

## OVERVIEW

Wrist fractures are the most common fractures in children. They usually occur with a fall onto an outstretched arm. The fracture may or may not be displaced and may or may not involve the growth plate. If alignment is acceptable, a temporary cast is applied. If needed, a procedure is done to reposition and re-align the fracture. This can often be done with sedation in the emergency department. The alignment does not have to be perfect as growth and remodeling will correct a significant amount of residual angulation and displacement. The alignment is checked after one week and the temporary cast replaced with a solid cast. Pain and swelling improve after 1-2 weeks and healing is usually pretty good by 4 weeks, with most patients back to full activities by 6-8 weeks.



## BACKGROUND

Wrist fractures occur most commonly in the 3 - 11 year old age group. About 30% of these fractures show little or no displacement and another 25% bend or crack without breaking. The fracture can extend across or into the growth plate. Most are Salter-Harris type 2, which means the fracture extends partially through growing cartilage and partially through adjacent bone. For most Salter Harris fractures at the wrist, growth problems are uncommon.

## CLINICAL PRESENTATION AND DIAGNOSIS

Wrist fractures usually occur with a hard fall and cause focal pain and swelling at the fracture site. Children with displaced fractures often show obvious deformity and swelling. A young child with a non-displaced fracture may present with vague pain, which can confuse and delay the diagnosis. Xrays confirm the diagnosis and clarify the fracture pattern. Some fractures may be subtle and incomplete. Incomplete fractures are sometimes called "buckle fractures". Wrist fractures can involve the growth plate. A fracture directly across the growth plate (type 1) or partially across the growth plate (type 2) can cause problems for continued growth.



## TREATMENT

Buckle fractures are relatively stable and can sometimes be treated with a splint that should be worn for 3 weeks or until the wrist is free of pain. A removable splint is nice, in that it can be removed for motion exercises to minimize stiffness and for bathing.

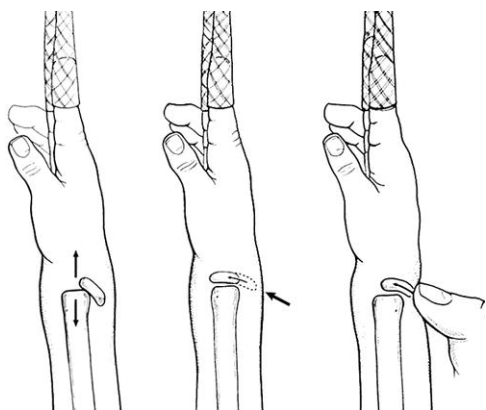
Complete fractures that are non-displaced or minimally displaced can be treated with casting to hold the fracture in position and minimize motion to promote healing of the bone. Sometimes a splint is applied initially to allow for swelling and then changed to a cast after the first week. Xrays are may be done weekly to recheck the position. Casting continues until 4 weeks out from the injury.



Displaced fractures are usually treated with a procedure to reposition and realign the fracture (reduction) and a cast is applied. This procedure might be done with sedation or with full anesthesia in the operating room. Finger traps to hold the fingers upward and weights at the elbow are sometimes used to help reposition the fracture. However, the physician will also manipulate the arm with a "reduction" maneuver to get the fracture in a better position.

Occasionally, the fracture cannot be realigned by manipulating the arm, and a decision must be made to accept the position and allow growth and remodeling to occur versus the risk/benefits of making an incision to expose the bone and get the fracture repositioned. It is common in adults, but occasionally in children, the fracture can be unstable and difficult to keep aligned. If this is

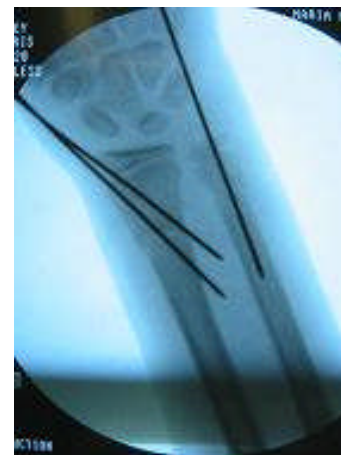
the case, pins can be drilled across the fracture site to hold it in place.



A temporary cast is also applied to hold the fracture. After 5-7 days, an xray is obtained to confirm that the fracture is still properly aligned. The temporary cast is then converted into a solid cast. After 4 weeks, the cast is removed so that motion exercises can be started. Use of the arm is limited by wearing a sling during the day. After 6 weeks, the fracture is well healed and activities can be gradually increased.

## PAIN MANAGEMENT

Fractures hurt and appropriate pain management is important. With good pain management, children will eat better, sleep better, heal better, and have less apprehension when they start working on motion and return to activities. The primary factors for pain include the injury, motion and force at the site of injury, pain medication, and supplemental measures. Appropriate treatment of the fracture is important and is described above. Especially, for the first few days, activity should be minimized to reduce motion and force at the injury site. Pain medications should be used as needed. Supplemental measures like distraction (music, videos, etc), ice, elevation, other measures to control swelling, etc, should be used as beneficial.



Pain medications are important and generally, ibuprofen and Tylenol codeine, when given together, provide good pain relief for most children. It is worth while to set an alarm (even in the middle of the night) to stick to the schedule. It takes a few minutes to wake up and take the medicine, as opposed to letting pain build up and spending hours trying to get it under control.

Ibuprofen is a non-steroidal anti-inflammatory medication, which has few side effects and low risk, but may not be strong enough for the first few days. For best effect, it should be given every 8 hours for a least 5 days and as long as needed after that.

Tylenol codeine is a mild narcotic medication, which will provide better pain relief, but also has more side effects, which often include sleepiness, nausea, constipation, etc. Pain relief is best and side effects are minimized if dosing is adjusted based on the pain severity. Start by giving a full dose every 4 hours. If pain relief is good, continue at the same dose or decrease the dose by half. If pain relief is not adequate, increase the dose. Continue adjusting and decreasing the dose as the pain improves until it is no longer needed. It is best to not skip a dose and to not skip a step.

In summary, the fracture should be treated with appropriate immobilization as recommended, activity should be limited, and pain medications should be used as needed according to the recommended schedule. Ibuprofen should be given every 8 hours and tylenol codeine every 4 hours, adjusting the dose based on the level of pain. Most kids are off the tylenol codeine within 2-3 days and off the ibuprofen by 5-7 days. Children usually do very well and are usually pain free within 5-10 days.

### **CAST CARE AND ACTIVITY**

Cast care is also important. A partial cast or splint is used initially to allow for swelling. It is usually put on with an ACE wrap, but it is not meant to be adjusted. If the temporary cast starts getting loose, tape should be applied to reinforce it as needed.

For the first 48 hours, the wrist should be elevated to minimize swelling and pain. It is possible for the swelling to increase to the point that the cast or the skin may get too tight. This is a serious problem. The first and most reliable sign of trouble is that the pain is not well controlled. If pain is severe and increasing over 2-4 hours despite elevation and appropriate pain medicine, it is very important to return to the hospital. Do not remove or loosen the cast, as this can make things worse.

It is also important to keep the cast clean and dry. If the cast gets wet, it will not dry well and it will start to irritate the skin. A wet cast usually needs to be replaced. Sponge baths are recommended to minimize risk of getting the cast wet in a shower or tub. While a plastic bag may protect the cast in the tub, if the bag leaks and the cast gets wet, it typically takes hours and hours to get the cast replaced. The time and risk you take using a plastic bag to get into the tub are far greater than just doing a nice quick and safe sponge bath.

While in the cast, it is important to take it easy. The cast will protect the arm, but it is not strong enough for most physical activities. Sports and gym should be avoided. There should be no running, jumping, climbing, and definitely no falling. This includes staying off bikes, skates, skateboards, scooters, trampolines, monkey bars, slides, swings, etc. A general rule of thumb is to keep 2 feet on the ground at all times.



### **EXPECTED OUTCOMES AND POTENTIAL COMPLICATIONS**

For children, wrist fractures are common and generally heal very reliably and without problems. If the fracture is protected and reinjury avoided, progression to healing is reliable. Growth and remodeling are also reliable, especially in young children. With time, the bone becomes "as good as new" as the body slowly replaces the damaged bone and corrects residual deformity. The images above show a fracture with residual displacement that gradually remodeled with time. If there is concern for possible growth disturbance, the growth is checked after 6 - 12 months with follow-up xrays. Rarely, during the first 24-48 hours, swelling can increase to the point of blocking blood flow into the arm. This is called a compartment syndrome and typically is accompanied by severe pain. If pain is not well managed despite elevating the arm and using appropriate pain medicine, the child should be urgently brought back to the hospital.

### **MORE INFORMATION**

Further information can be obtained on the internet. Your local public library can help you explore these sources if you are interested. Two good sites for expert and peer reviewed information are the American Academy of Orthopedic Surgeons at [www.aaos.org](http://www.aaos.org) and [www.emedicine.com](http://www.emedicine.com).

### **FEEDBACK**

If you have questions or comments, please contact the office or submit them to the web site at [www.pedortho.com](http://www.pedortho.com).