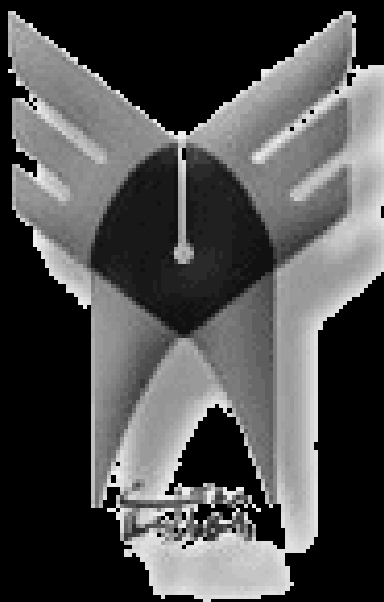


IN THE NAME OF GOD

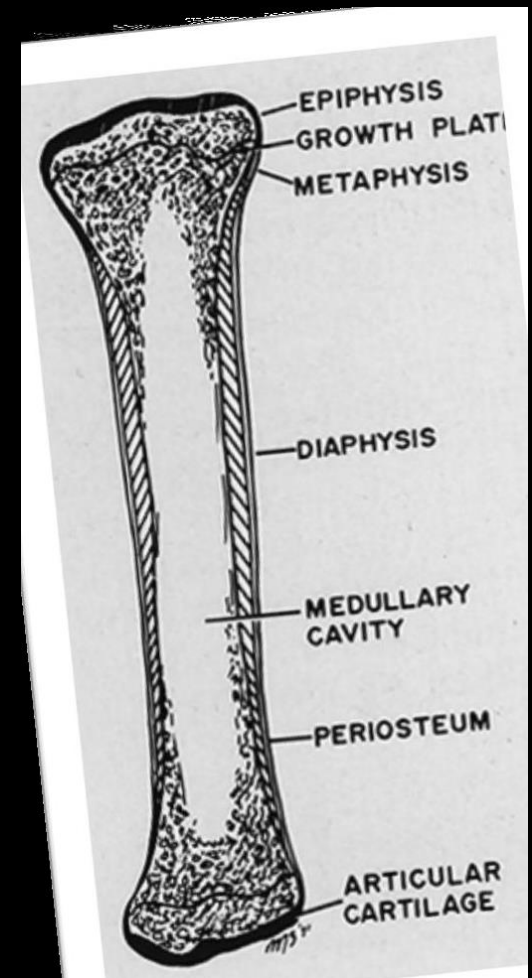


Veterinary Faculty
Karadj Branch
Islamic Azad University

Dr.AmirAli Raissi
Veterinary Radiologist

Veterinary Radiology

Bone

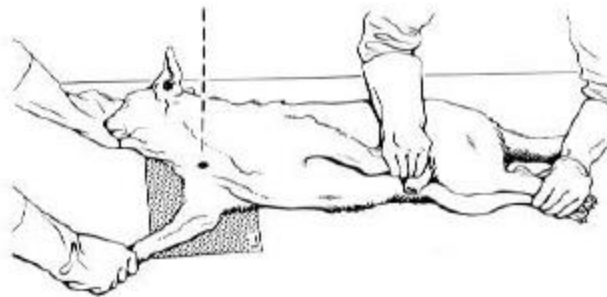


حالت گماری اندام قدامی

- Scapula
- Shoulder joint
- Humerus
- Elbow Joint
- Radius & Ulna
- Carpal joint
- Metacarpus
- Digits

حالت گماری اندام قدامی

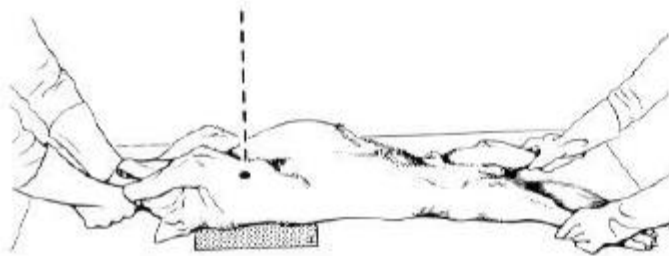
- Scapula
- Shoulder joint



Lateral

حالت گماری اندام قدامی

- Scapula
- Shoulder joint

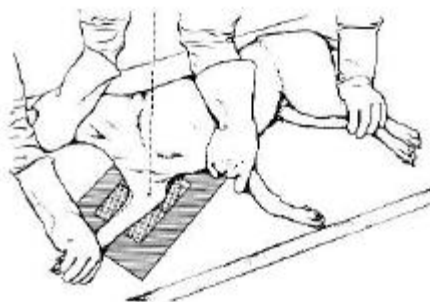


Caudo-Cranial



حالت گماری اندام قدامی

- Humerus
- Elbow Joint
- Radius & Ulna

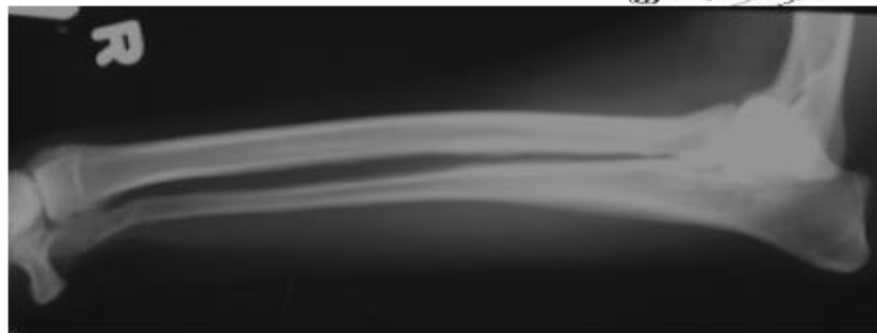


Lateral



حالت گماری اندام قدامی

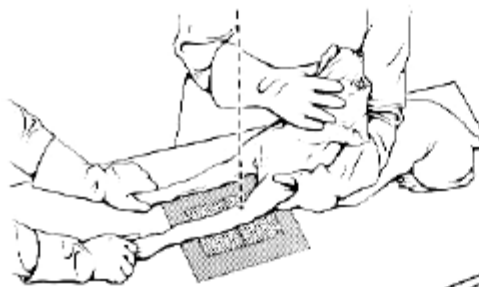
- Humerus
- Elbow Joint
- Radius & Ulna



Lateral

حالت گماری اندام قدامی

- Humerus
- Elbow Joint
- Radius & Ulna

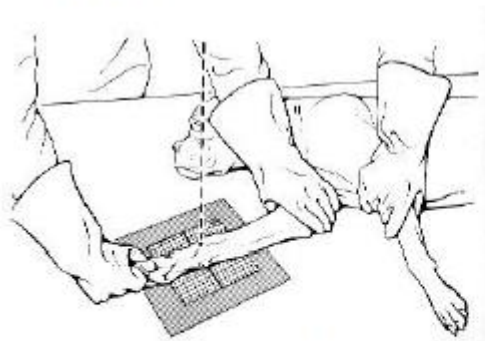


Cranio-Caudal



حالت گماری اندام قدامی

- Carpal joint
- Metacarpus
- Digits

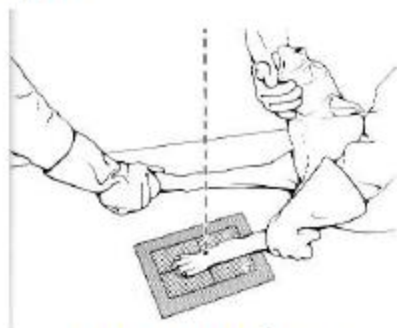


Lateral



حالت گماری اندام قدامی

- Carpal joint
- Metacarpus
- Digits



Dorso-Palmar



حالت گماری اندام قدامی

- Carpal joint
- Metacarpus
- Digits

Dorso-Palmar



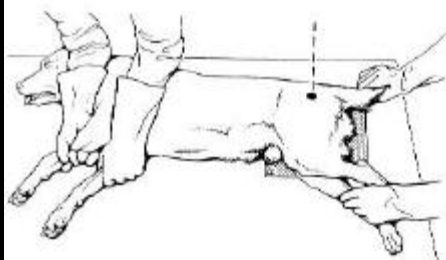
Lateral

حالت گماری اندام خلفی

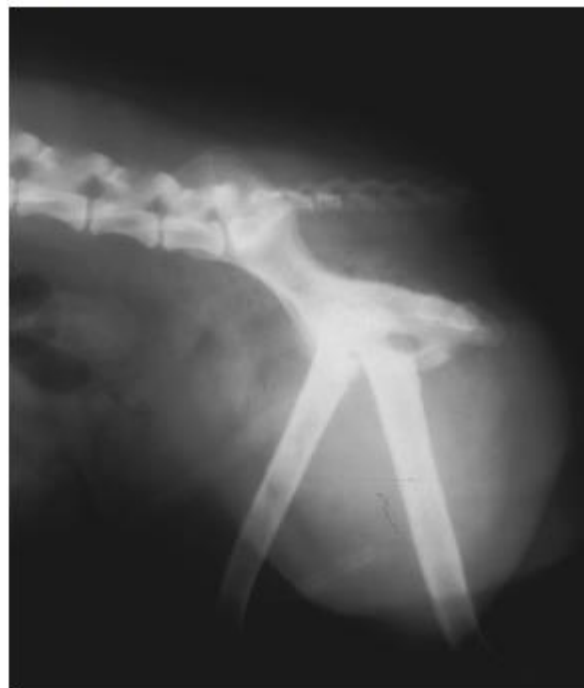
- Pelvic bones
- Hip joint
- Femur
- Stifle joint
- Tibia & Fibula
- Tarsal joint
- Metatarsus
- Digits

حالت گماری اندام خلفی

- Pelvic bones
- Hip joint

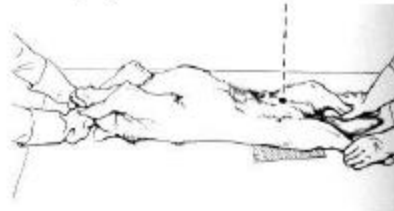


Lateral

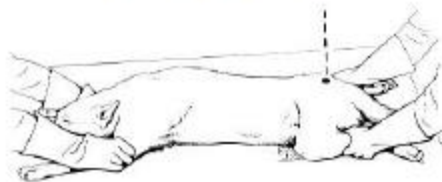


حالت گماری اندام خلفی

- Pelvic bones
- Hip joint



Ventro-Dorsal



Dorso-Ventral

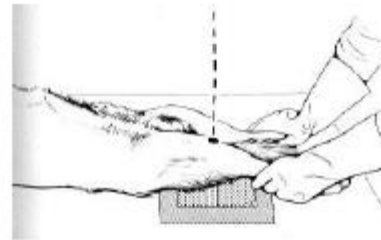


حالت گماری اندام خلفی

- Femur
- Stifle joint
- Tibia & Fibula



Cd-Cr

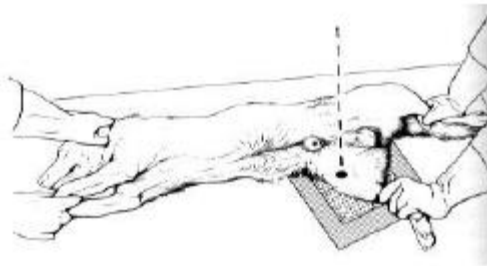


Cr-Cd

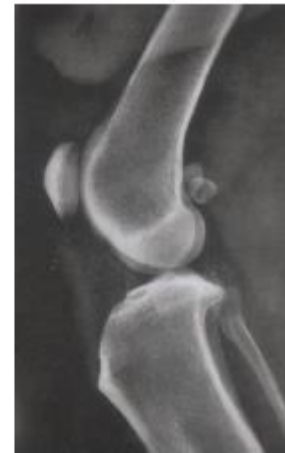
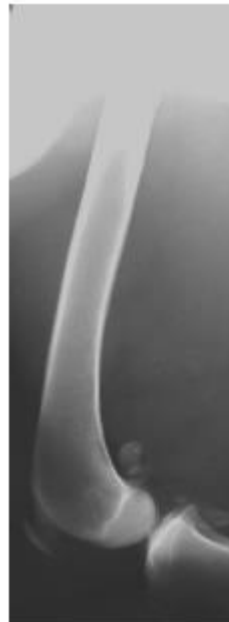


حالت گماری اندام خلفی

- Femur
- Stifle joint
- Tibia & Fibula



Lateral



حالت گماری اندام خلفی

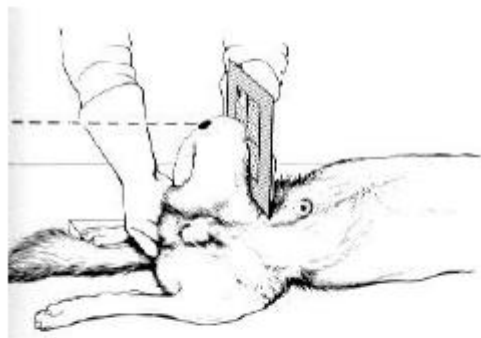
- Femur
- Stifle joint
- Tibia & Fibula

Cranio-Caudal



حالت گماری اندام خلفی

- Stifle joint

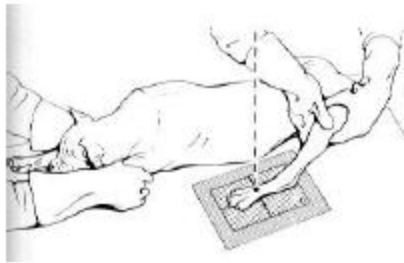


**Tangential view
(Sky-line view)**



حالت گماری اندام خلفی

- Tarsal joint
- Metatarsus
- Digits

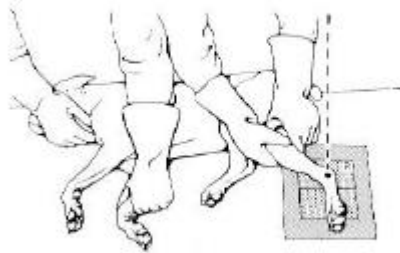


Dorso-Plantar



حالت گماری اندام خلفی

- Tarsal joint
- Metatarsus
- Digits



Lateral



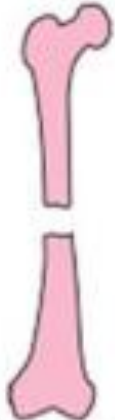
Fractures

- *Complete or Incomplete*
 - *greenstick fracture (convex)*
 - *Torus (concave)*
 - *fissure, or hairline*
- *Closed or Open*
 - *air shadows in open*
- *Simple, Comminuted, multiple (segmental)*
 - *Butterfly (wedge-shaped)*
- *Transverse, Oblique, or Spiral*
- *Avulsion or Chip*
- *impacted (Compression) or Overriding*
- *Pathologic or Stress*
- *Diaphyseal or Epiphyseal*
 - *Slip (separation)*
 - *Salter-harris (with fracture)*

Fractures



Normal



Transverse



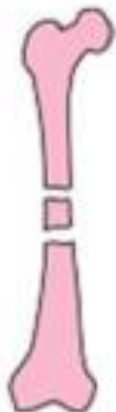
Oblique



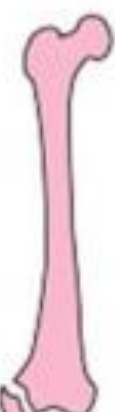
Spiral



Comminuted



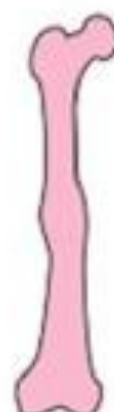
Segmental



Avulsed



Impacted



Torus



Greenstick

Complete - incomplete



Open & Closed fracture



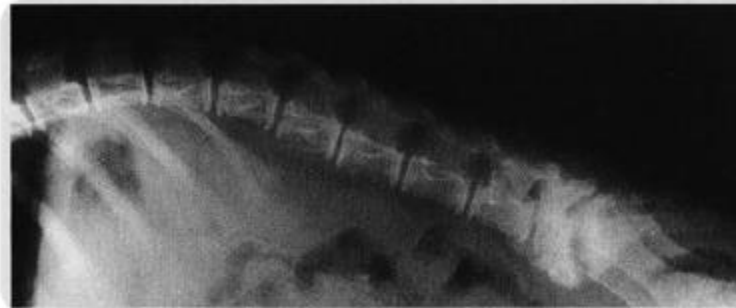
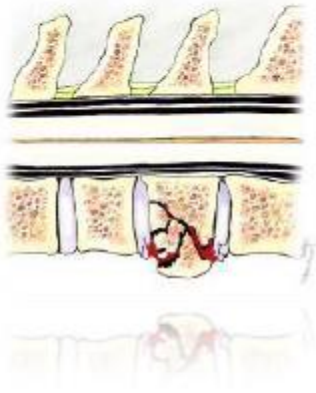
Multiple fracture



Comminuted fractures



Compression fractures



Depressed fractures



Impacted fractures



Spiral fractures



SPIRAL FRACTURE
THROUGH MID-CHAFT
OF LEFT FEMUR



Greenstick fractures



- FISSURE #

“In this a crack appears in the bone”



- OBLIQUE #

“In this the fracture is diagonal to a bone's long axis”

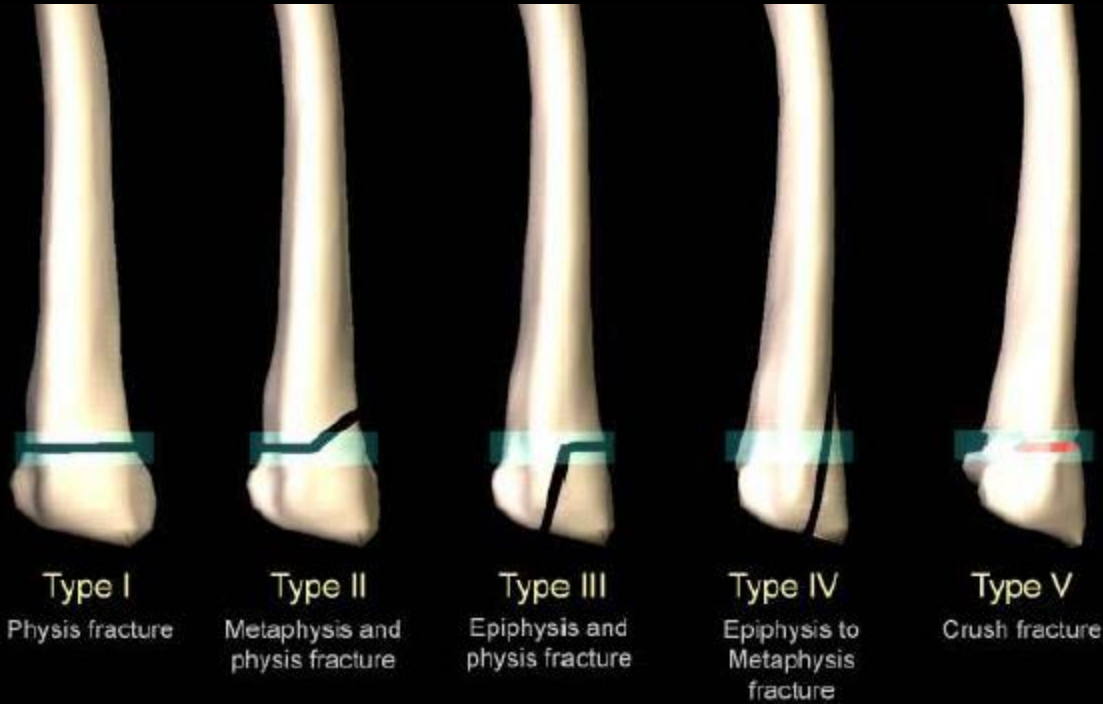


Transverse fracture



Avulsion fracture and chip fracture





Salter-Harris Epiphyseal Fracture Classification

*Physis (growth plate) is highlighted in blue. Fracture line is black or red.

شکستگی بهم ناپیوسته Non-union Fr.



• علل

- تثبیت نامناسب و حرکت
- قطعات شکستگی
- تغذیه ناکافی
- خونرسانی نامناسب
- عفونت

• علائم رادیولوژی:

- مشخص بودن خط شکستگی
- پس از چند ماه
- گرد و اسکروتیک شدن انتهای
- قطعات شکستگی

بد جوش خوردن شکستگی *Mal-union*





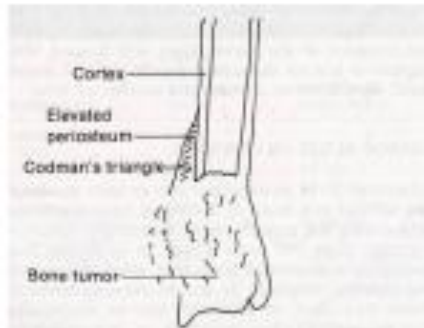
INCREASED OPACITY

- increased mineralization or the production of new bone result from:
 - disease processes
 - response to trauma
 - stress.
- *Sclerosis:*
 - *increased radiographic opacity in bone:*
 - surround areas of infection
 - in subchondral bone may be seen associated with inflammatory changes in a joint.

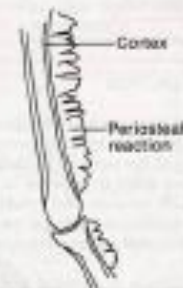
PERIOSTEAL REACTION

- If the periosteum is elevated from the underlying cortex, new bone formation occurs
- *7 to 10 days after (In young earlier)*
- periosteum react to irritation by the production of new bone:
 - indicative of the severity of the lesion
 - Earliest: vague, amorphous
 - benign process: smooth and intact
 - Aggressive: broken or interrupted pattern
- Types:
 - laminated ("onion skin"),
 - smooth,
 - palisade-like,
 - radiating ("sunburst").
 - *Codmaris triangle*
 - destructive lesions

PERIOSTEAL REACTION



The tumor elevates the periosteum, resulting in subperiosteal new bone formation — often a feature of malignancy, but also seen in some cases of osteomyelitis.



This palisade-like periosteal reaction is seen in hypertrophic osteopathy and sometimes in osteomyelitis.



A "sunburst" type of periosteal reaction is sometimes, but not always, seen associated with osteosarcoma or chondrosarcoma.



A linear (lamellar or laminated) type of periosteal reaction may be seen with callus formation, or it may result from metabolic disease or irritation of the bone from a variety of causes.

CHANGE IN SIZE OR CONTOUR

- result of disease or trauma
- particularly during the growth phase.
- Premature closure of a growth plate:
 - shorter bone.
 - misshaped neighborhood bones
- after fracture healing
- *Valgus*:
 - *angulation away from the midline*
- *Varus*:
 - *an angulation toward the midline.*



پاسخ استخوان به تحریکات

- کاهش دانسیته

– کاهش عمومی دانسیته استخوان

- Osteomalacia
- Osteoporosis

– کاهش موضعی دانسیته یا لیز استخوانی

- استئولیز با شکل مشخص (Geographic Lysis)
- استئولیز به شکل بید خورده (Moth-eaten Lysis)
- استئولیز نفوذی (Permeative Lysis)
- مخلوط (Mixed)

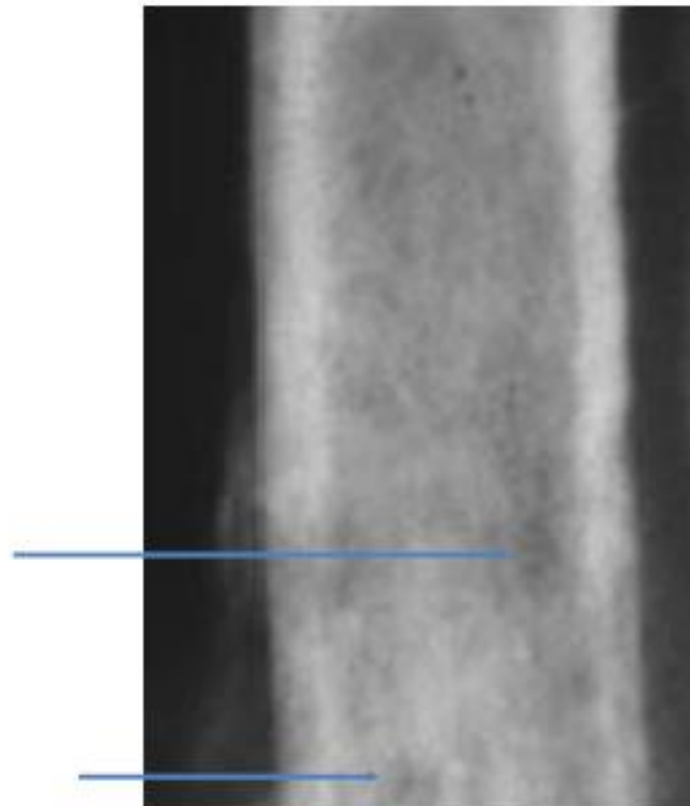
استئولیز با شکل مشخص



Geographic osteolysis



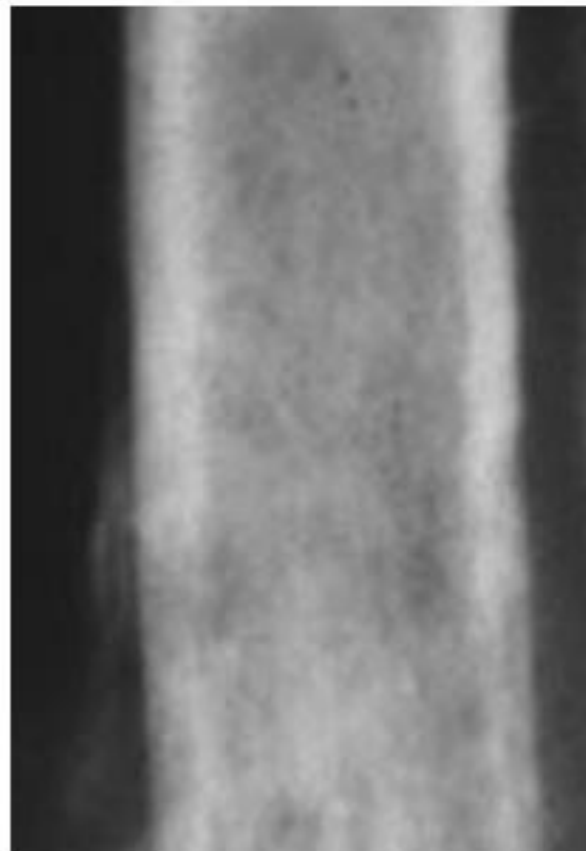
استئولیز به شکل بید خورده



استئوليز نفوذی



Permiative osteolysis



الگوی مخلوط

- More than one pattern
 - Central geographic
 - Surrounded by moth eaten
 - Marginated by permeative
- The most aggressive



استئومیلیت *Osteomyelitis*



- التهاب عفونی مغز استخوان و کورتکس
- علائم بالینی:
 - درد و لنگش
 - گرم بودن موضع
 - تورم بافت نرم
 - احتمال خروج چرک از ناحیه (در برخی موارد از استئومیلیت چرکی)

استئومیلیت *Osteomyelitis*



- علائم رادیولوژی

- استئولیز

- واکنش پریوستی و

- New Bone Formation

- تورم بافت نرم

تمایز استئومیلیت و استئوسارکوم

- استئومیلیت در هر سن و استئوسارکوم در سنین بالا
- استئومیلیت بیشتر در ناحیه دیافیز و استئوسارکوم بیشتر در ناحیه اپی فیز
- شدت پیشرفت عارضه
- Sun-burst effect در ۵۰٪ از موارد استئوسارکوم
- متاستاز به ریه در موارد استئوسارکوم (Cannon Ball)

