



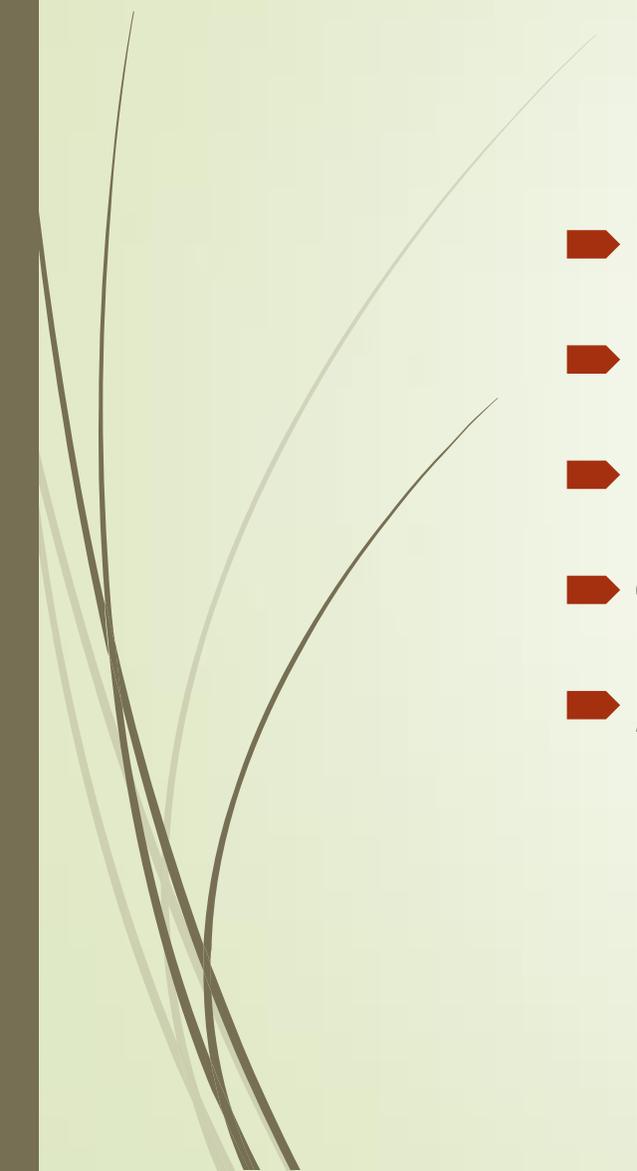
Joint imaging

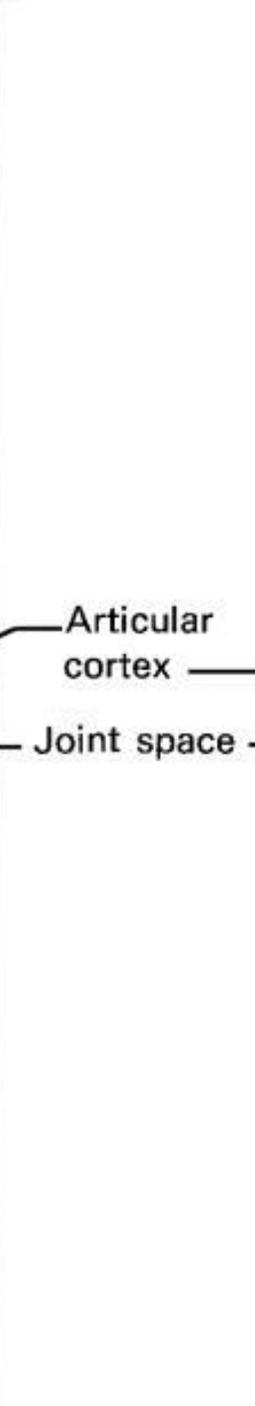
By

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Aims of our lecture:

- Radiological signs of joint disease
 - Diagnosis of arthritis
 - Different types of arthritis
 - Other joint pathology
 - MRI of knee and shoulder
- 



Articular
cortex

Joint space





Plain film signs of joint disease

- ❖ **Joint space narrowing**: due to destruction of articular cartilage. It occurs in practically all forms of joint disease, except avascular necrosis.
- ❖ **Soft tissue swelling**: a feature of inflammatory, and particularly infective arthritis. Also can be seen in gouty tophi.
- ❖ **Osteoporosis**: painful conditions and underuse of the bones. E.g. rheumatoid and tuberculous arthritis.



❖ **Articular erosions:** destruction of the articular cortex and the adjacent trabecular bone

Causes:

- 1- Inflammatory overgrowth of the synovium (pannus)
 - Rheumatoid arthritis, commonest
 - Juvenile rheumatoid arthritis (Still's disease)
 - Psoriasis
 - Reiter's disease
 - Ankylosing spondylitis
 - Tuberculosis.
- 2- Deposition of urate crystals in gout.
- 3- Infection: pyogenic arthritis and tuberculosis.
- 4- Repeated hemorrhage in hemophilia
- 5- Neoplastic, e.g. synovial sarcoma.



❖ **Osteophytes, subchondral sclerosis and cysts:**

Features of osteoarthritis. A characteristic increase in the density of subchondral bone is seen in avascular necrosis

❖ **Alteration in the shape of the joint:** slipped epiphysis, developmental dysplasia of the hip, osteochondritis dissecans and avascular necrosis in its later stages.



Joint erosion





Diagnosis of arthritis

- 1. Whether one or more than one joint involved?** e.g. rheumatoid arthritis, infections and synovial tumours.
- 2. Which joints are involved?**
 - Rheumatoid arthritis
 - Psoriatic arthritis
 - Gout characteristically
 - Osteoarthritis
 - Neuropathic arthritis
- 3. Is a known disease present?** e.g. haemophilia or diabetes.

Rheumatoid arthritis

- ❖ A polyarthritis caused by inflammatory overgrowth of synovium known as **pannus**.
- ❖ The earliest change is **periarticular soft tissue swelling** and **osteoporosis**.
- ❖ **Joint space narrowing**.
- ❖ Initially small bony **erosions**, at the joint margins. Later, extensive erosions
- ❖ Metatarso- or metacarpophalangeal joints, proximal interphalangeal joints and on the styloid process of the ulna.
- ❖ Advance changes: **Ulnar deviation**. **Arthritis mutilans**.



Rheumatoid arthritis

- ❖ With severe disease, there may be subluxation at the atlantoaxial joint, possibility of neurological symptoms from compression of the spinal cord by the odontoid process
- ❖ A widespread erosive arthropathy is almost diagnostic of rheumatoid arthritis.

Rheumatoid arthritis



Osteoarthritis

- ❖ commonest form of arthritis.
- ❖ The hip and the knee are frequently involved, the ankle elbow are infrequently affected.
- ❖ The wrist, joints of the hand and the metatarsophalangeal joint of the big toe are also frequently involved.
- ❖ Radiological features:
 - ❑ Joint space narrowing.
 - ❑ Osteophytes
 - ❑ Subchondral sclerosis
 - ❑ Subchondral cysts
 - ❑ Loose bodies

Osteoarthritis



Comparison of osteoarthritis and rheumatoid arthritis

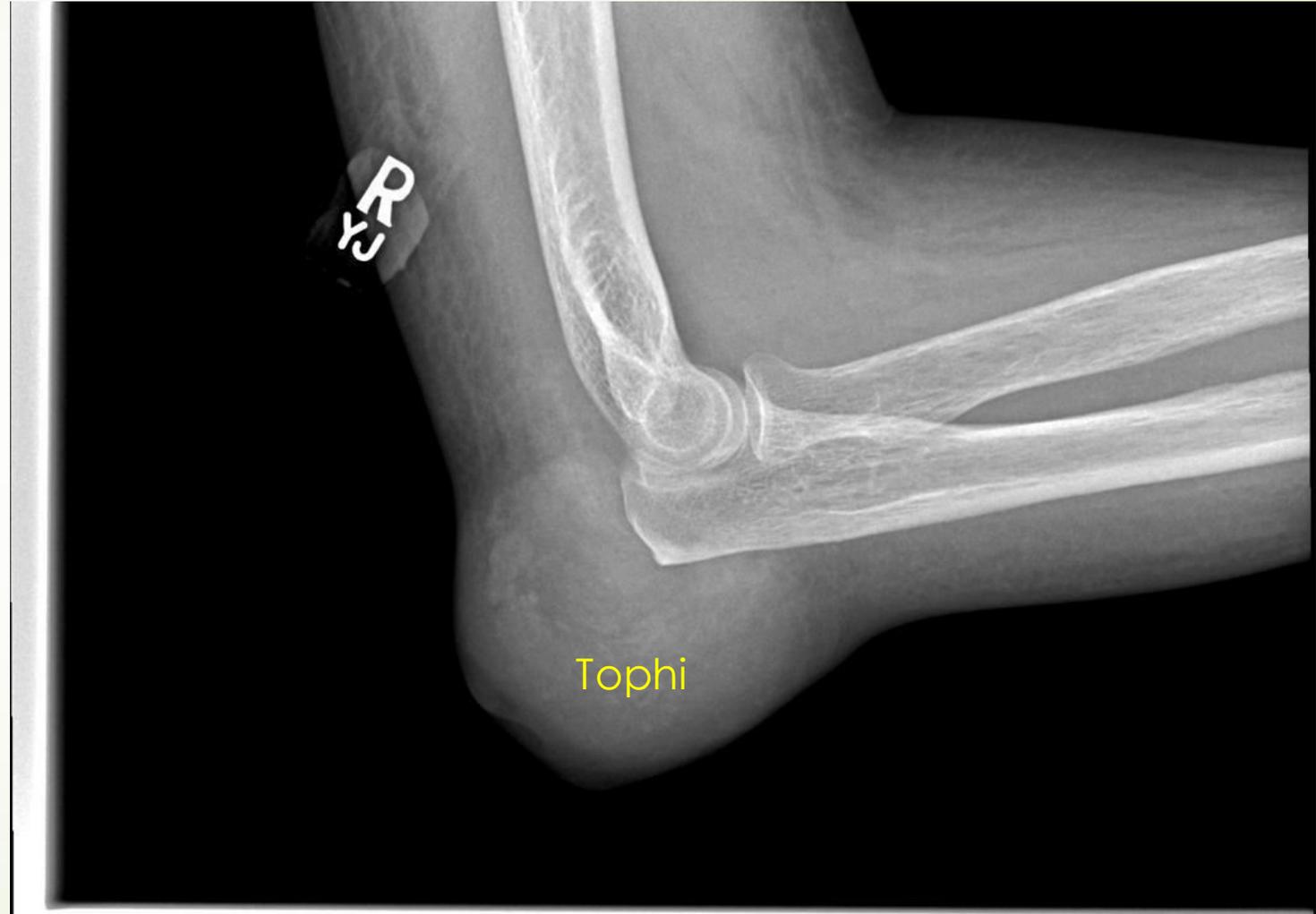
Radiological feature	Osteoarthritis	Rheumatoid arthritis
Joint space narrowing	Maximal at weight-bearing site	Uniform
Erosions	Not occur	Is a characteristic feature
Subchondral sclerosis and cysts	Seen	Not a feature
Sclerosis	Prominent feature	Not a feature
Osteoporosis	Not occur	Often present
Joint involved	Knee, hip Metacarpophalangeal Distal interphalangeal	Metacarpophalangeal Proximal interphalangeal



Gouty Arthritis

- ❖ Most commonly affects the metatarsophalangeal joint of the big toe.
- ❖ The earliest change is soft tissue swelling
- ❖ Erosions have a well-defined, often sclerotic overhanging edge
- ❖ Usually no osteoporosis
- ❖ Localized soft tissue lumps, known as tophi, may occur in the periarticular and occasionally show calcification.

Gouty Arthritis



Joint Infection

- ❖ Pyogenic bacterial infection or tuberculosis
- ❖ In pyogenic arthritis, *Staphylococcus aureus*, there is rapid destruction of the articular cartilage & subchondral bone and a soft tissue swelling. A joint effusion is the earliest finding
- ❖ TB arthritis, The hip and knee are the most commonly affected. Joint space narrowing and erosions, articular cortex destruction, and striking osteoporosis,



pyogenic arthritis



TB arthritis

Neuropathic joint (Charcot joint)

6 Ds of Charcot joint:

- Increased Density (subchondral sclerosis)
- Destruction
- Debris (intra-articular loose bodies)
- Dislocation
- Distention
- Disorganisation



Charcot joint

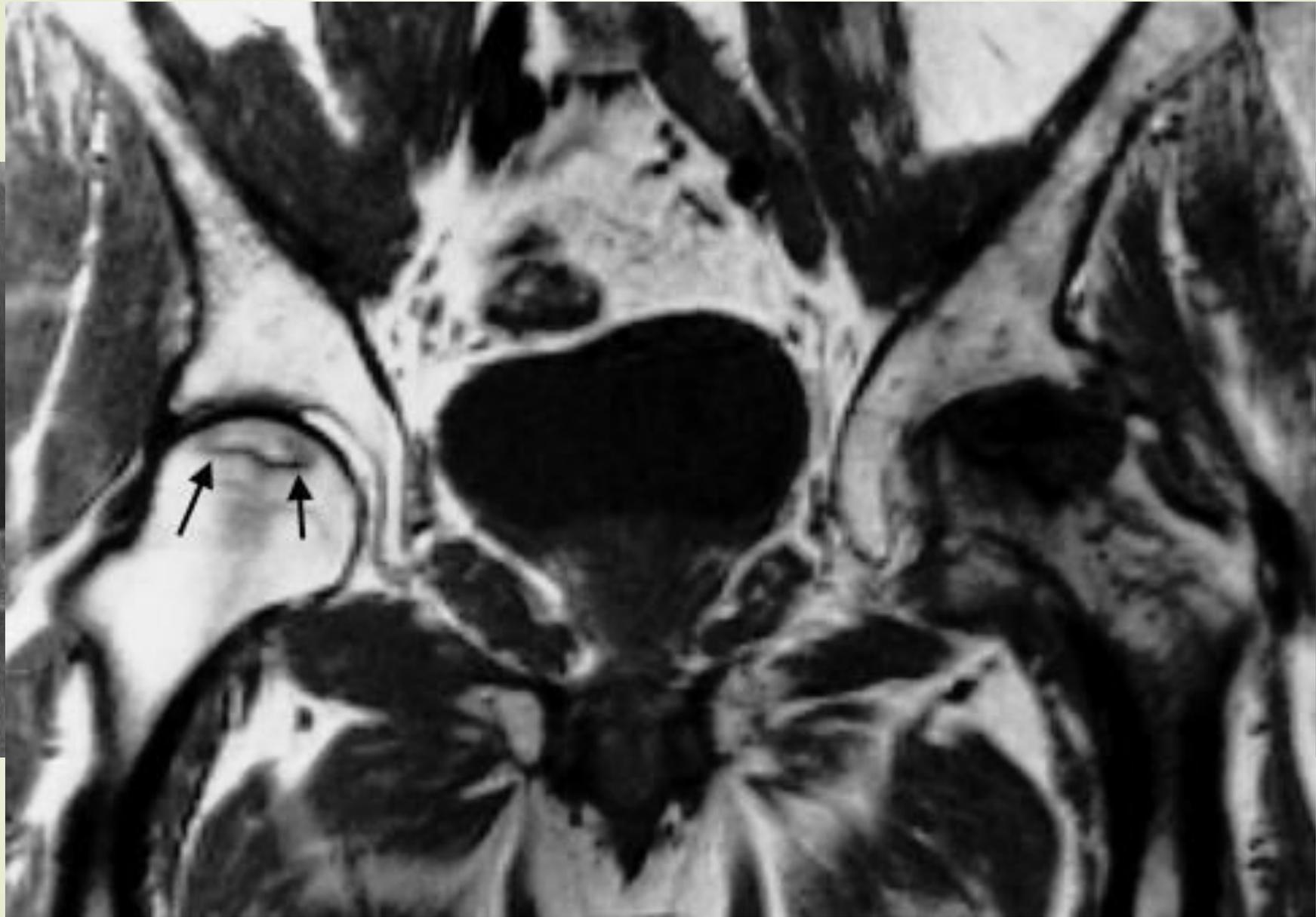
Avascular (aseptic) necrosis

❖ Causes:

- steroid therapy
- Collagen vascular diseases
- Radiation therapy
- Sickle cell anemia
- Exposure to high pressure environments
- Fractures.

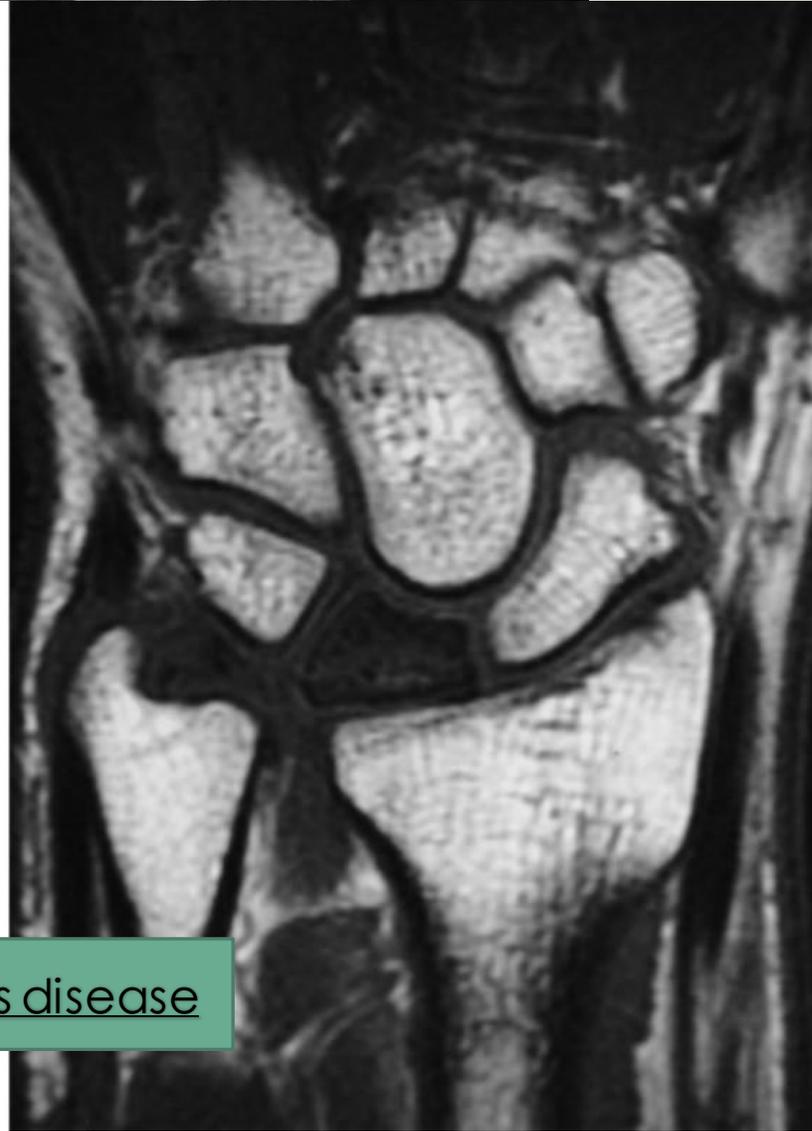
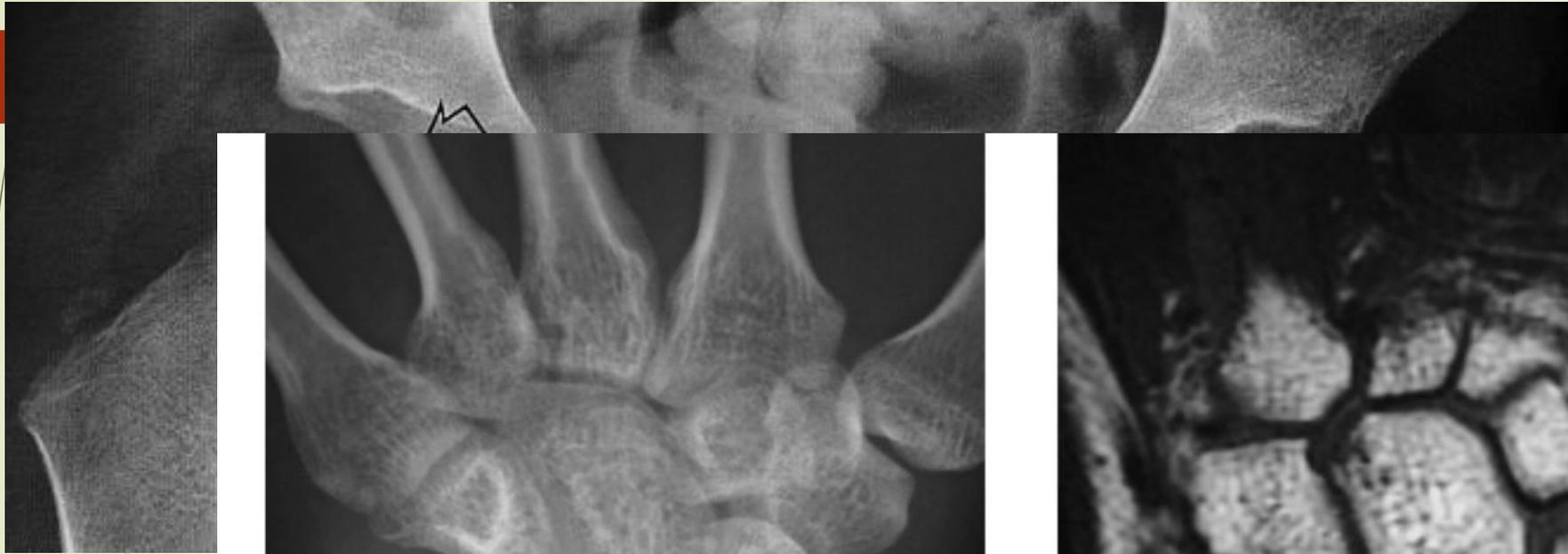
❖ The radiographic features:

- Increased density of the subchondral bone with irregularity of the articular contour or fragmentation of the bone
- A characteristic crescentic lucent line just beneath the articular cortex.
- The cartilage space is preserved until secondary degenerative changes supervene.



Osteochondritis

- ❖ Avascular necrosis, but with unknown cause
 - Perthe's disease: femora head
 - Freiberg's disease: metatarsal heads
 - Kohler's disease: navicular bone of the foot
 - Osgood–Schlatter's disease: tibial tuberosity
 - Kienböck's disease: lunate bone in the wrist



Kienböck's disease

A

B



Developmental dysplasia of the hip (DDH)

- ❖ Ultrasound at early infancy
- ❖ X ray later in life
- ❖ The features: lateral and upper displacement of the head of the femur. Increased slope to the acetabular roof

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Thank you