MED437
KING SAUD UNIVERSITY

PATHOLOGY
TEAM 437

Pathology

Practical

MSK-Block

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Try to read all the cases.. They are only 8 , and SIMPLE ! ☺

Case 1

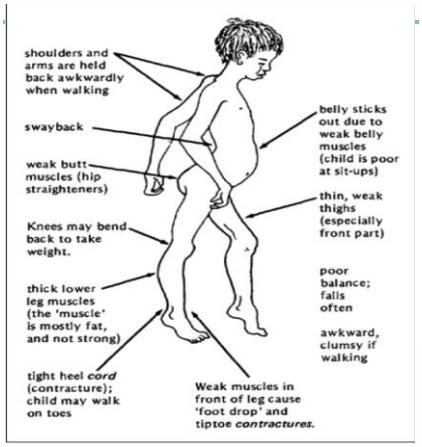
"Duchenne Muscular Dystrophy(DMD)"

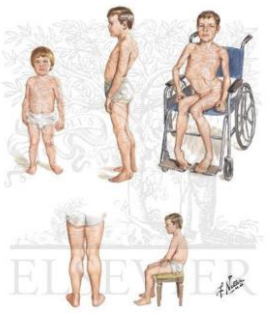
A 3 -year-old boy presented to his pediatrician with complaint of his parents from difficulty in walking , poor balance , and frequent falls .

Laboratory investigation shows elevated creatine kinase .

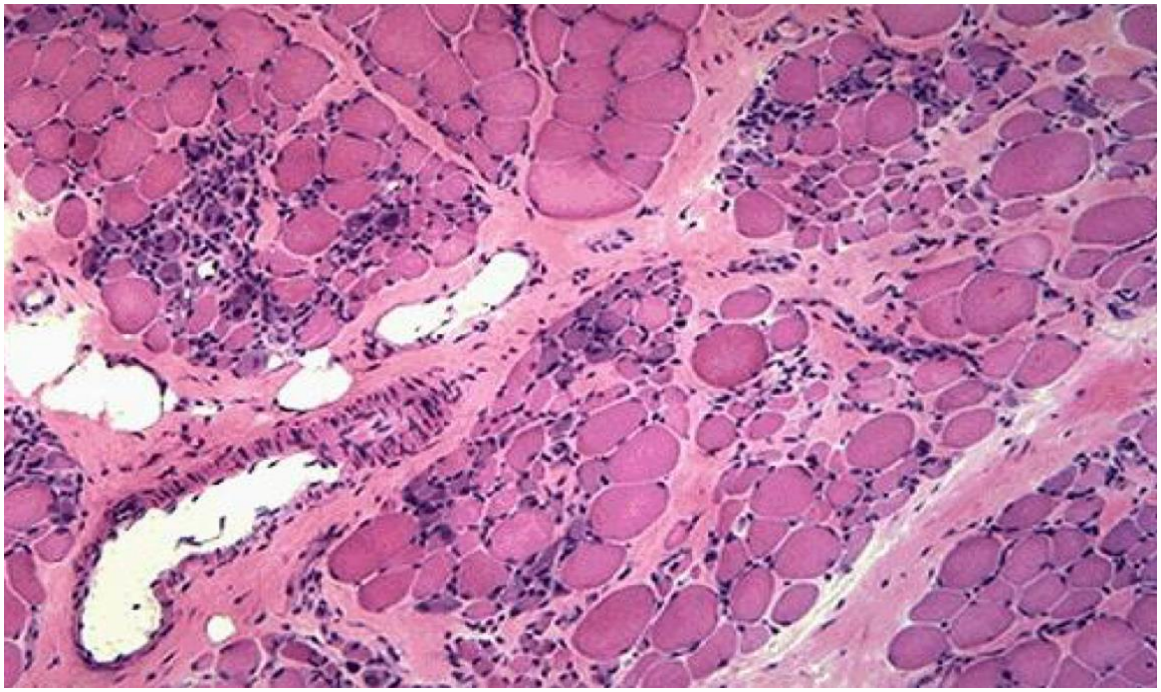
Muscle biopsy show absence of dystrophin by western blot analysis

- ***What is your provisional diagnosis? :-***
- ***→ Duchene Muscular Dystrophy (DMD)***



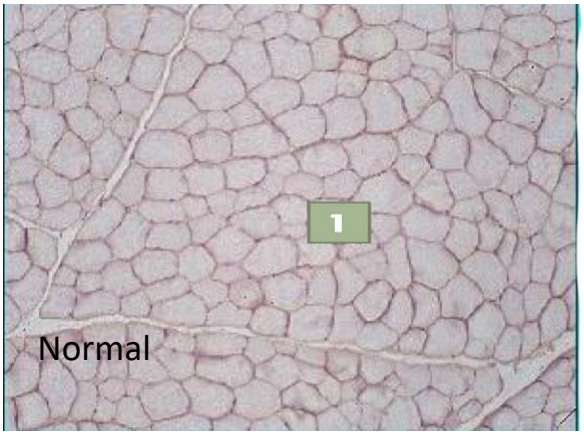


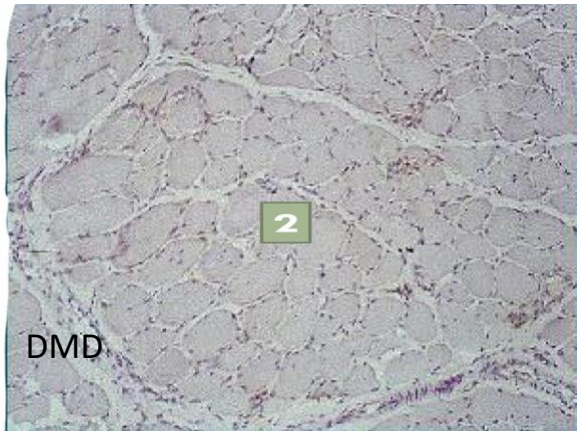
- DMD is the most severe and common type of muscular dystrophy.
- DMD affects mostly males at a rate of 1 in 3,500 births
- DMD is characterized by the wasting away of muscles.
- Diagnosis in boys usually occurs between 16 months and 8 years.
- Death from DMD usually occurs by age of 30.



Duchenne muscular dystrophy showing:

1. variations in muscle fiber size.
2. increased endomysial connective tissue.
3. regenerating fibers (blue tint).
4. hypercontracted fibers (hyaline fibers).





Immunohistochemical staining in DMD :

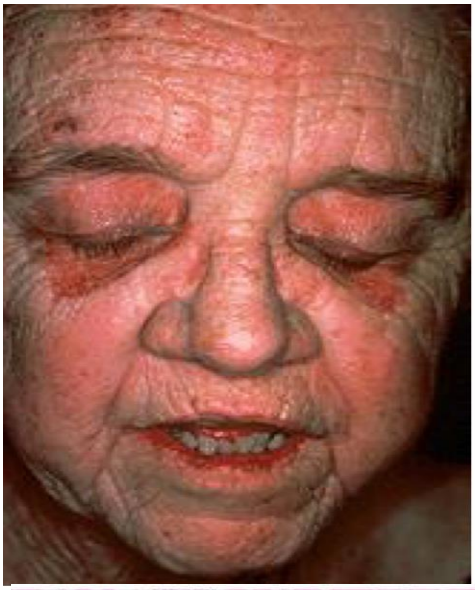
Dystrophin, an intracellular protein, forms an interface between the cytoskeleton proteins and a group of transmembrane proteins.

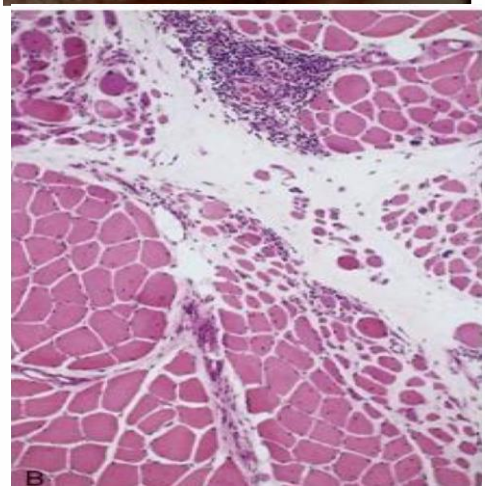
COMPLETE Absence of Membrane-associated Dystrophin

Case 2

Dermatomyositis

A 52-year-old woman presents with 6 of progressive muscle weakness and a skin rash.
Physical examination is remarkable for a diffuse purple/red discoloration of the skin over her cheeks, nose, and eyelids. Examination confirms *proximal muscle weakness*.
Laboratory findings show an increase in creatine kinase (10 times the normal).





Dermatomyositis is an inflammatory myopathy characterized by inflammation of muscle tissue and a skin rash.

Occurs more frequently in women

Purple/violet colored upper eyelids Purple-red skin rash.

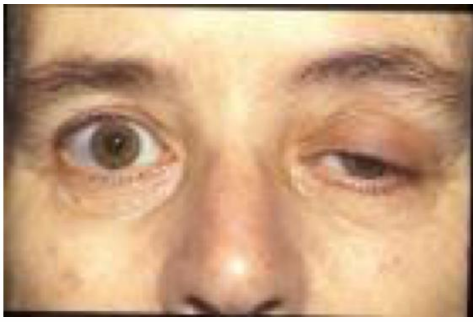
Can occur in any individual with peak age patterns at: 5-15 years of age 40-60 years of age.

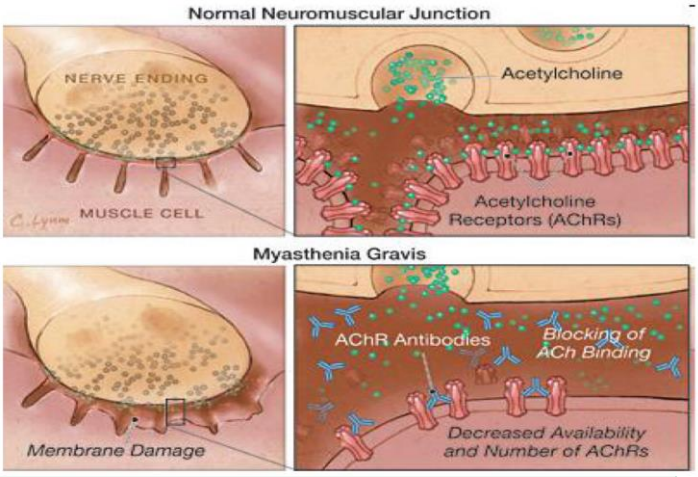
The histologic appearance of muscle shows:
1. Perifascicular atrophy of muscle fibers.
2. Chronic inflammation

Its an Autoimmune disease

The doctor said that this is *Theoretical* , And that it doesn't have to do with Practical .. But read it just in case ☺

MYASTHENIA GRAVIS





- **Several Types of Myasthenia Gravis :-**

1. **Neonatal Myasthenia Gravis:** A transient condition in 10% to 15% of infants born to mothers with MG.
2. **Congenital Myasthenia**
3. **Juvenile Myasthenia:** Onset is around 10 years of age.
4. **Ocular Myasthenia**
5. **Generalized Autoimmune Myasthenia**

- **Acquired autoimmune disorder :-**

1. fundamental defect is a decrease in the number of available AChRs at the postsynaptic muscle membrane.
2. simplification of the postsynaptic folds and widening of the synaptic cleft Clinically **characterized by:**

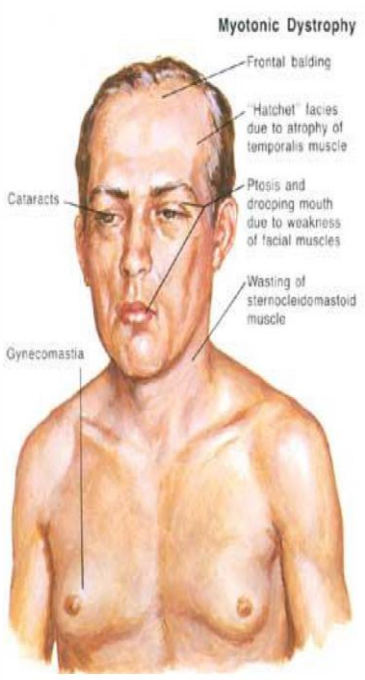
✓ Weakness of skeletal muscles
✓ Fatigability on exertion.

Pathology of Myasthenia Gravis :- (Know this <u>just in case</u> !)

- The neuromuscular abnormalities in MG are brought about by an autoimmune response mediated by specific anti-AChR antibodies.
- These antibodies reduce the available AChR's at neuromuscular junctions.
- the thymus is abnormal in approximately 75% of patients with MG
- In 65% of patients the thymus is hyperplastic

Doctor barely talked about this ..

MYOTONIC DYSTROPHY



Also known as **dystrophia myotonica**

- Composed of 2 clinical disorders with overlapping phenotypes & distinct molecular genetic defects :

1. DM1-the classic disease.
2. DM2-proximal myotonic myopathy

- Autosomal dominant disease

OSTEOPOROSIS

A disease characterized by low bone mass and microarchitectural deterioration of the bone tissue
***Leading to*: enhanced bone fragility and increase in fracture risk**

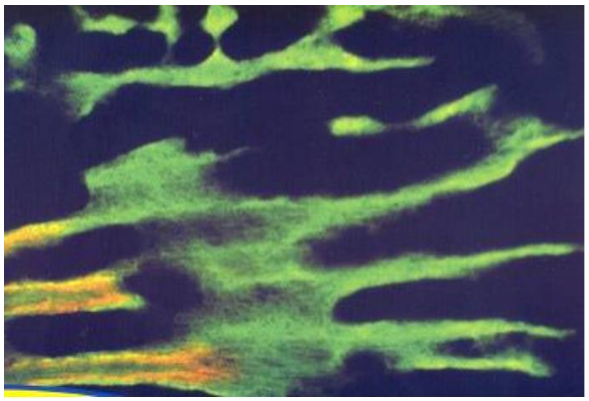
In Osteoporosis , The rate of formation is inadequate to offset the rate of resorption and maintain the structural integrity of the skeleton

Stages of Fracture healing

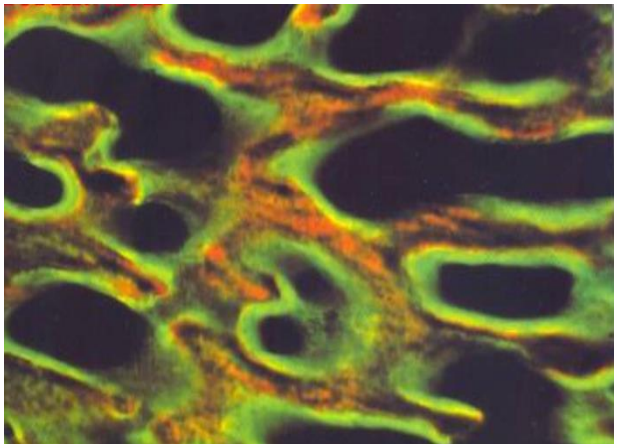
1.Inflammation

2.Bone healing

3.Repair



1) First phase of woven bone formation



2) Later phase in woven formation

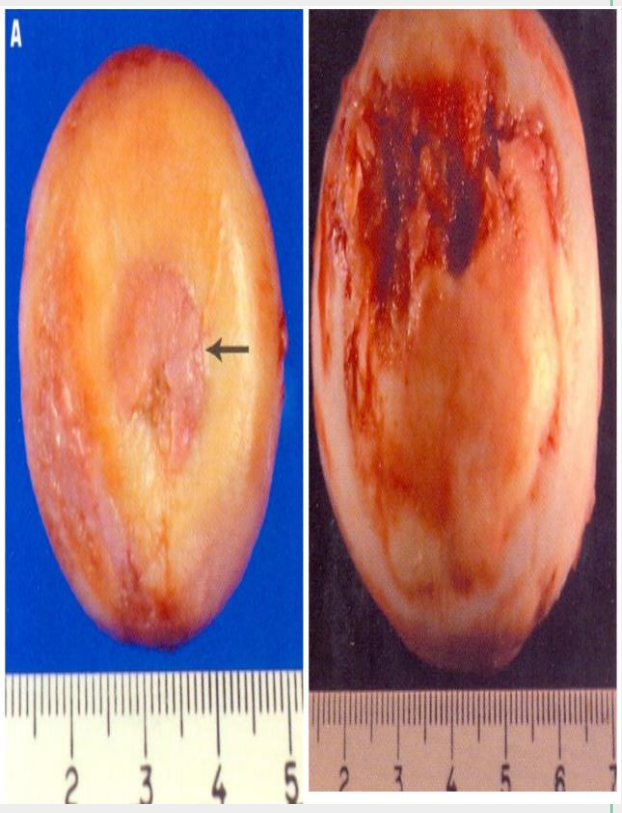
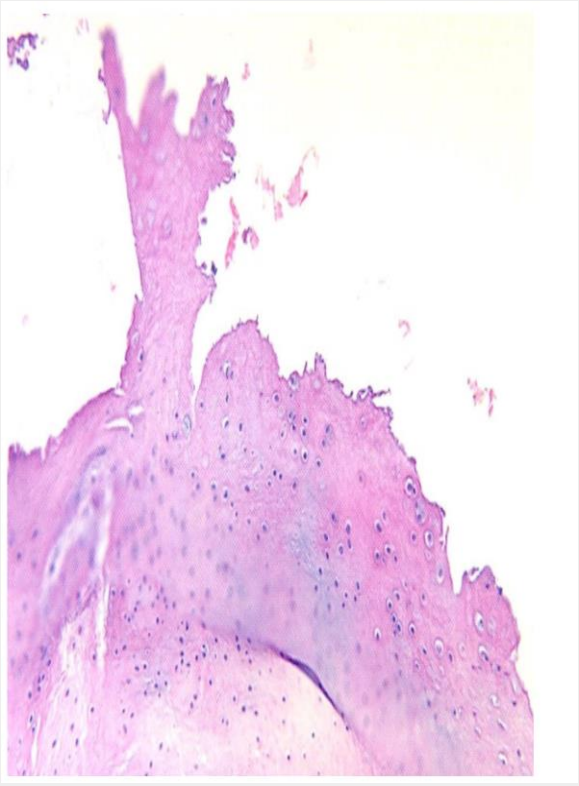
Remodeling

Case 3

Non infectious arthritis

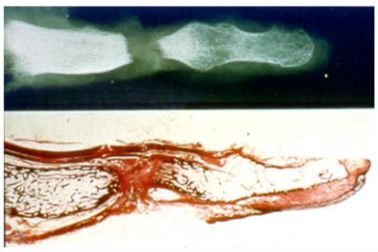
"Osteoarthritis"

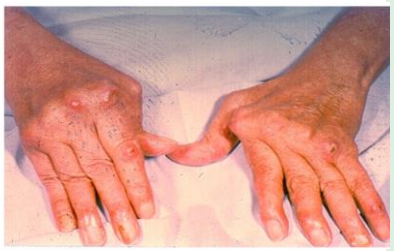
An obese 56-year-old woman presented with bilateral localized pain to her knees, hands and difficulty in walking .

Gross	*LPF (Low Power)*
	
1) Progressive erosion of articular cartilage. 2) eburnated articular surface. 3) Subchondral cyst. 4) residual articular cartilage.	1) Mushroom-shaped osteophyte (bony outgrowths) develop at the margins of the articular surface and are capped by fibrocartilage and hyaline cartilage that gradually ossify . 2) Absence of inflammation

Case 4

"Rheumatoid arthritis"



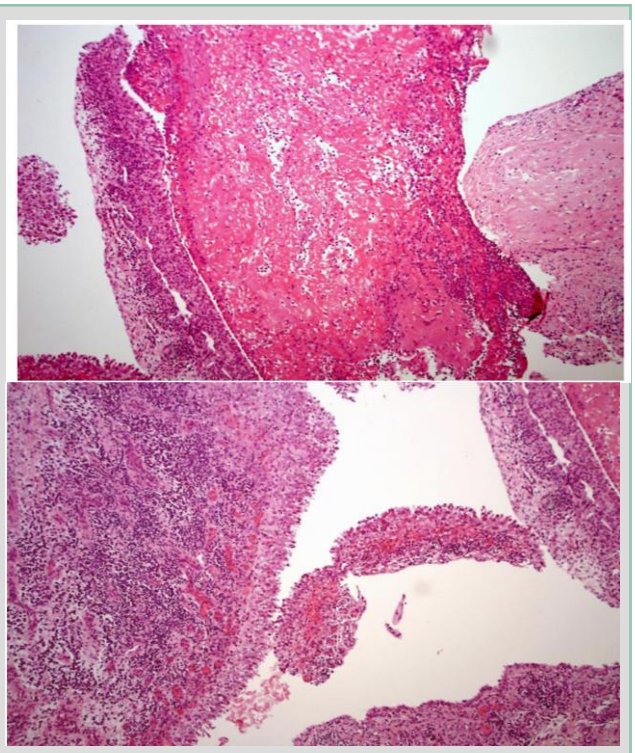


affecting the head of the femur ,The synovium becomes edematous, thickened and hyperplastic and transforming its smooth contour to one covered by delicate and bulbous fronds .

A 45 -year- old woman complains of low grade fever , malaise and stiffness in her joints each morning .

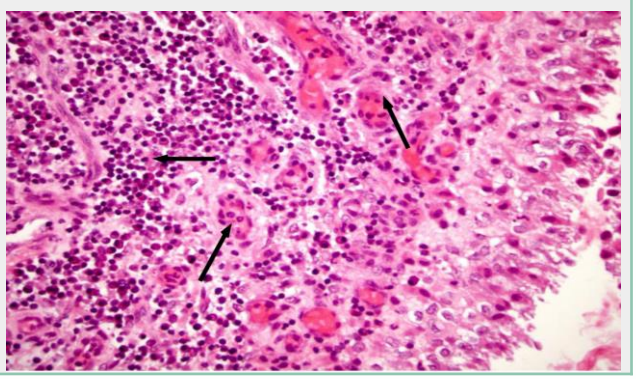
Hyperplastic Synovium-LPF :-

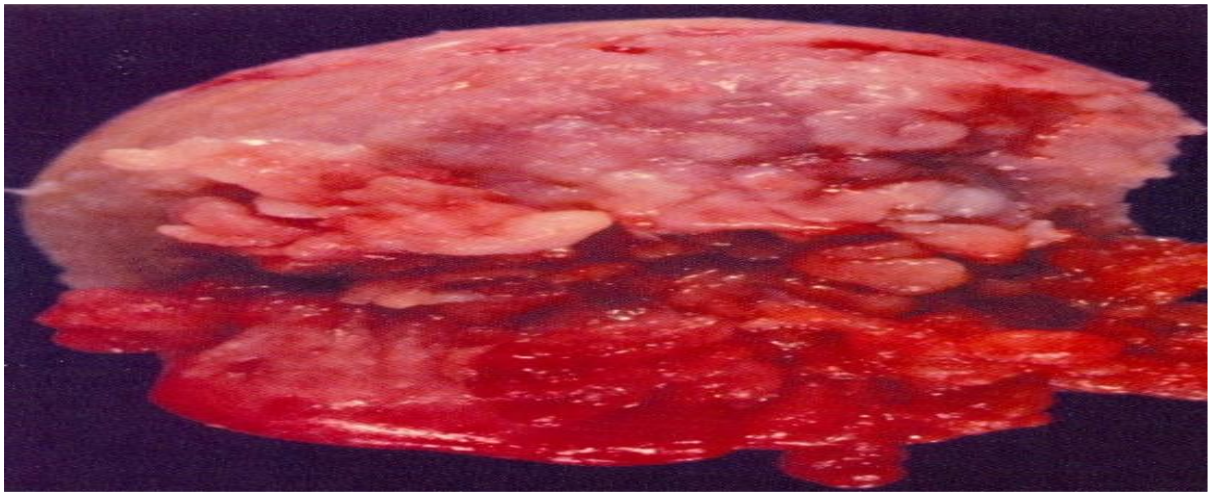
1. **Hyperplastic synovial cells**
2. **Dense Chronic inflammation consisting of lymphocytes and plasma cells**
3. **Formation of Pannus**
4. **Pannus :** Vascular granulation tissue formed in cases of rheumatoid arthritis.



Hyperplastic Synovium-HPF :-

1. **Hyperplastic synovium with underlying plasma cells and lymphocytes including many congested blood vessels**





Main Features:-

(GROSS)

1) Congested hyperplastic synovium.

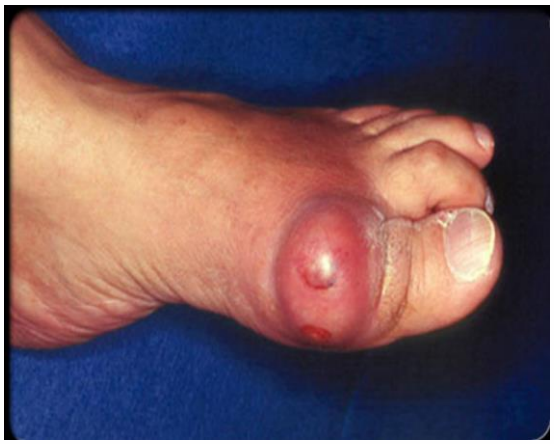
2) Eroded bone and cartilage.

Serological Tests for the diagnosis of RA :-

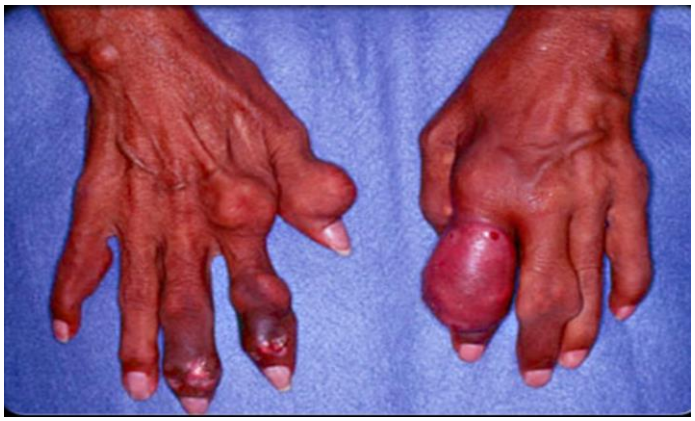
1. Rheumatoid factor (RF). (IgM Antibody Against Fc Portion of IgM)
2. Anti-CCP Ab in serum(antibodies directed against cyclic citrullinated peptides).
3. C-Reactive protein (CRP) and ESR (Non specific).

GOUT

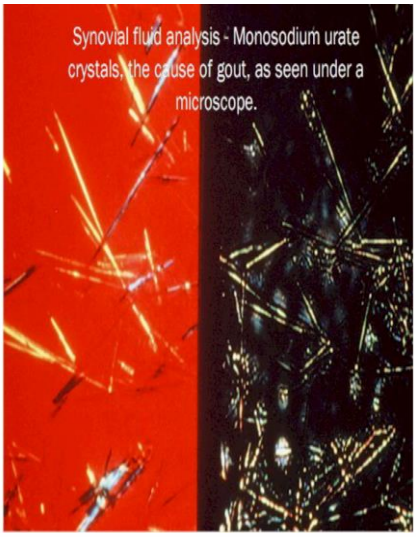
Gout is a syndrome caused by the inflammatory response to tissue deposition of monosodium urate crystals (MSU).

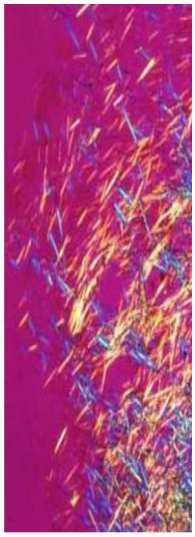


Acute Gouty Arthiritis on the Big Toe



Severe gout in the fingers resulting in large, hard deposits of crystals of uric acid. These deposits are called Tophi





Polarized microscopy (left)

1.Needle-shaped urate crystals.

2.Acutely inflamed joint.

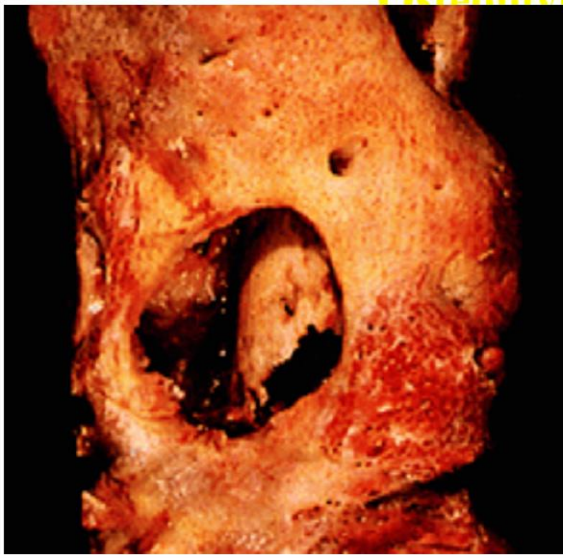
Unpolarized microscopy (right)

Case 5

Osteomyelitis"

Bacterial most of time , Caused by:-

1. **Staphylococcus aureus**
2. Salmonella (Sickle cell)
3. TB (in Spine first)
4. Syphillis (Periosteum)

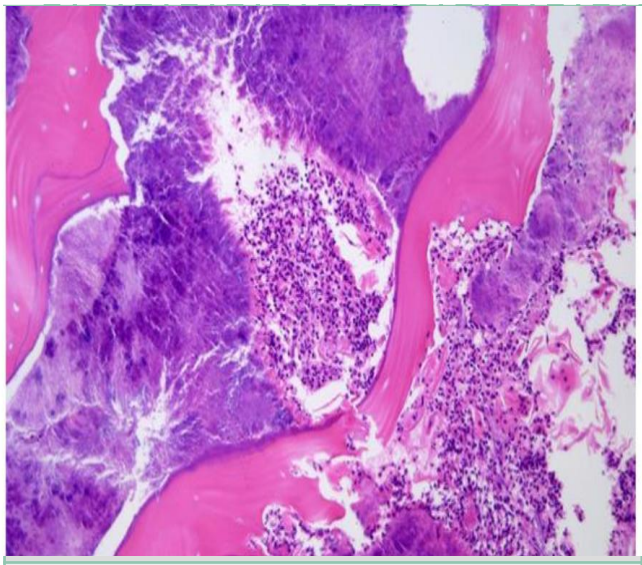


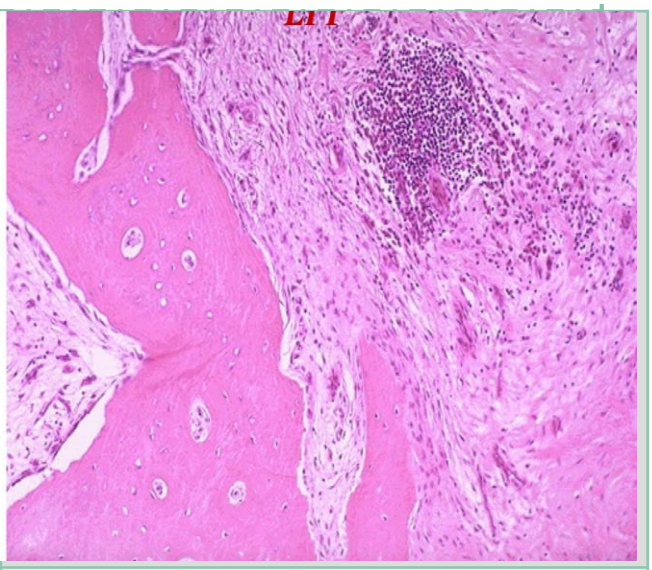
Resected femur in a patient with draining osteomyelitis.

The drainage tract in the subosteal shell of viable new bone (involucrum) reveals the inner native necrotic cortex (sequestrum)

A 22- year- old male presented with localized pain above his right knee joint with recurrent fever. Later, he had a <u>discharging sinuses</u> from the skin overlying the right knee.

- *What is the most likely diagnosis ? → Osteomyelitis ☺*





Acute Osteomyelitis

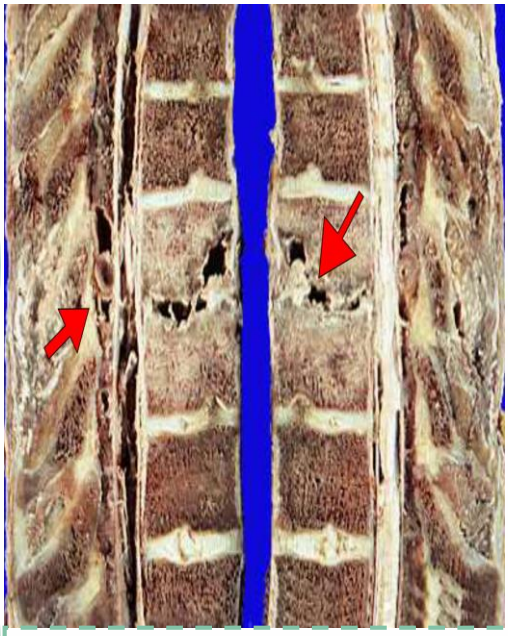
Bony Sequestrae are surrounded by colonies of bacteria AS WELL as purulent infiltrate

Chronic Osteomyelitis

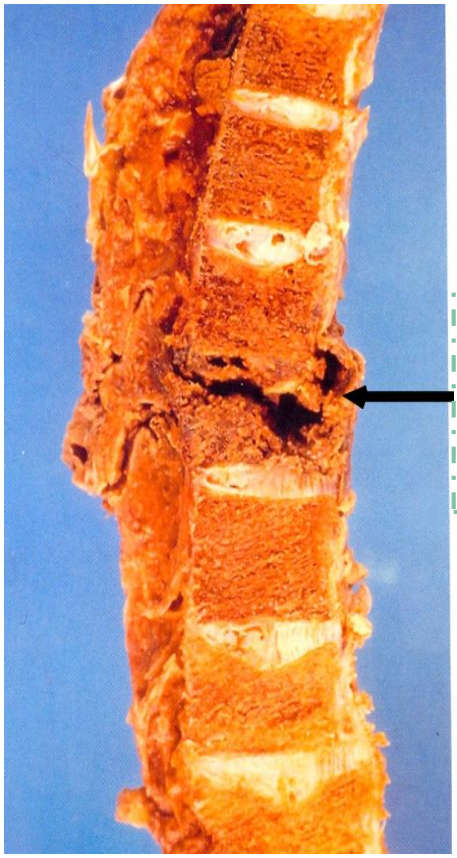
- Fibrosis of the marrow space accompanied by chronic inflammatory cells
- Bone destruction with remodeling

Case 6

"Spinal TB - Pott's disease (Tuberculous Osteomyelitis)"



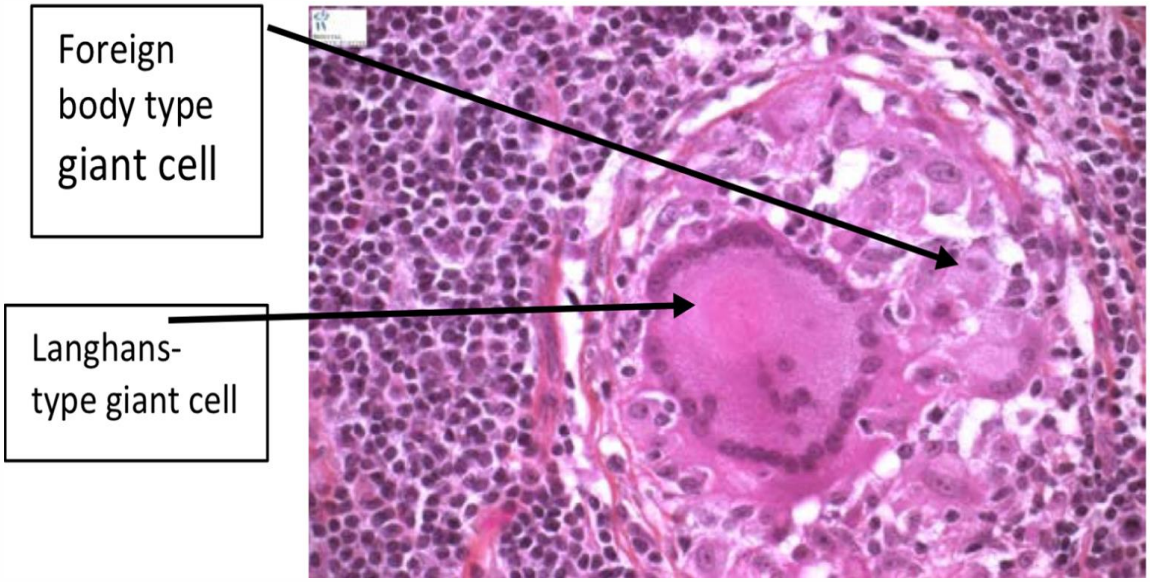
Gross pathology of T.B osteomyelitis of the vertebral spine (pott's disease)



Granulomatous necrosis of vertebral column

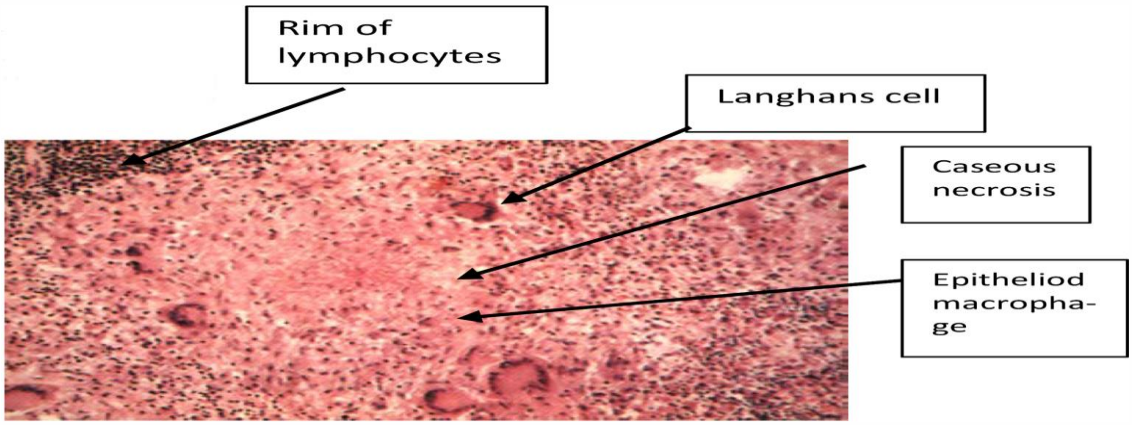
A 30 -year-old debilitated man presented to the orthopedic clinic with back pain, low grade fever, marked elevation of sedimentation rate and recent kyphosis and scoliosis .

The patient has a history of coughing up blood, fever, chills, night sweats, weight loss, pallor, and often a tendency to fatigue very easily.



Bone section shows :-

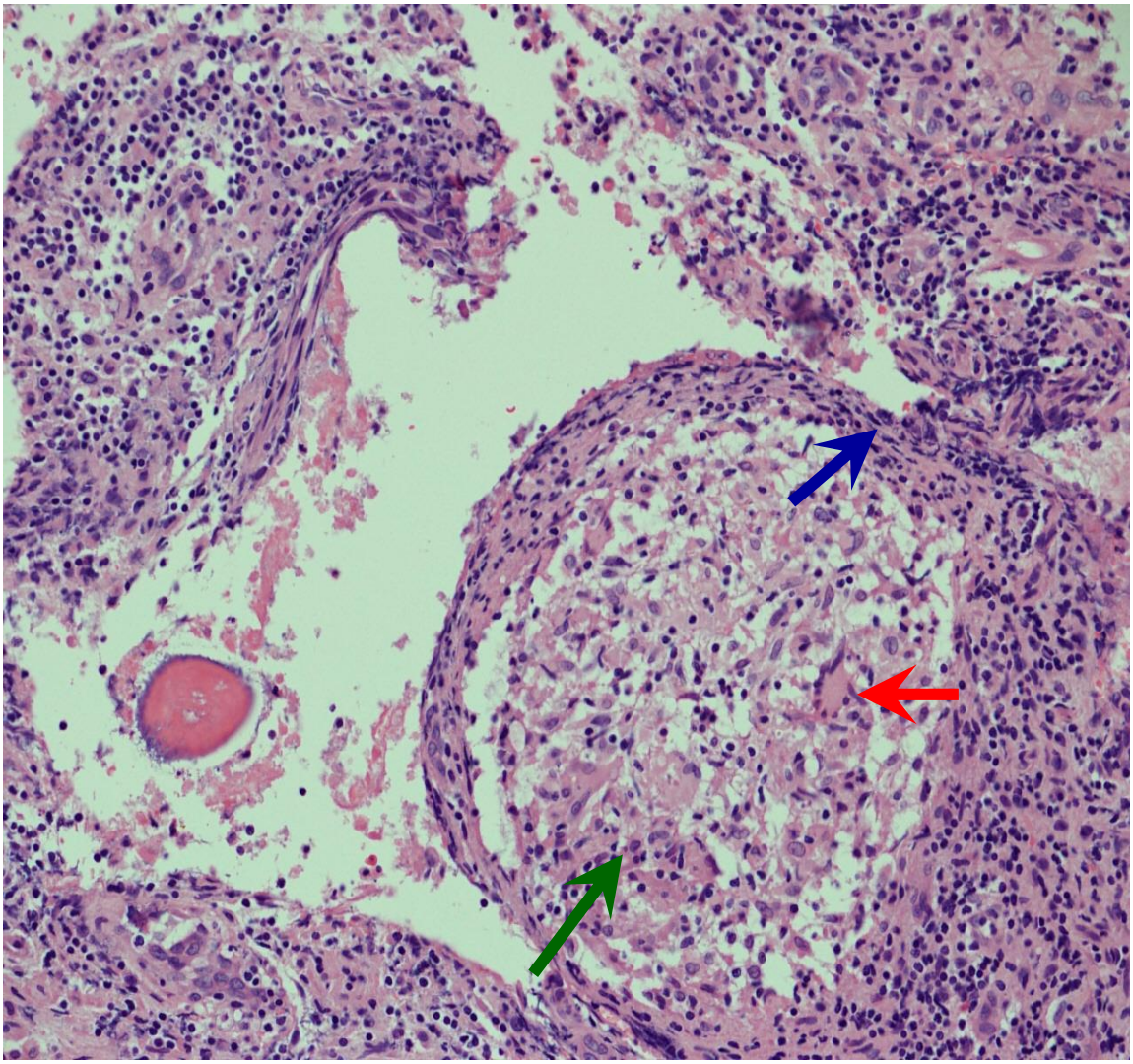
- **Epithelioid cells fuse to form giant cells** , containing 20 or more nuclei. The nuclei arranged either peripherally (**Langhans-type giant cell**) or haphazardly(**foreign body-type giant cell)**. These giant cells can be found either at periphery or the center of granuloma



Section of bone shows granuloma formation with epithelioid like cells ,
langhans-type giant cells and rim of lymphocytes

TB can sometime go to the Synovium

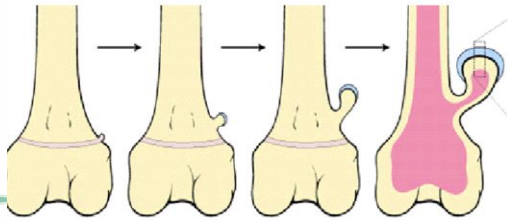
Synovium – Tuberculous arthiritis



Blue Lymphocytes.
Green : Epithelioid histiocyte.
Red : Giant cell.

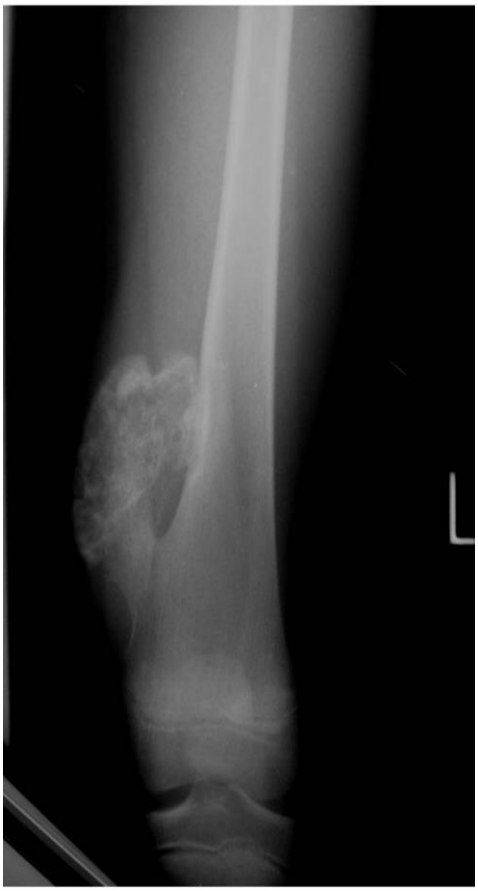
Case 7

"Osteochondroma exostosis"

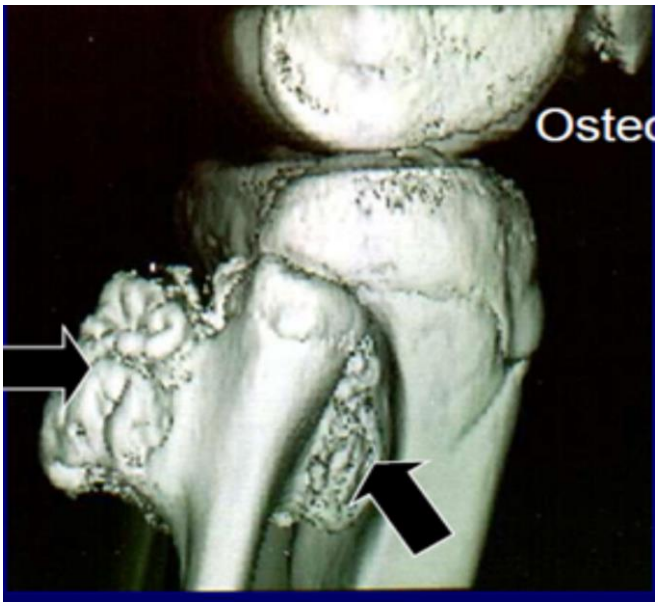


- **The solitary osteochondroma is the most common benign bone tumors**
- **Seen in patients aged from 10-30 years**
- **Arise during skeletal growth**
- **Equally in males and females**
- **Etiology is unknown**

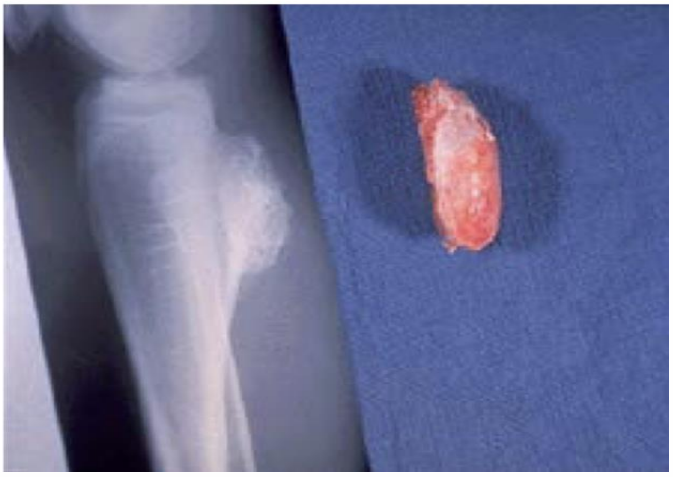
A 16 -year-old male was found to have a small swelling protruding from upper part of his leg with local pain .



Osteochondroma X-ray



MRI picture showing two osteochondromatous exostosis which are arising from ***the upper third of fibula .***

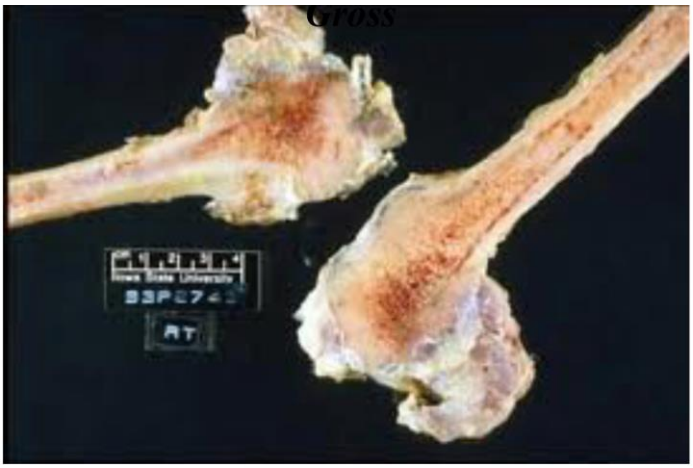


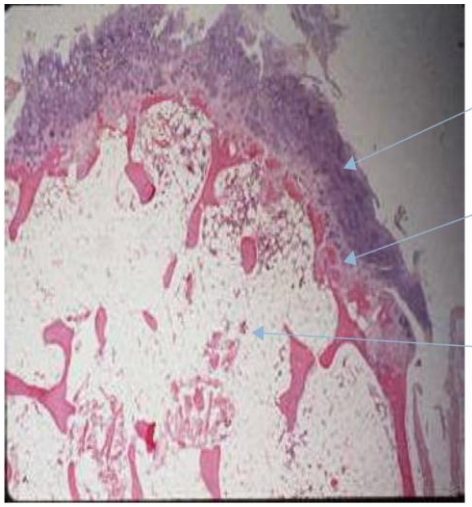
Gross & X-Ray :-

Osseocartilaginous protrusion arising from the upper tibial bone

Prognosis : Excellent prognosis

Possible complication : Chondrosarcoma may occur if these lesion are MULTIPLE



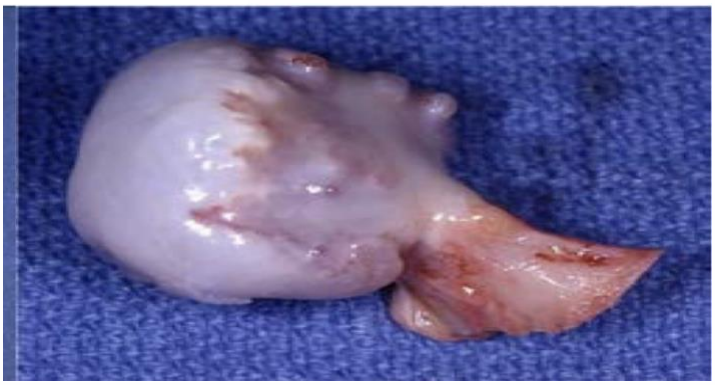


Contents :-

1. **Fibrous cap**
2. **Cartilaginous layer**
3. **Bone**

Solitary osteochondroma , GROSS specimen at resection

→ **Bone stalk and overlying membrane on cartilage cap**



Case 8

"Osteosarcoma"

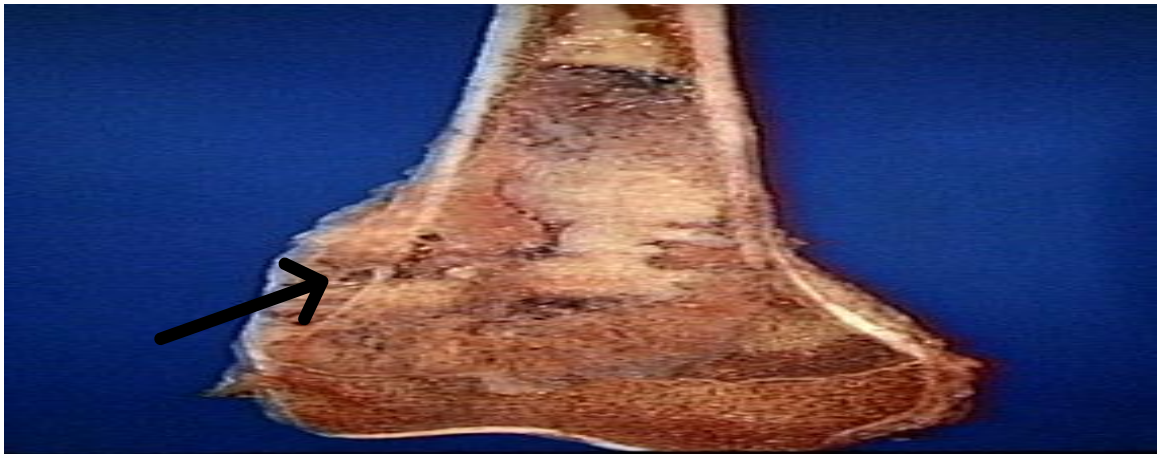
Primary malignancy :-

1. Weight bearing
2. Long bones
3. Young people
4. Osteoblast is malignant cell

GENE MUTATION (VERY IMPORTANT) :-

1. Germ line mutation in RB gene.
2. TP 53 suppressor gene mutation.

An 18-year-old female presented to the rheumatology clinic with 2 months history of pain and swelling in her upper thigh with weight loss

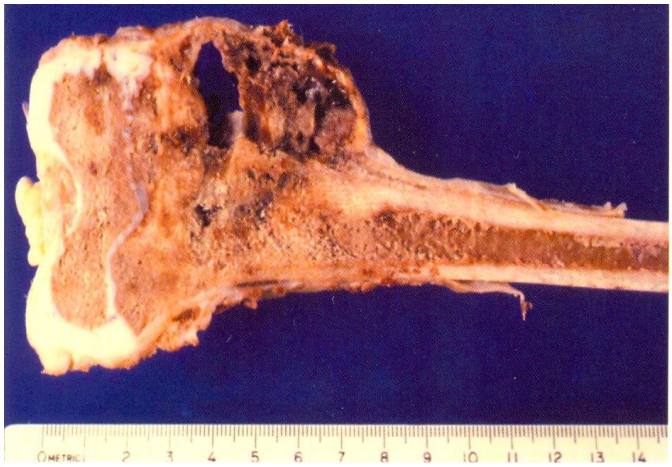


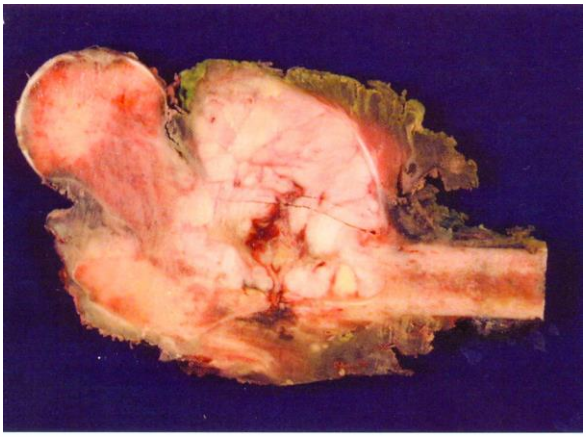
Osteosarcoma of the upper end of the tibia

- 2nd most common primary bone tumor
- Malignant tumor of mesenchymal origin

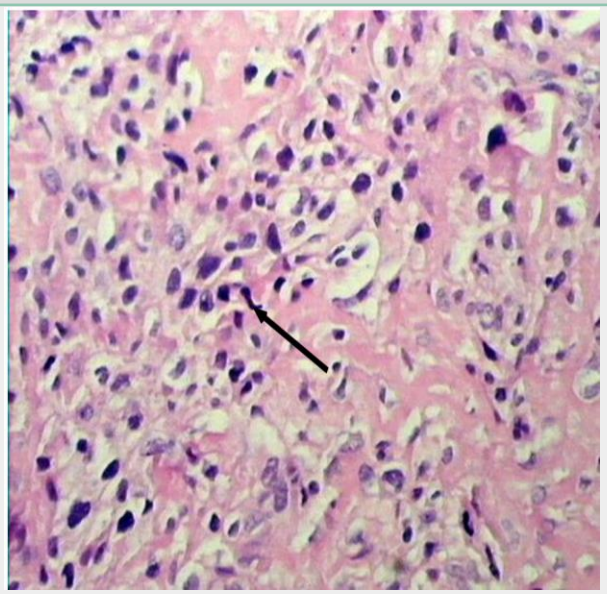
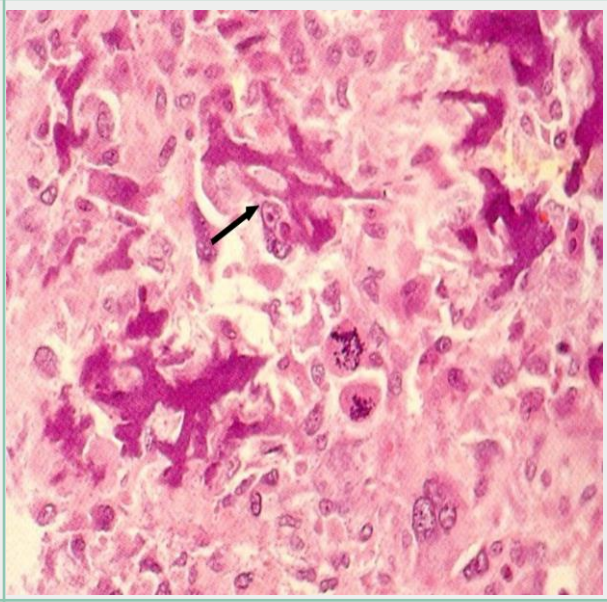
The tan-white tumor fills most of the medullary cavity of the metaphysis and proximal diaphysis. It has infiltrated through the cortex, lifted the periosteum, and formed soft tissue masses on both sides of the bone.

Conventional Osteosarcoma - Gross



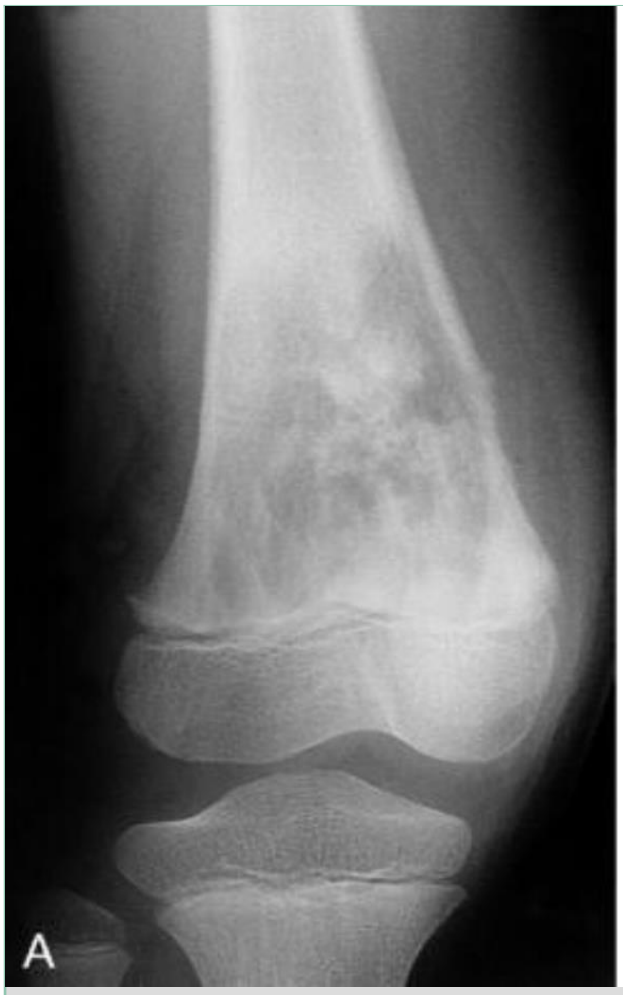


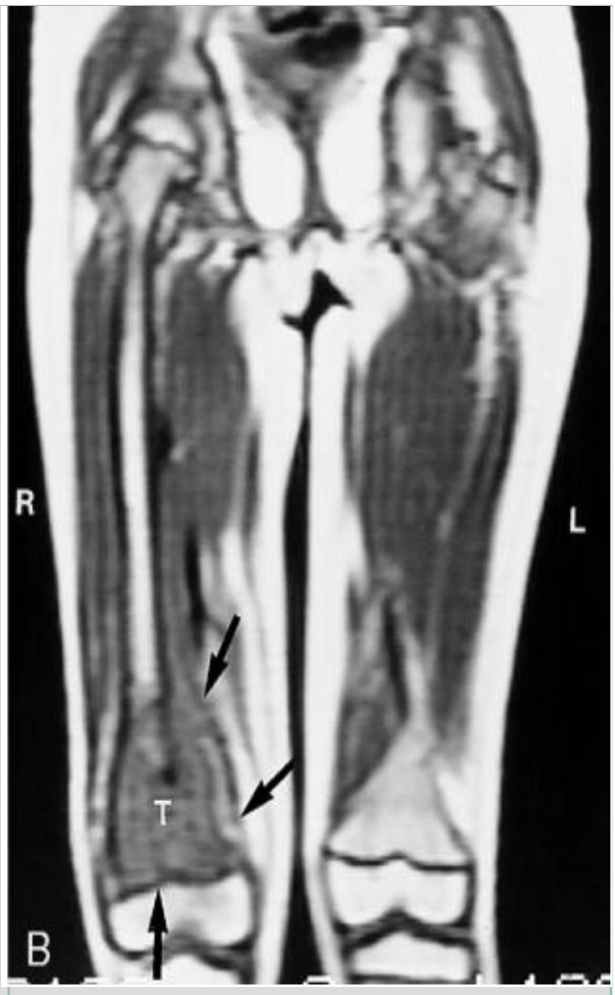
Mixture of **OSTEOID** , fibrous , cartilaginous , necrotic , hemorrhagic CYSTIC areas

Osteosarcoma - LPF	Osteosarcoma - HPF
	
Spindle shaped cells ***producing osteoid***	1. **Malignant OSTEOID producing spindle cells and giant cells** 2. Abnormal mitoses 3. Pleomorphic cells

Read this JUST in case

Central Osteosarcoma





- Destructive lesion is seen in the metaphysis on this anteroposterior view of the knee in a young teenager with pain.

- Magnetic resonance scan of both legs shows soft tissue extent of the tumor (arrows).

Few important Notes :-

1) When writing a characteristic or diagnosis , make sure to write Everything !

2) Avoid using Shortcuts , unless the answer is in shortcut

3) Remember to mention the location of lesion/tumor/infected area.

Good Luck ! ☺