



BROKEN BONES

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BONE ANATOMY

The effect of a traumatic injury on the bones of children is greatly influenced by their age at the time of the injury.

Children who are young and still growing have open “growth plates” at the ends of their bones. These “growth plates” help the bones grow correctly, in the right length and the right shape.

The very ends of bones are called the “Epiphysis.” This is the portion of the bone that is found in the joints connecting one bone to another. The epiphysis is covered in cartilage, the soft, smooth substance that helps bones glide over one another inside the joint for smooth movement.

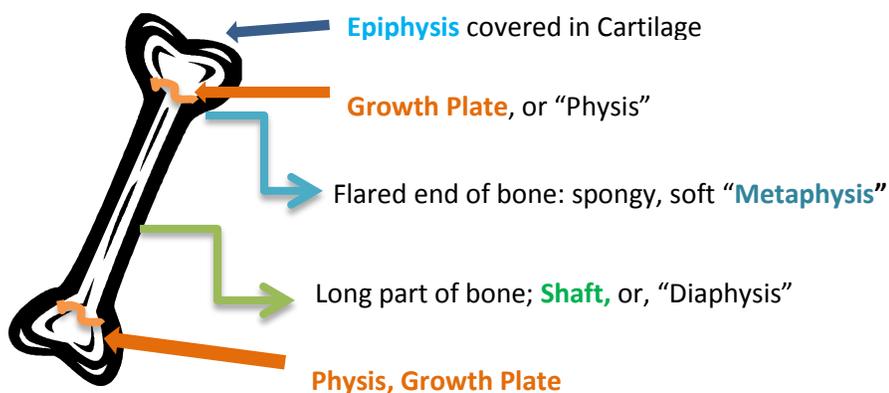
The flared end of the bone near the Epiphysis is called the “Metaphysis.” This portion of bone is much softer, and spongy with a good blood supply. But, because it is softer, it can sustain a fracture (or “break”) much more easily.

Sandwiched in between the Epiphysis and the Metaphysis is the actual growth plate, called the “Physis.” The growth plate also has some cartilage in it, but it has a very rich blood supply and the growth of the bone occurs here. Therefore, we know that bones grow from the ends and not from the middle.

The long or more solid, shaft of the bone is called the “Diaphysis” and is in between the two ends of the long bones.

There is a covering over all our bones that provides extra strength and nourishment to bones called the “Peri-osteum.” This is special skin tissue that envelopes and wraps around the bones. This is very important in healing.

In very young children the “periosteum” envelope is very thick. So thick, in fact, that if a child breaks their bone, this thick sleeve of tissue can hold the broken bone pieces together and this helps them keep their shape after the break. As we get older, this tissue becomes thinner and thinner until, as Adults, it can be paper-thin. This is one of the reasons why Adults often require pins or plates to hold their broken bones together, whereas, childrens’ are so thick they do not require that extra surgical intervention most of the time.



TRAUMA

When children sustain an injury to their bone from a fall or other trauma, it is less likely for them to sustain a break, or “fracture,” because their bones are younger, softer, and their periosteum is much thicker. However, because they also have such an excellent blood supply to their growing bones, if they do sustain a significant trauma, the bone can bruise quite easily, causing a “hematoma” between the bone and the periosteum. Or, if there is enough force to break the bone, it will bleed and also cause a collection of blood between the bone and the periosteum. This hematoma can be just as painful as breaking the bone because both will stretch the periosteum which is painful.

BREAKING THE BONE

When enough trauma or force is applied to the bone, it can break. Sometimes the break is only through the outside of the bone. This is called a “hairline” fracture and is very, very stable and heals very quickly. However, hairline fractures can be so tiny they don’t show up on X-ray until they begin to heal...about 1 week later.

Many children will fall on an outstretched hand trying to break their fall. This often results in a fracture of the “metaphysis” which is that flared, soft, spongy part of the bone near the ends and which lies right on top of the growth plate. Because this part of the bone is softer and more spongy, it sometimes will only “crinkle” or “buckle” hence, the term: “buckle” fracture. Very old timer medical providers may also refer to this as a “torus” fracture.

In Toddlers, who are still getting their “sea legs” and fall a lot, we often see a twisting fracture that may start in the metaphysis but travel up the bone into the shaft winding around the bone. This is a toddler’s fracture. This type of fracture can also be associated with child abuse (someone twisting the child’s leg) so other signs of injury may also be investigated when this type of fracture is found.

Sometimes, the break will go through the bone down into the joint or the growth plate. Most growth plate injuries do very well and heal quickly; but, if they are associated with a lot of force or a crush injury the growth plate can be damaged and cause problems with the length or shape of the bone as a child grows. Sometimes this will require special surgery to restore the health of the growth plate, or correct the deformity.

If the fracture involves the epiphysis or cartilage down into the joint it can be very serious. They may not heal. Sometimes this type of fracture requires special pins to be placed or even removal of the broken part of the cartilage.

Fractures that break all the way through the bone and the periosteum and through the skin are called “open” fractures and have a high risk of infection. And sometimes they can break into several pieces. This type of fracture almost always requires some kind of surgery to set the bones and a very prolonged period of casting and healing. Complications to these kinds of breaks can be deformity and infection or loss of function.

HEALING the BONE

If you suspect a bone to be broken, immobilize the injury as best as you can to decrease movement or weight-bearing and go to the nearest ER or Urgent Care. **DO NOT ALLOW YOUR CHILD TO EAT OR DRINK ANYTHING if the bone looks deformed. The stomach must be empty for 8 hours before surgery can be done if that is required. If the bone looks severely deformed, or there is no pulse or there is loss of color or feeling beyond the site of the break, call 911 immediately.** Once you know surgery will NOT be required, then eating and drinking is OK.

Most likely, xrays will be taken and if a break is identified, a splint or some other form of immobilization will be applied to allow for swelling and rest. Then, you will be referred to an Orthopedic Specialist. If a cast is needed, you have 7 days to have one placed. If surgery is required, it will usually be done within 24 hours of the break.

REST: The most important first rule about helping fractures (“breaks”) to heal is REST. Not moving or using the arm or leg for the first few weeks can allow the fracture to initially set while new bone is laid down. A splint is usually the first method of stabilizing and immobilizing the fracture while it is still in the swelling phase. After a week or so and the swelling has decreased, a cast may be placed. Fractures requiring surgery will usually be done within the first 12 hours after the trauma has occurred.

Movement across a fracture site causes a lot of pain, so doing everything possible to decrease movement is very important.

ELEVATION: Elevating the body part above heart level is also important to decrease pain and swelling.

COOL: Ice placed over the splint or wrapping 20 minutes every hour can be very helpful as well.

MEDICATION: Taking Tylenol is the best initial medicine since Aspirin or Ibuprofen can thin the blood and cause more bleeding initially.

All of these fractures, if they occur in very young children, can heal in a few weeks (3-4). Older children will often take longer, up to 8 weeks, to heal. Once the fracture is “healed” it still takes about a year for the bone to truly mend completely.

More severe injuries, or breaks in older children or teenagers can take even longer to heal.

CASTING

If a cast is placed on your child’s arm or leg, there are some important things to remember to take care of the cast:

- If cast is on a leg, always wear the cast shoe to protect the integrity of the bottom of the cast so it doesn’t get dirty, wet, or holes worn into it. This will also help protect from getting dirt or rocks/stones inside the cast which can be very painful and very difficult to remove. Walk on the cast only as and when directed by the Orthopedic specialist.
- If the arm is broken, use of a sling may be helpful for the first week or longer. Using a sling reminds children (and others such as friends and teachers) that the arm is broken and should be protected from use or injury until the doctor clears them for more normal activities. Children do not have to sleep with slings in place.
- Slings can be secured to the child’s shirt on the outside, or worn secured to a T-Shirt under another shirt to protect them from trying to use it for the first week or so until pain and swelling subside and the bone has enough healing for the fracture to be stable with use.
- DO NOT allow the cast to get WET. The best policy is to do sponge baths. Placing a bag over the cast and putting the child in the bath tub or shower most often results in leakage.
- If your child’s cast gets wet, you will need to let your Orthopedic Doctor know as soon as possible. Skin under a cast that becomes wet usually will not dry. The skin will become wrinkly (“pruney”) and macerated and will begin to fall apart. If that happens then a huge wound can open up that will take a long time to heal and can even leave a scar. In addition, fungus and bacteria love to live in a warm, dark, moist environment. Your child’s skin can develop mold or fungus or a bacterial infection. Again, this can lead to more surgery or scarring.
- DO NOT stick anything down inside the cast to scratch with. Keeping the cast cool and dry (no sweating or overheating due to hard play) will help to decrease itching. If itching does occur, tap firmly on the outside of the cast with your hand or a spoon. The vibration will help “scratch” the itch on the inside of the cast.
- If your child sweats a lot and the inside of the cast become moist from sweat or stinky, you may attempt to blow COOL AIR from a blow dryer down inside the cast. ONLY USE COOL AIR, NEVER WARM OR HOT. If your blow

dryer does not have a cool or cold setting, DO NOT USE IT. Again, if the cast becomes very stinky, sweaty, or very itchy, call your Orthopedic doctor or PA. They will tell you how to deal with it and may need to see you.

- If something accidentally DROPS inside the cast, do your best to shake it out. But, if it will not come out, you MUST SEE YOUR ORTHOPEDIC doctor or PA within 24 HR. Objects caught down inside a cast can quickly work their way through the skin and muscle and down to the bone. This can lead to significant pain, infection, and scarring. The Orthopedic specialist will be able to help you remove it.
- If your child complains of a specific spot that is persistently painful—called “point tenderness” and it doesn’t go away over several hours of time, then call your Orthopedic Specialist. Sometimes young children will put something inside their cast but not tell you, or many times, will simply forget they did so. Also, if part of the cast became wrinkled inside and hardened that way, there could be a piece of cast material that is rubbing through your child’s skin and creating a painful wound. So, if a child consistently complains of pain in a specific spot, see your Orthopedic Specialist to investigate.

ALL DONE

Once your child’s fracture has healed sufficiently to be taken out of the cast, it will take several days to weeks for their muscles to build back up and their strength and coordination to return. Activities must still be restricted during this time to prevent re-injury or further damage. Some children will have enough weakness that they require physical therapy for a time to insure they regain their strength and function.

As said before, the bone actually takes up to a year to fully heal. But you will not have to restrict activities for that long. Usually, after the cast comes off, the doctor will advise that your child avoid sports activities for a couple of weeks and then gradually return to full activities as strength and function becomes more normal.