

1



2

## **PATHOLOGY**

- ▶ Osteogenesis Imperfecta
- ▶ Giant Cell Tumors (Osteoclastomas)
- ▶ Osteomalacia (Rickets)
- ▶ Trimalleolar Fracture
- ▶ Bimalleolar (Pott's) Fracture

3

## **Osteogenesis Imperfecta**

### **Inherited disorder of connective tissue**

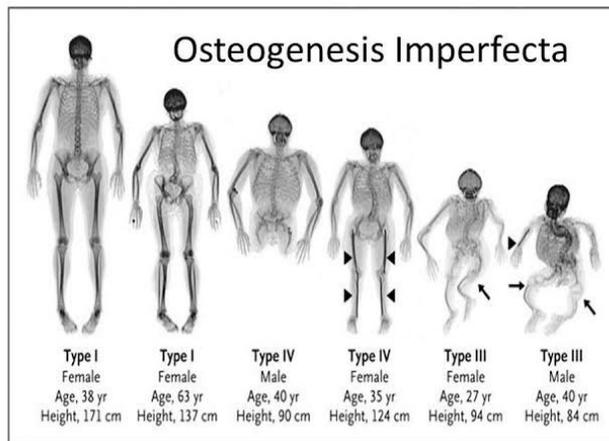
- ▶ **Causes:** Hereditary
  - ▶ defect in the gene that produces type 1 collagen, an important building block of bone.
- ▶ **Complications:**
  - ▶ repeated fractures, bone deformities, blue tint sclera, early hearing loss, skeletal structure does not support body weight; severe osteoporosis
- ▶ **Radiographic appearance:**
  - ▶ Healed fxs with exuberant callus formation
  - ▶ Wormian bones of the skull (mosaic appearance)
- ▶ **Technical considerations:**
  - ▶ Subtractive disease – decrease technique
- ▶ **Prognosis:**
  - ▶ depends on severity of the gene defect

4

## Types & Prognosis:

- ▶ **Type I**
  - ▶ Mild, is the most common form. Persons with this type can live a normal lifespan.
- ▶ **Type II**
  - ▶ Most severe form that is usually leads to death in the first year of life.
- ▶ **Type III**
  - ▶ Also severe. Individuals with this type have many fractures starting very early in life and can have severe bone deformities. Many become wheelchair bound and usually have a somewhat shortened life expectancy.
- ▶ **Type IV**
  - ▶ Moderate to severe, is like type I, although individuals with type IV often need braces or crutches to walk. Life expectancy is normal or near normal.

5



6

- ▶ Flattening of vertebral bodies , fx of ribs and long bones



7

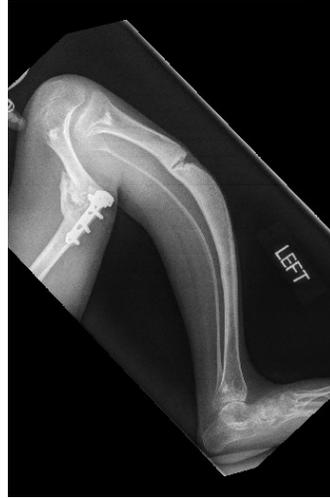
- ▶ AP and lateral projections of the lower leg show extension rod placement to strengthen bone and decrease bowing and fracture possibility.



A Mobay items and derived items © 2007, 2010 by Medtronic, Inc., an affiliate of Cleveland Clinic. B Mobay items and derived items © 2007, 2010 by Medtronic, Inc., an affiliate of Cleveland Clinic.

8

Reading Hospital  
patient who was  
21 years old when  
images were  
taken



9

Adult foot.  
Demineralization  
and the lack of  
bony cortices  
demonstrated on  
AP and lateral  
projections.



Medley Bone and Mineral Series © 2007, 2003 by Medley Inc., an affiliate of Elsevier Inc.

10

**Giant Cell Tumors**  
(Osteoclastomas)

**Benign tumor**

- ▶ **Causes:** Idiopathic
- ▶ **Affects:** proximal tibia or distal femur
- ▶ **Complications:** damage to affected bone
- ▶ **Radiographic appearance:**
  - ▶ Multiple large bubbles separated by thin strips of bone
- ▶ **Technical considerations:**  
Subtractive – appears as radiolucent on image and is destructive to bone
- ▶ **Prognosis/Treatment: Good, but can come back**
  - ▶ **Curettage of lesion**

11



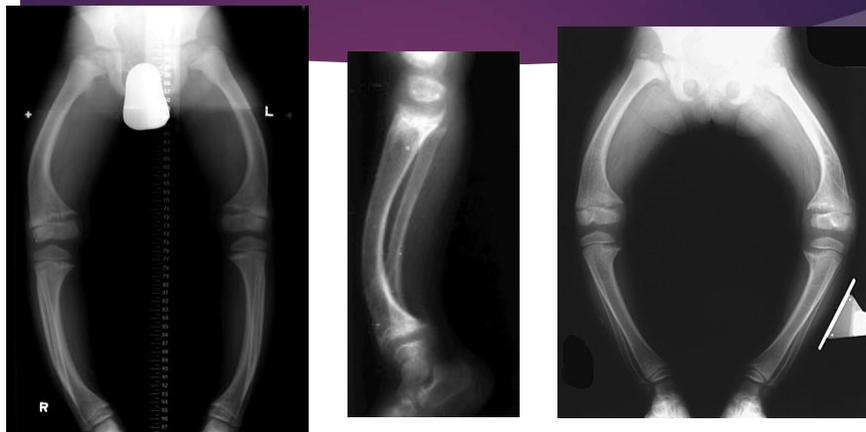
12

## Osteomalacia (Rickets)

Calcification of growing skeletal elements are defective due to deficiency in vitamin D

- ▶ **Causes:**
- ▶ **Complications:** bowing deformities, kyphosis
- ▶ **Radiographic appearance:**
  - ▶ Loss of bone density
  - ▶ Bending or bowing deformities
  - ▶ Delayed appearance of the epiphyseal ossification centers
- ▶ **Technical considerations:** Subtractive – decrease in bone density
- ▶ **Prognosis/Treatment:** Excellent, appropriate supplementation with calcium and vitamin D will lead to healing of the bony defects within days to months.

13



14

## Trimalleolar Fracture

### Fracture involving the posterior lip of the tibia in addition to the medial and lateral malleoli

- ▶ **Causes:** Trauma
  - ▶ twisting, rolling, falling, sudden and forceful impact, and weakened ligaments
- ▶ **Complications:**
  - ▶ tendon disruption, wound infection, injury to the nerves and vessels in the area, non-union or delayed union of the fracture, ankle joint instability, degenerative arthritis, pain, loss of range of motion, and calcification of the ligaments.
- ▶ **Radiographic appearance:**
  - ▶ fractures of lateral, medial and posterior aspects of ankle
- ▶ **Technical Considerations:**
  - ▶ No manual exposure factor change
    - ▶ unless splinted, casted, etc... then increase technique
- ▶ **Prognosis:**
  - ▶ Healing in alignment leaves little or no impairment. Other possibilities include: arthritis, pain, & recurrent sprains.

15



16

## Bimalleolar (Pott's) Fracture

### Fracture of both malleoli with dislocation of the ankle joint

- ▶ **Causes:** Trauma
  - ▶ twisting, rolling, falling, sudden and forceful impact, and weakened ligaments
- ▶ **Complications:**
  - ▶ tendon disruption, wound infection, injury to the nerves and vessels in the area, non-union or delayed union of the fracture, ankle joint instability, degenerative arthritis, pain, loss of range of motion, and calcification of the ligaments.
- ▶ **Radiographic appearance:**
  - ▶ Transverse fx at one malleolus and spiral fx at other, with ankle joint dislocation
- ▶ **Technical Considerations:**
  - ▶ None unless splinted, casted, etc... then increase technique
- ▶ **Prognosis:**
  - ▶ Healing in alignment leaves little or no impairment. Other possibilities include: arthritis, pain, & recurrent sprains.

17



18



19



20

## AP Ankle

- ▶ Evidence of proper collimation and the presence of a side marker placed clear of the anatomy of interest
- ▶ Ankle joint centered to exposure area
- ▶ Medial and lateral malleoli
- ▶ Talus
- ▶ No rotation of the ankle:
  - ▶ Normal overlapping of the fibiofibular articulation with the anterior tubercle slightly superimposed over the fibula
  - ▶ Talus slightly overlapping the distal fibula
  - ▶ No overlapping of the medial talomalleolar articulation
- ▶ Tibiotalar joint space
- ▶ Bony trabecular detail and surrounding soft tissues



21

1



EI: 220

22



23



24

## AP Mortise Ankle

- ▶ Evidence of proper collimation and presence of a side marker place clear of the anatomy of interest
- ▶ Entire ankle mortise joint centered to exposure area
- ▶ Distal tibia, fibula and talus
- ▶ Proper 15- to 20-degree rotation of ankle:
  - ▶ Talofibular articulation open
  - ▶ Tibiotalar articulation open
  - ▶ No overlap of the anterior tubercle of the tibia and the superolateral portion of the talus with fibula
- ▶ Bony trabecular detail and surrounding soft tissues



25

4



EI: 320

26



27



28

## Lateral Ankle

- ▶ Evidence of proper collimation and presence of a side marker place clear of the anatomy of interest
- ▶ Ankle joint centered to exposure area
- ▶ Distal tibia and fibula, talus, calcaneus, and adjacent tarsals
- ▶ Ankle in true lateral position:
  - ▶ Tibiotalar joint as well visualized, with the medial and lateral talar domes superimposed
  - ▶ Fibula over the posterior *half* of the tibia
- ▶ Fifth metatarsal base and tuberosity should be seen to check for Jones fracture
- ▶ Bony trabecular detail and surrounding soft tissues



29

7

EI: 90



30



31



32

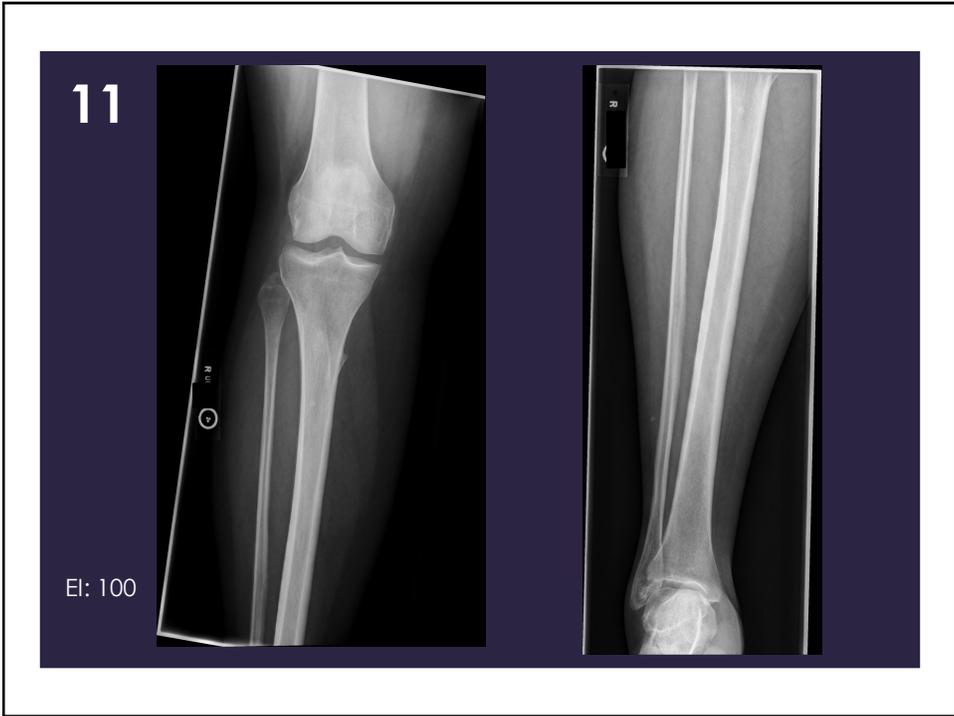


33

## AP Tibia/Fibula

- ▶ Evidence of proper collimation and the presence of a side marker placed clear of the anatomy of interest
- ▶ Ankle and knee joints on one or more images
- ▶ Entire leg without rotation:
  - ▶ Proximal and distal articulations of the tibia and fibula moderately overlapped
  - ▶ Fibular midshaft free of tibial superimposition
- ▶ Bony trabecular detail and surrounding soft tissues

34



35



36

## Lateral Tibia/Fibula

- ▶ Evidence of proper collimation and the presence of a side marker placed clear of the anatomy of interest
- ▶ Ankle and knee joints on one or more images
- ▶ Entire leg in true lateral position:
  - ▶ Distal fibula superimposed by the posterior half of the tibia
  - ▶ Slight overlap of the tibia on the proximal fibular head
  - ▶ Moderate separation of the tibial and fibular bodies or shafts (except at their articular ends)
- ▶ Possibly reduced superimposition of femoral condyles because of divergence of the beam
- ▶ Bony trabecular detail and surrounding soft tissues



37

13

EI: 100



38

14



EI: 150



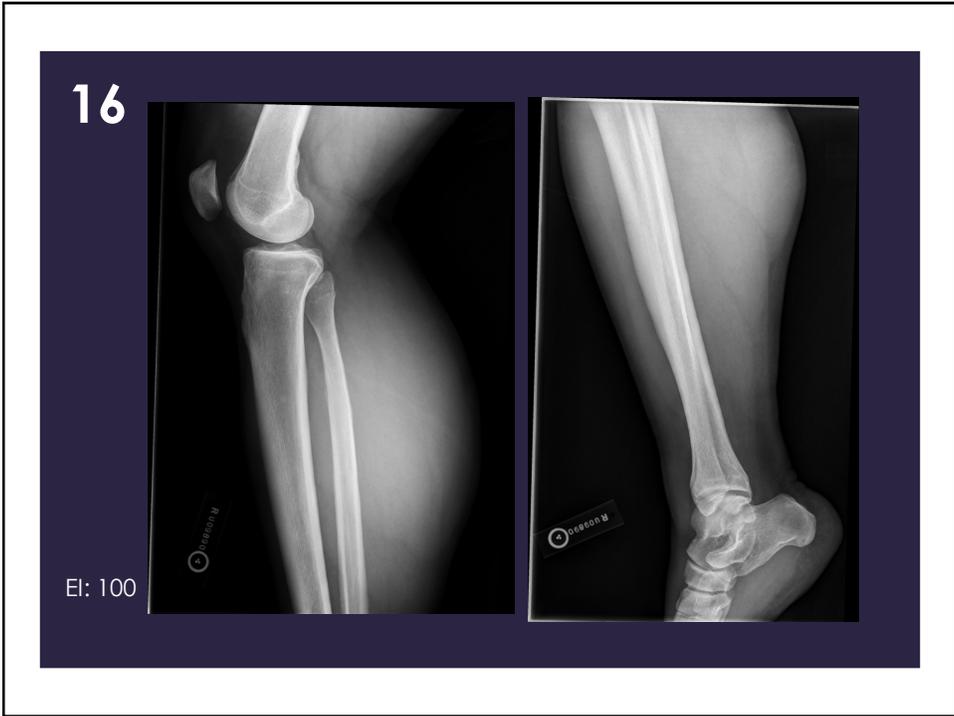
39

15



EI: 200

40



41



42