

# Orthopaedic Observations

*A Matter of Medicine...*

*TM Pending*

## Pediatric Fractures and Growth Plate Injuries

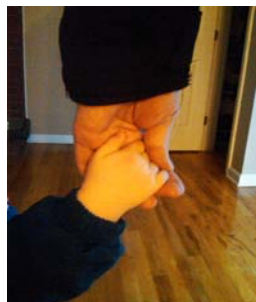
By Jen Bogardus, MPT



Childhood sports have become more intense than they ever have before. Our kids spend hours at the ice rink, on the field, and in the gym. We often tell children to “tough it out,” and many children believe that playing through the pain is the real athlete’s way of proving dedication and desire. But, a child’s bones are a specialized system of growth and change,

always working to prepare the bony structure for a lifetime of work and play. It is essential, that we as parents, teachers, and coaches, pay attention to a child’s pain and have them treated appropriately. By detecting injury early, we can help them avoid long term, and sometimes very serious complications.

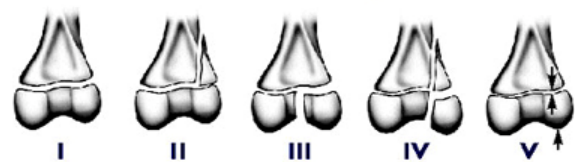
Pediatric bones are very different from adult bones. Bones are basically structured like this; the long shaft is called the diaphysis. This area contains the spongy bone where new blood cells are made. The end of a bone is called the epiphysis, and connecting the two areas together, is an area of widening, the metaphysis. In children, the area of the metaphysis presents as an epiphyseal plate, or growth plate, made of cartilage. This functions as a dynamic structure that allows the bone to grow to the appropriate length and then will fuse when full length is reached. Pediatric bones also differ in that they are less dense. Their outer covering (the periosteum) is also more pliable. All of these characteristics are nature’s way of allowing for growth and change.



When an adult fractures a bone, we generally treat by reducing the fracture, immobilizing, and then waiting for the body’s natural healing process of collagen secretion to take place. This causes a callus in the area of fracture and eventually, it will harden into calcium, and the bone will once again be able to support weight. The great concern with children occurs when there is a fracture that involves that very fragile growth plate. This type of injury is called a Salter-Harris fracture (S-H), and can re-

sult in cessation of growth and/or change in the angle of the long bone. Salter-Harris fractures are seen twice as often in boys as in girls, and “they account for approximately twenty percent to thirty percent of all children’s fractures” (Morrissy and Weinstein p. 1230).

### The Salter-Harris Classification of Growth Plate Injuries



There are five major types of fractures that involve the growth plate. The first, Type I, presents as a fracture through the plate transversally. This fracture is generally diagnosed by observation of swelling and point tenderness. Healing happens very quickly (usually two to three weeks) and it is rare that complications occur.

Type II is the most common type of S-H fracture. It accounts for approximately three quarters of all S-H fractures. This presents as a fracture through the growth plate and includes a section of the wide, angled portion of the long bone. These too, heal quickly, and do not usually affect growth.

Type III involves a fracture of the growth plate and extension into the epiphysis or end of the bone. This tends to occur once the growth plate is partially fused. This fracture usually necessitates a reduction (bringing the bones back together), and can have a poor prognosis if not reduced properly.

Type IV presents with a fracture line across both the end of the bone and the shaft of the bone to include the growth plate. This type of injury must be perfectly reduced, and often still affects the future growth of the bone.

Type V presents with a fracture line across both the end of the bone and the shaft of the bone to include the growth

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Type V is an injury that results secondary to some type of crushing force. The growth plate becomes damaged so severely that the potential for growth no longer exists. This situation is called growth arrest. The areas that most commonly suffer growth arrest are the femur and tibia (leg bones), distal radius (the bone on the thumb side of the forearm), and the phalanges (finger bones). In this scenario, the child may suffer a limb length discrepancy and a change in the angulation of the bone. Both of these issues may affect a child's gait, ability to participate in sports, and may contribute to compensatory pain in other body parts.

S-H fractures are difficult to diagnose by x-ray alone because the plates have not hardened into solid bone. Therefore, they appear as a gap between the metaphysis and the epiphysis. Doctors often x-ray the opposite side for comparison since there are so many variations in the appearance of growing bone. Once the fracture is diagnosed, a plan of action must be established. If the fracture is type I or II, they do not generally need surgical intervention, and usually heal with time. The other three present a more serious concern and sometimes, an ORIF (open reduction internal fixation) must be done surgically to bring the bones back together. When this must happen, every attempt is made to keep the screws out of the growth plate. If a piece of hardware must cross the plate, a smooth screw can be used, which does not usually cause growth arrest. If a child is close to their full growth maturity and experiences growth arrest, there is usually little that can be done. If the child still has a large amount of growing to do, the options are limited. Sometimes, they can remove the area of growth arrest if it is small enough. Other options may include stopping the growth on the opposite limb to provide symmetry or undergoing a limb lengthening procedure (R.A. Zell, MD, personal communication, February 2010). After these

types of surgeries, or even after immobilization from a fracture, the child may require physical therapy. Physical therapy can assist with restoring range of motion, reducing swelling, and improving strength. Physical therapy also assists athletes return to their sport with activity specific rehab.

Kids are resilient! They heal faster than we adults do. They generally handle the recovery faster better than we do, and they certainly can learn to overcome physical issues with fantastic grace and courage. But, as their mentors and guardians, we need to pay very close attention to their activities and any subsequent injuries. We can do our part by insisting on the use of helmets and padding when kids are participating in recreational play. We can monitor the amount of time kids spend practicing at highly intense levels, and we can make sure that we have our kids evaluated for possible injuries when appropriate. Prevention is the most effective way to protect our children from the risk of long-term musculoskeletal issues.

Morrissy, R.T. & Weinstein, S.L. (1996). *Pediatric Orthopaedics*, (4th ed.). Philadelphia, PA: Lippincott-Raven.

*Jen graduated from Quinnipiac University with a Bachelors of Health Science in 2001, and then with her Masters in Physical Therapy in 2002. She has been a therapist for 7 years, where she has gained extensive experience in the areas of trauma and wound care at Yale New Haven Hospital, and has 6 years of homecare experience prior to joining the team at The Orthopaedic Group, LLC. Jen played Division I Softball, and now enjoys applying her athletic experience to her patients in the outpatient setting. Jen has spoken at the CPTA conference, and she recently taught as an assistant instructor in Quinnipiac's graduate physical therapy program. She is a member of the National Strength and Conditioning Association, as well as the Professional Advisory Committee for Home Health.*



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