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Growth Plate Fractures

The bones of children and adults share many qualities and risks of injury. However, a child's bones are also at risk of unique injury called a growth plate fracture. These fractures can result in long-term consequences such as limb deformity or unequal length of limbs. Thus these injuries require special attention. Most growth plate fractures, however, are at low risk for problems, particularly in those who are near the end of growth.

What is a growth plate?

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 (metaphysis) and the end of the bone (epiphysis). The growth plate regulates and helps determine the length and shape of the mature bone.

The Long bones of the body do not grow from the center outward. 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 muscle and bone develop at different speeds. A child's bones may be weaker than the surrounding connective tissue (ligaments).

Children's bones heal faster than adult's bones. This has two important consequences. First, it means that a child with an injury should see an orthopedic surgeon within five to seven days before the bone begins to heal. Second, the period of immobilization required for healing will not be as long as for an adult.

Risk Factors

Who is at risk?

- **Children at the end of their growth period are especially vulnerable**
- **Growth plate fractures occur twice as often in boys than girls**
- **1/3 of all growth plate injuries occur in competitive sports (football, basketball, or gymnastics)**
- **20 % growth plate fractures occur as a result of recreational activities (biking, sledding, skiing, or skateboarding)**

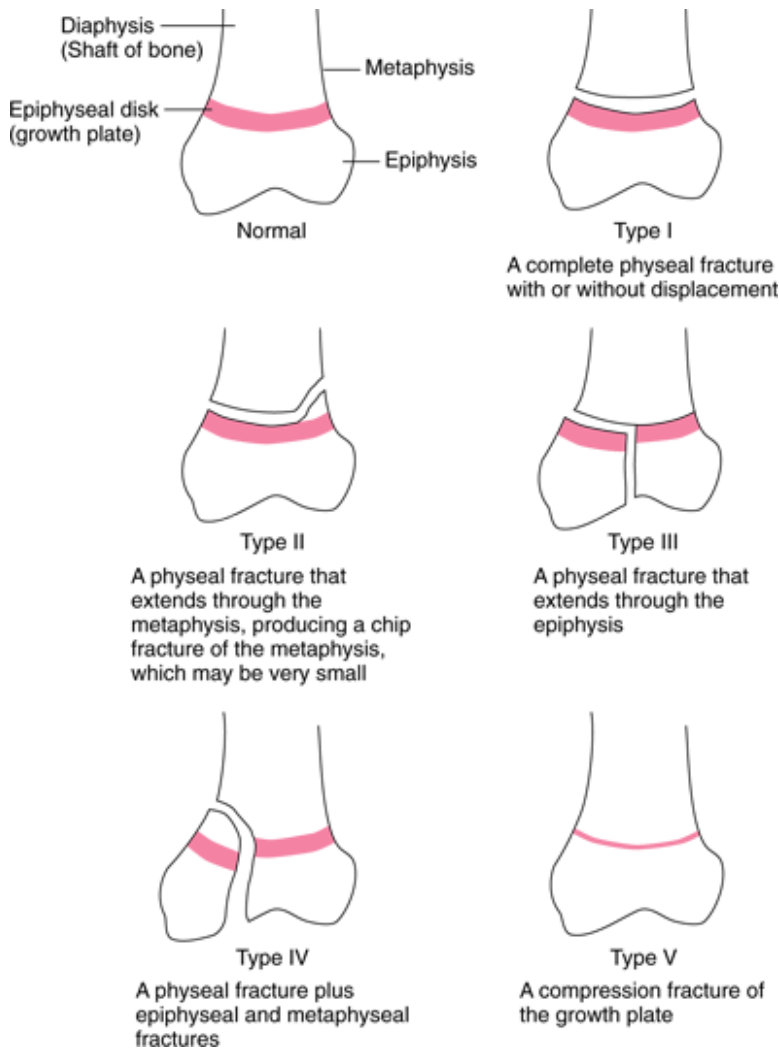
Fractures can result from a single traumatic event (fall or automobile accident), or from chronic stress and overuse. Most growth plate fractures occur in the long bones of the fingers (phalanges) and the outer bone of the forearm (radius). They are also common in the lower bones of the leg (tibia and fibula).

Symptoms

Any child who experiences an injury that results in visible deformity, persistent or severe pain, or an inability to move or put pressure on a limb should be examined by a doctor.

Treatment

Treatment depends on the fracture type. Growth plate fractures are classified depending on the degree of damage to the growth plate and orientation of fracture to the growth plate. Several classification systems of growth plate fractures have been developed. The most widely used is the Salter-Harris system. In addition, other factors that affect healing and treatment include: age and health of the patient, associated injuries, and the amount of displacement of the fractured ends of the bone (occurring through the growth plate).



Type I Fractures:

- These fractures break through the growth plate with no shift in the bone.
- The fracture is often not visualized on an X-ray.
- They generally heal well. Usually no surgery is required.
- They are treated with cast immobilization.

Type II Fractures:

- These fractures break through the growth plate and metaphysis (widened area next to the shaft)
- These fractures usually heal well but may require surgery if displacement or angulation is severe
- Most common type of growth plate fracture
- Most are treated with cast immobilization

Type III Fractures:

- These fractures break through the growth plate and the end of the bone into the joint (epiphysis)
- More common in older children

- Typically treated with surgery to ensure proper alignment of the growth plate and joint service

Type IV Fractures:

- These fractures break through bone shaft (metaphysis), growth plate, and the end of the bone (epiphysis) into the joint
- Commonly result in arrest of growth in the bone
- They are treated with surgery and internal fixation to restore alignment the growth plate and joint.

Type V Fractures:

- These fractures are result of crushing injury to the growth plate
- Commonly result in arrest of growth in the growth plate
- Treatment is variable

Type VI Fractures:

- Newer classification (Peterson)
- A portion of the epiphysis, growth plate, and metaphysic are missing
- Usually occurs with an open wound (open fracture)
- Often involves lawnmowers, farm machinery, ATV's, or gunshot wounds
- All require surgery and most will require later reconstructive or corrective surgery.

Results

Growth plate fractures should be watched carefully to ensure proper long-term results. In some cases a bony bridge can form that prevents the bone to grow or cause curved growth. Techniques exist in which the bony bar can be removed and replaced with fat, cartilage, or other material to prevent it from reforming. In other cases, the fracture actually stimulates growth so that the injured bone is longer than the uninjured bone. Surgical techniques can help achieve correction of this unequal length of bone.

Regular follow-up visits to the orthopedic surgeon should continue in some cases up to year after the fracture. Complicated fractures (type IV, V, and VI) may need to be followed until the child reaches skeletal maturity.