weighted image of an MRI of same patient, which shows destruction of C6–C7 vertebrae


# Differential diagnosis

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- ▶ spondyloarthritis
- ▶ pyogenic vertebral osteomyelitis
- ▶ Malignancy
- ▶ Brucellosis





# Imaging

- ▶ CXR maybe normal
- ▶ Conventional radiography :defining bone destruction
- ▶ MRI is more effective in identifying early disease
- ▶ CT can be helpful  needle biopsy
- ▶ Both CT and MRI helpful in monitoring therapy

- ▶ 40% of smears and cultures from psoas abscesses are positive
- ▶ 80% to 95% positive culture results (bone biopsy)

# PPD

- ▶ TST or purified protein derivative (PPD) → screening test
- ▶ It is unable to distinguish latent infection from active disease
- ▶ sensitivity and specificity in the range of 70%(latent TB)

- ▶ The degree of positivity  BCG vaccinations and the number of subsequent TSTs
- ▶ TST result  $\geq 20\text{mm}$  rarely the result of BCG
- ▶ high-risk situation : PPD  $\geq 5\text{ mm}$   LTBI





**TABLE  
118.1****Causes of False-Negative Purified Protein  
Derivative Test**

Increased age (>70 yr)

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Steroid use (prednisone  $\geq 15$  mg/day)

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Hypoalbuminemia (<2 g/dL)

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Azotemia

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Impaired cellular immunity

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HIV infection

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Other debilitating diseases



# Interferon- $\gamma$ Release Assays (IGRA)

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- ▶ T cell-based testing
- ▶ Equivalent or better sensitivity and improved specificity compared with TST

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- ▶ Discordant IGRA–/TST+ results → prior BCG vaccination
- ▶ Discordant IGRA+/TST– results → corticosteroid therapy
- ▶ Annual monitoring for new TB infection in patients treated with TNF inhibitors, especially in highly endemic areas

# GeneXpert nucleic acid amplification assay

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- ▶ The test is a molecular TB which detects the DNA in TB bacteria
- ▶ detect the genetic mutations associated with resistance to the drug Rifampicin
- ▶ Detection within 48 hours



# Culture

- ▶ Arthroscopically higher positive cultures than needle biopsies CT-guided
- ▶ pathology—caseating or non-caseating granulomas ± acid-fast bacilli

# Polymerase Chain Reaction

- ▶ The role of molecular diagnostic assays in extrapulmonary TB is still being defined
- ▶ preliminary experience has demonstrated promise

# Bruceellar spondylodiscitis

# Brucellar spondylodiscitis

- Brucellosis causes subacute or chronic spondylodiscitis
- The most common organism is brucella melitensis
- Vertebral column is affected in 6-50 percent of cases of skeletal brucellosis
- Lumbosacral is usually affected
- Commonly occurs in middle-age or elderly
- Men > women
- 5% multiple levels
- Abscess is rare

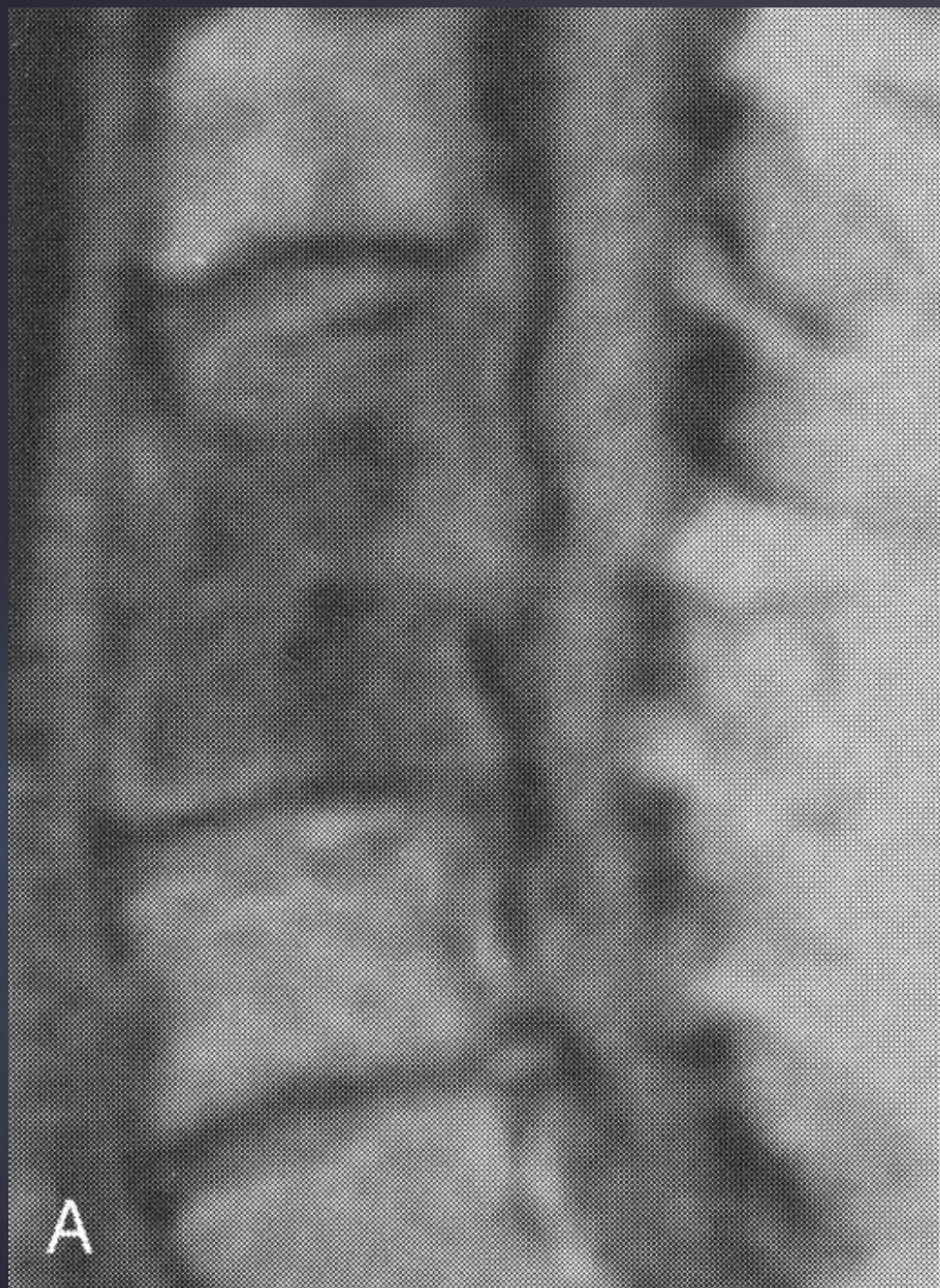
# Pyogenic spondylodiscitis

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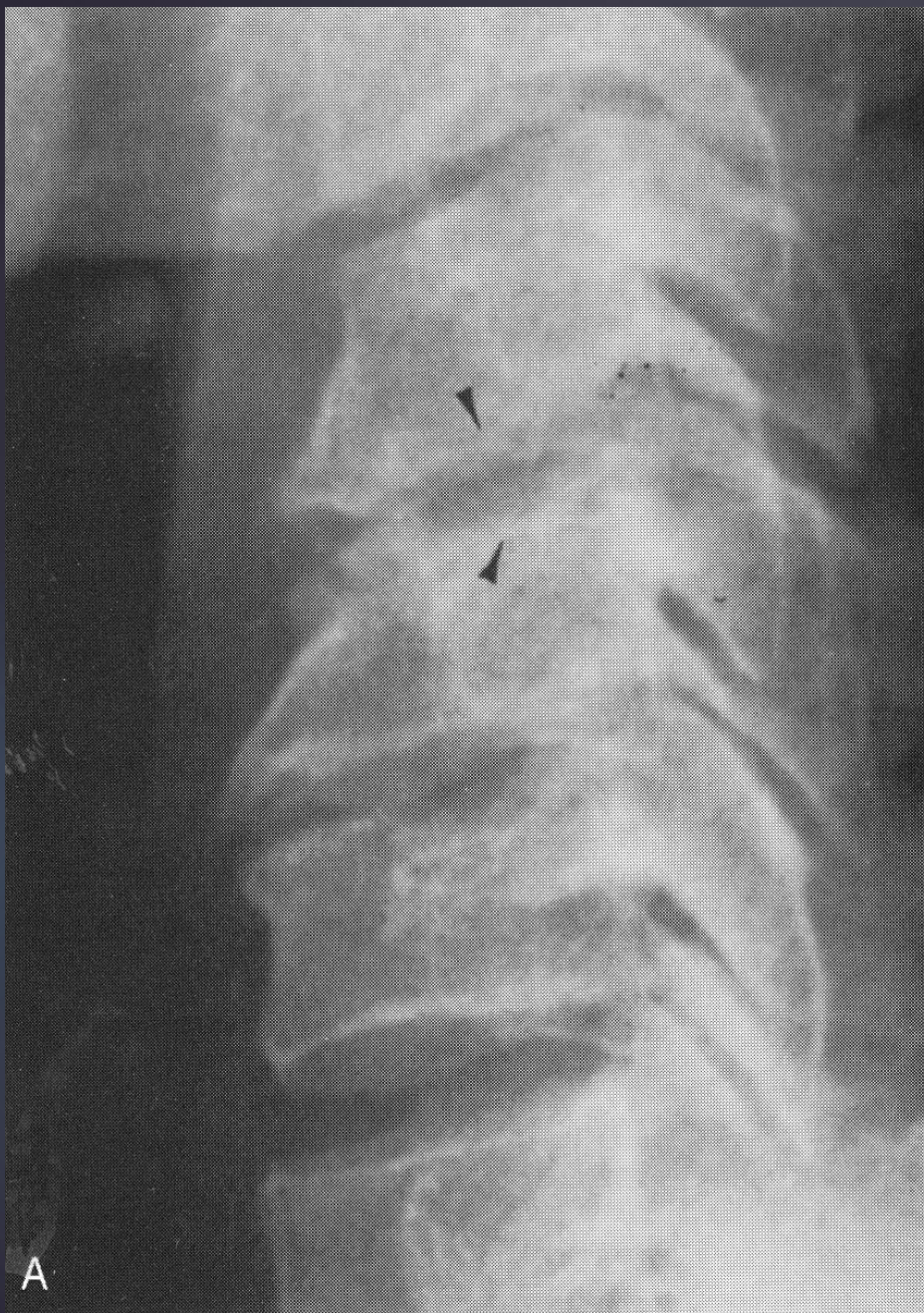
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- The most frequently encountered organism is staph aureus
- A history of recent infection (UTI, endocarditis) is common
- Usually occurs in 5 and 6 decades of life or later
- The lumbar spine is the most typical site of involvement (45%) followed by the thoracic and cervical spine











# Metabolic

# Metabolic

- ▶ Osteoporosis
- ▶ Osteomalacia
- ▶ Hyperparathyroidism
- ▶ Ochronosis
- ▶ ...

# Osteoporosis

# Clinical presentation



# Clinical presentation

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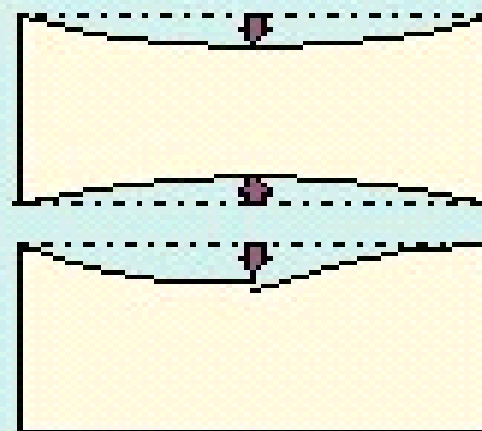
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## ❑ Spine fracture

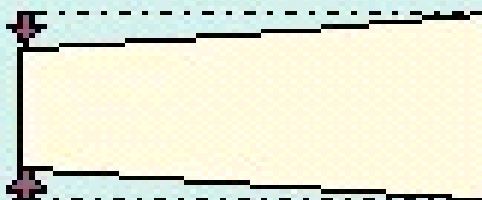
- Asymptomatic (2/3)
- Acute
- Chronic complication:  
loss of height , Kyphosis



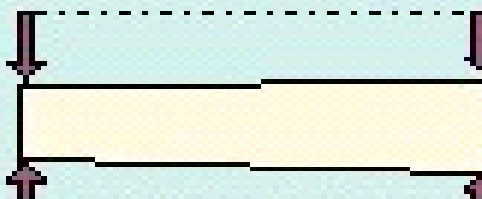
Fish mouth



Wedge shape



Pan cake

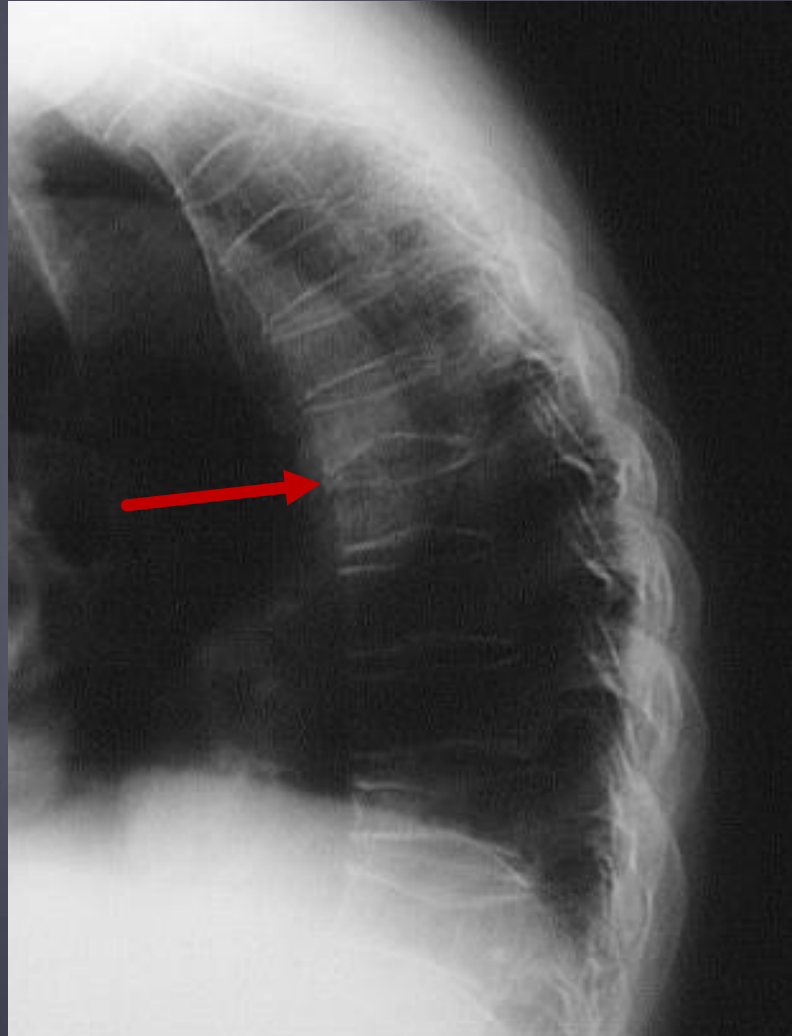


# Vertebral fracture

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□ Fish mouth



# Vertebral fracture

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□ Wedge  
shape



# Vertebral fracture

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☐ Pan cake



# The Clinical Challenge

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- ▶ Often asymptomatic
  - ▶ Until fracture occurs
  - ▶ Even after some fractures (eg, 2/3 of vertebral fractures are asymptomatic)
- ▶ The challenge to clinicians:
  - ▶ Identify patients at high risk for fracture
  - ▶ Prevent first fracture





# Be on the Lookout for Silent Fractures

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- 65-year-old, T-score -1.6
- Height measurement: 2.5" loss from her young adult height; lateral spine x-ray ordered

## Vertebral Fractures:

- 2/3 unrecognized by patients/clinicians
- Indicate very high risk for future spine and hip fractures
- Are a major indication for pharmacotherapy



# Ochronosis

# CLINICAL MANIFESTATIONS

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## ► Ochronosis

### 1. Skin



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## ► Ochronosis

1. Skin
2. Ear



31-40 Yr



41-50 Yr



51-60 Yr



61-80 Yr



## ► Ochronosis

1. Skin
2. Ear
3. Sclera



## ► Ochronosis

1. Skin
2. Ear
3. Sclera
4. Prostate
5. Heart valves
6. Tendones





# CLINICAL MANIFESTATIONS

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## *Spondylosis*



# CLINICAL MANIFESTATIONS

## *Spondylosis*

- ▶ Acute lumbago
- ▶ disc herniation
- ▶ Chronic lumbago
- ▶ Disc space narrowing and height loss
- ▶ Rigidity
- ▶ Lordosis loss
- ▶ Kyphosis

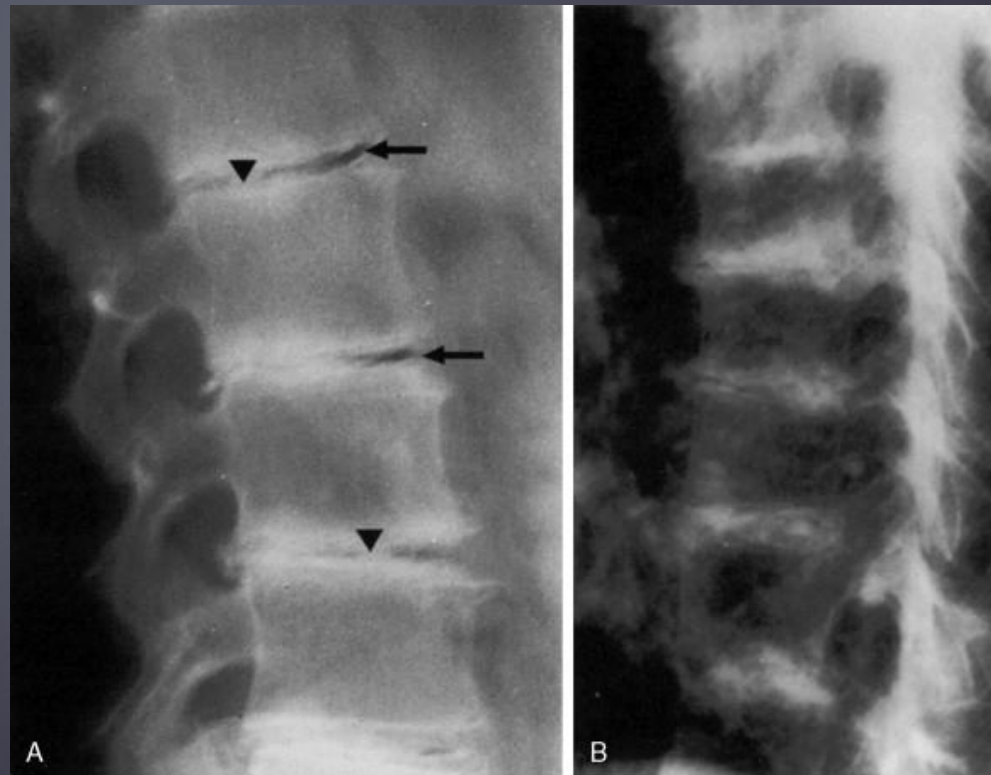


# *RADIOGRAPHY*

## *AXIAL SKELETON*

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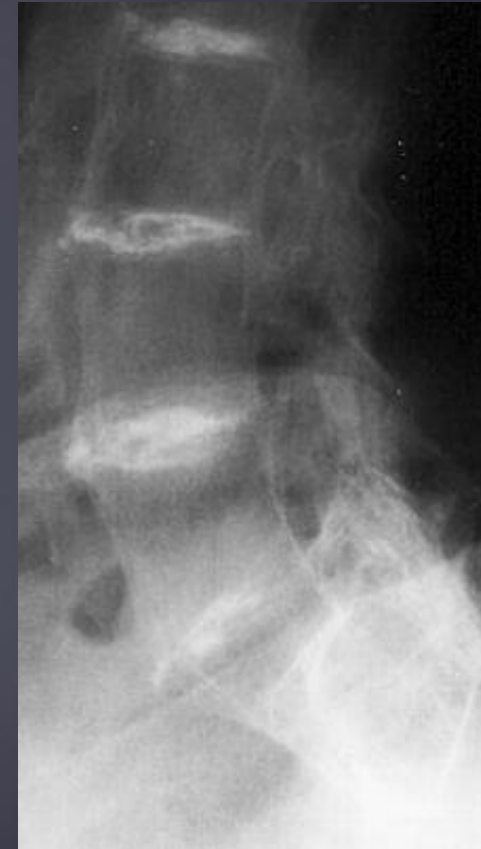
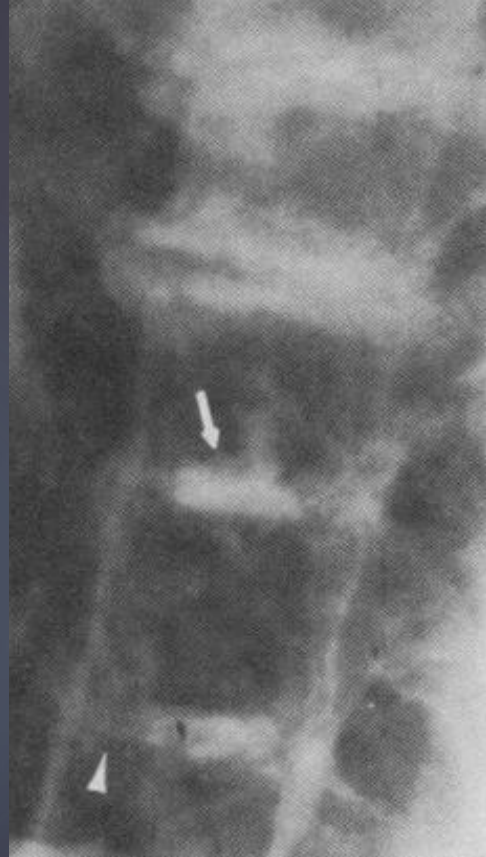


# RADIOGRAPHY

## AXIAL SKELETON

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# CLINICAL MANIFESTATIONS

## (Other musculoskeletal disorders)

- ▶ Tendinopathy
- ▶ Ligament rupture
- ▶ Muscle rupture
- ▶ Bursitis

# DIAGNOSIS

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► Disease should be suspected in patients with:

1. Dark urine
2. False positive test for glucose in urine
3. Premature osteoarthritis
4. Chondrocalcinosis
5. Disk space loss and calcification

# DIAGNOSIS

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## ► Diagnosis triad:

1. Degenerative arthritis
2. Ochronotic pigmentation
3. Black urine after alkalization, or adding ferric chloride, Benedict reagent, or silver nitrate





# HYPERPARATHYROIDISM

# Musculoskeletal Manifestations

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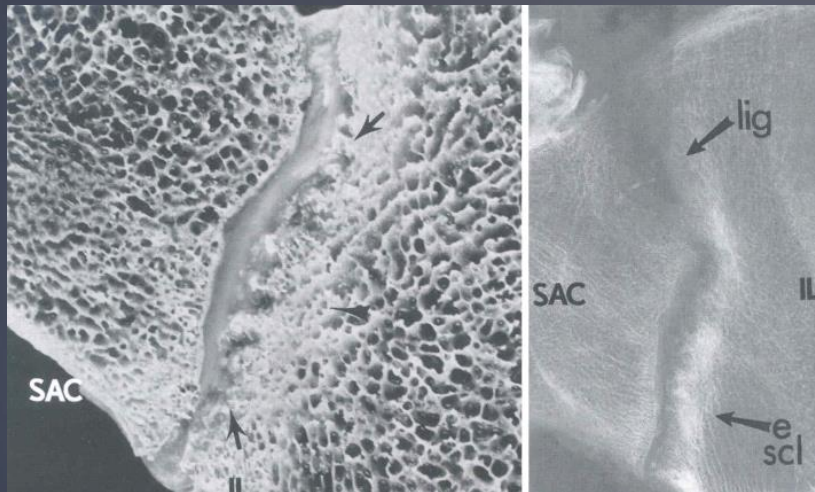
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- ▶ Osteitis fibrosa cystica
- ▶ Osteoporosis, osteomalacia
- ▶ CPPD
- ▶ Gout (3-45%)
- ▶ Joint laxity and tendon rupture
- ▶ Back abnormalities

Kyphosis  
LBP  
Disc herniation  
Disc calcification  
Subluxation  
especially in  
cervical spine  
Hypermobility in  
lumbar spine

### ► Subchondral bone resorption

#### 1. SI joints



### ► Subchondral bone resorption

1. SI joints
2. AC and SC joints
3. Discovertebral joints



# Radiography

## *Bone Sclerosis*

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# Radiography

## *Diffuse Osteoporosis*

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# Laboratory Findings

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## ► Hypercalcemia

# Laboratory Findings

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## ► Hypercalcemia


Normocalcemic  
hyperparathyroidism

# Laboratory Findings

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▶ Hypercalcemia

▶ PTH 

# Laboratory Findings

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2023

▶ Hypercalcemia

▶ PTH



▶ Hypophosphatemia

# Laboratory Findings

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▶ Hypercalcemia

▶ PTH



▶ Hypophosphatemia

▶ ALP





# Laboratory Findings

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- ▶ Persistent hypercalcemia: 86%
- ▶ Intermittent hypercalcemia: 6%
- ▶ Normocalcemia: 8%
- ▶ Hypophosphatemia: 79%
- ▶ ALP<sup>↑</sup>: 90%

# Diagnosis

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## ► Hyperparathyroidism should be suspected in patients with:

1. Generalized osteoporosis
2. Bone pain, arthralgia
3. Pathologic fracture
4. Proximal muscle weakness, myalgia
5. Hypercalcemia
6. Nephrolithiasis
7. Chondrocalcinosis, pseudogout

# Diagnosis

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Hypercalcemia  
+  
High or inappropriately normal PTH

با تشکر