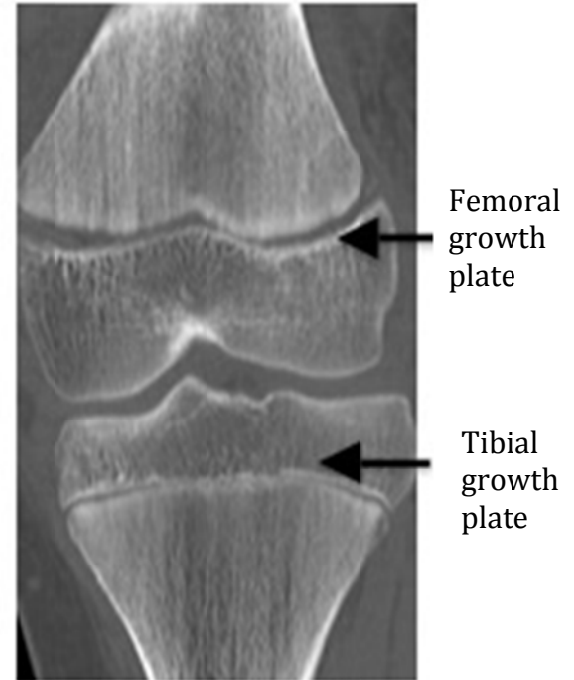


## **Growth Plate Fractures**

### **Introduction**

- Even though the bones of a child and adult are made of the same material, children are not “little adults”. In order to grow, children have growth plates, which may be subject to fracture.
- Growth plate fractures require immediate attention because long-term consequences may arise, such as unequal or arrested growth in the affected limb
- Appropriate evaluation by an orthopaedic surgeon experienced in pediatric orthopaedic trauma will determine the nature of the growth plate injury, provide counseling about treatment options, and allow for long term follow ups to assess the outcome of the injuries.



### **Description**

- The growth plate (physis) is an area of developing tissue near the ends of long bones, between the widened part of the shaft of the bone (the metaphysis) and the end of the bone (the epiphysis).
- The final length and, in some aspects the, shape of the mature bone is regulated by the growth plate
- Long bones do not grow from the center outwards. Instead, growth occurs at each end of the bone around the growth plate.
- The growth plate is the last portion of the bone to harden (ossify), which leaves it vulnerable to fracture. Because muscles and bones develop at different speeds, a child's bones may be weaker than the surrounding connective tissues (ligaments).
- Fractures can result from a single traumatic event, such as a fall or automobile accident, or from chronic stress and overuse.
- Most growth plate fractures occur in the long bones of the fingers (phalanges) and the outer bone of the forearm (radius). They are also common in the lower bones of the leg (the tibia and fibula).
- Children's bones heal faster than adult's bones which has two important consequences:
  - First, proper treatment by a pediatric orthopaedic specialist should be sought within five to seven days of the injury (or sooner) before the

bones begin to heal. This is especially so if the bones require manipulation to improve alignment

- Second, the period of immobilization required for healing will not be as long as compared to an adult
- X-rays initially make the diagnosis of a growth plate fracture. Occasionally other diagnostic tests such as magnetic resonance imaging (MRI), computed tomography (CT), or ultrasound are necessary to evaluate the exact nature of the fracture

### **Risk Factors**

- As long as a child is growing, he or she is at risk. Children that are nearing the end of their growth potential are especially vulnerable
- The risk in boys is twice that of girls
- One third of growth plate injuries occur during competitive sports such as football, basketball, or gymnastics
- Nearly 20% of growth plate injuries occur during recreational activities such as bicycle riding, sledding, skiing, or skateboarding

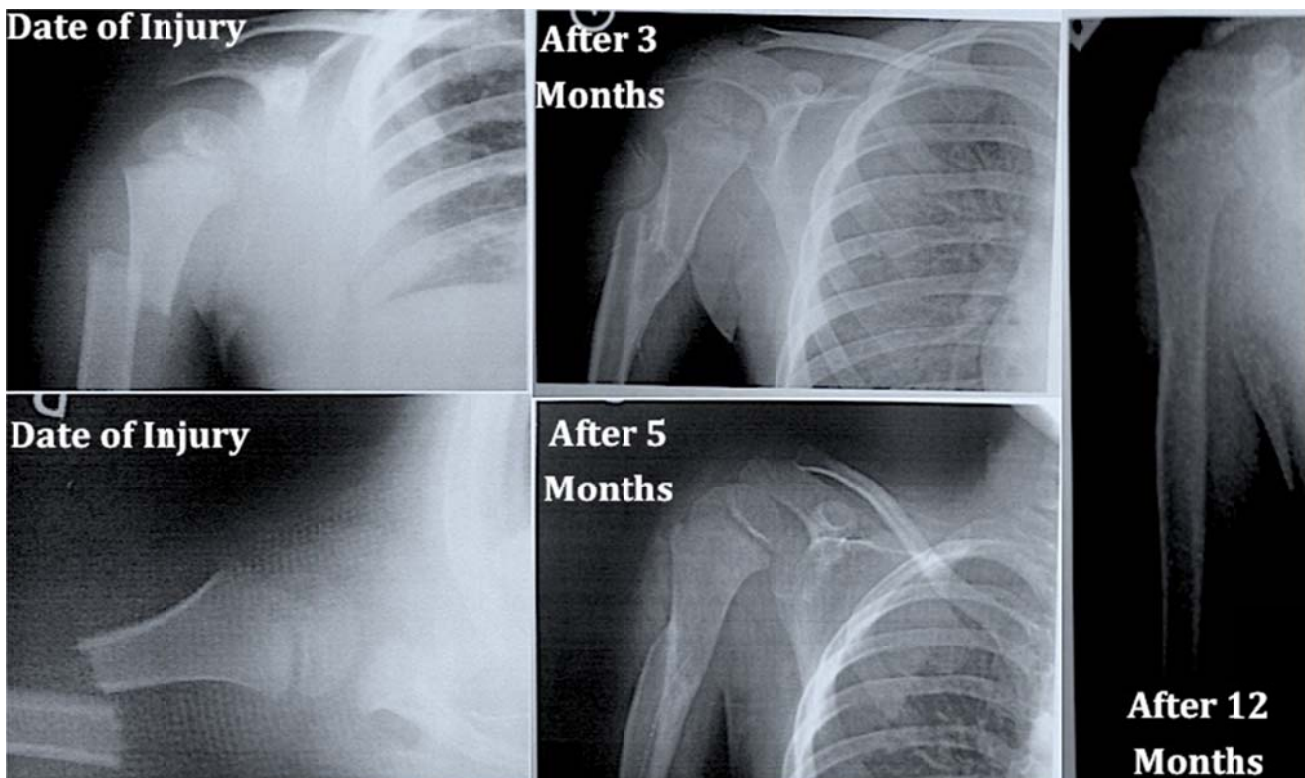
### **Treatment**

- Growth plate fractures are classified depending on the degree of damage to the growth plate and surrounding bone
- Several classifications exist for growth plate fractures, but the Salter-Harris system is the most widely used system. This classification helps determine the treatment of the fracture
  - Type I fractures – these fractures break through the growth plate only. In many cases no shifting of bone occurs thus these fractures may not be visible on x-ray.
    - Fractures isolated to the growth plate heal well and usually do not require surgery
    - Treatment is with cast immobilization
  - Type II fractures – classified as a break in the shaft of the bone next to the growth plate (metaphysis) and growth plate.
    - This is the most common type of growth plate fracture
    - Surgery is usually not required and treatment consists of cast immobilization
  - Type III fractures – defined as a fracture involving the end of the bone (epiphysis) and growth plate
    - Type III fractures have the potential to arrest the activity of the growth plate
    - Surgery with fixation by metal implants is necessary to ensure proper alignment of both the growth plate and the joint surface
  - Type IV fractures – these fractures break through the bone shaft, growth plate, and end of bone

- Like type IV fractures, growth may be halted
- Surgery with fixation by metal implants is necessary to ensure proper alignment of both the growth plate and the joint surface
- Type V fractures - similar to type I fractures, only the growth plate is injured. Unlike type I fractures, the growth plate is crushed
  - The majority of these fractures have arrested growth
  - Surgery is necessary to correct the injury
- Growth plate fractures must be watched carefully to ensure proper long-term results.
- In some cases, a bony bridge will form that prevents the bone from getting longer or will cause a curve in the bone. Orthopaedic surgeons are developing techniques that enable them to remove the bony bar and insert fat, cartilage, or other materials to prevent it from reforming.
- In other cases, the fracture actually stimulates growth so that the injured bone is longer than the uninjured bone.
- Regular follow-up visits to the doctor should continue for at least a year after the fracture. Complicated fractures (types IV and V) as well as fractures to the thighbone (femur) and shinbone (tibia) may need to be followed until the child reaches skeletal maturity.

### Remodeling

- Remodeling of bone is the process of a change in bony architecture based on the stress patterns imposed across the bone
- This process primarily occurs in the skeletally immature patient (child)
- The bones of a young child have immense capability to remodel. Even grossly angulated bones have the ability to heal straight in a young child, even though



some form of reduction is preferred

