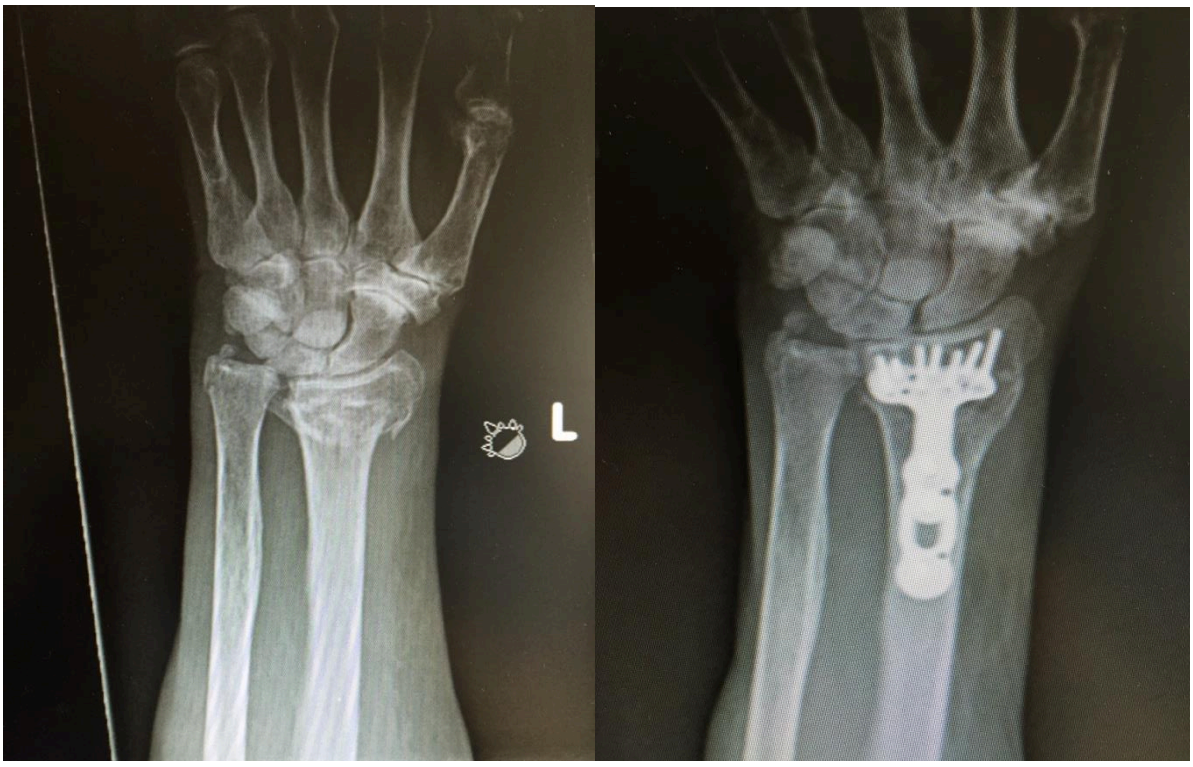
DISTAL RADIUS FRACTURES



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Introduction

This booklet will provide a general guide to distal radius fractures; the methods of treating the fracture; and a general guide to the expected recovery pathway if surgery is indicated. This document is not fully comprehensive, and any specific questions should be addressed with your surgeon. We hope that you find this helpful.

Common Terms

Distal: the end of the bone furthest away from the body. The distal radius is close to the wrist
Proximal: the end of the bone closer to the body; opposite of distal. The proximal radius is close to the elbow
Volar: the palm side of the wrist or hand
Dorsal: the back side of the wrist or hand
Radius: a forearm bone on the thumb side
Ulna: a forearm bone on the pinky side

A Normal Wrist

The wrist is a complex joint that connects the forearm to the hand. The joint is a collection of multiple bones and joints. The bones comprising the wrist include the distal ends of the radius and ulna, eight carpal bones, and the proximal portions of the five metacarpal bones. This complex joint allows for allows movement in all directions. See figure 1.



Figure 1: Normal wrist anatomy

Distal Radius Fractures

A fractured bone is the same as a broken bone. A distal radius fracture frequently occurs about 1 inch from the end of the bone, but can occur in many different ways. The radius is the larger of the two forearm bones linking the hand to the elbow. The end of the radius closest to the hand is especially vulnerable to fracture because it is the bone that takes nearly the full load when falling on an outstretched hand.

A fracture of the distal radius is one of the most common types of injuries to the skeletal system. Distal Radius Fractures can be further categorized into the following type fractures:

- **Intra-articular fracture**- A fracture that extends into the wrist joint.
- **Extra-articular fracture**- A fracture that does not extend into the joint
- **Open fracture**- When a fractured bone breaks the skin. These types of fractures require immediate medical attention because of the risk of infection.
- **Comminuted fracture**- When a bone is broken into more than two pieces

Distal radius fractures are one of the most common injuries encountered in orthopedic practice and is treated using a variety of different techniques, from casting to pinning to surgery with plates and screws. The type and severity of the fracture among other variables help determine the treatment.

There are two most common variants of distal radius fractures that are characterized by the wrist position during a fall. These fractures are called Colles' fractures and Smith's fractures, both of which will be described in more detail below.

Colles' Wrist Fracture

A Colles' fracture is a fracture of the distal radius where the wrist gets pushed back as seen in figure 2. The fracture is sometimes referred to as a "dinner fork" or "bayonet" deformity due to the shape of the resultant forearm.



Figure 2: Colles' fracture of the left hand, with visible displacement away from the palm

The fracture is most commonly caused by people falling onto a hard surface and breaking their fall with outstretched arms, falling with the wrists extended.

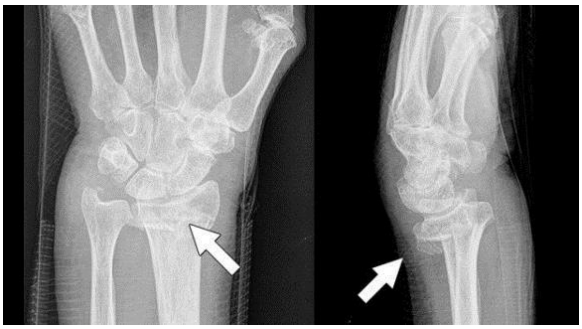


Figure 3: An x-ray viewing of the posterior displacement of the radius.

Smith 's Wrist Fracture

A Smith's fracture is a fracture of the distal radius with displacement of the wrist toward the front of the hand. The fracture is also known as a reverse Colles' fracture.



Figure 4: Smith's fracture of the right hand, with visible anterior displacement

It is caused by a direct blow to the back of the forearm or falling onto flexed wrists, as opposed to a Colles' fracture which occurs as a result of falling onto wrists in extension. Smith's fractures are less common than Colles' fractures.



Figure5: An x-ray viewing of the anterior displacement of the wrist (Smith fracture).

Indications for Surgery

Your surgeon will evaluate your health history, perform a physical examination, and take x-rays to diagnose your wrist pain. Your surgeon will measure different angles on the x-ray to help decide whether surgery is indicated.

Preparing before Surgery

Recovery is a gradual process and will take time after surgery. You should plan for your return home before the day of surgery. Most patients return home the same day of surgery. Below are areas where family and friends can assist you:

- Ask your family or friends if they can assist you with activities of daily living for about two days before and after the surgery.
- Have family and friends clean and place house in order before return.
- To prevent falling, remove throw rugs and excess clutter from traffic paths.
- Place a sturdy armchair in your living room near a table so that magazines, hobby supplies, TV remote, telephone (a cordless is a good idea) or other items you want can be within reach.
- Rearrange your kitchen so that often-used utensils are easily accessed. Place them at a height so that you do not need to bump into something accidentally.
- Have family or friends prepare some meals in advance and freeze them.



If you are interested in assistance from a home healthcare agency or public health nurse, select the agency before hospitalization. Your doctor's office can help you with these arrangements. Most of the time, your insurance will cover the cost of home health care for a few days (7-10 days) after surgery. It can be arranged that you have a nursing assistant come to your house and help with bathing and simple activities of life.

What to Bring to Surgery

- Remember to bring your sling
- Leave your valuables at home
- Do not bring your home medications, but it is important to have a list with the appropriate dosages. This will be requested at the time of registration
- Comfortable, non-skid walking or athletic shoes. Elastic laces or hook and loop fasteners are a plus, eliminating the need to tie you shoes.
- Clothes that are soft and loose fitting. Women can bring pants with elastic waistbands. For men, gym pants are easiest.

Your Hospital or Surgery Center Stay

You will be provided a time to come to check in to the surgery center or hospital. It is important to follow these instructions:

- You should stop all medications that have a potential to cause bleeding. The most common medicines that fall into this category include aspirin, anti-inflammatories, and blood thinners such as Plavix and Coumadin.
- You should discontinue all herbal and over-the-counter supplements one week before surgery. Some supplements affect bleeding tendencies and may cause problems with wound healing. You may continue multivitamins and should take 500mg of Vitamin C per day beginning when surgery is scheduled and continued for 1 month after surgery. This helps prevent bleeding at surgery and is helpful for healing.
- Before surgery, do not eat or drink anything after midnight. Your stomach must be empty before you receive anesthetic. This helps prevent nausea, vomiting, and other complications during and after surgery.
- Take a shower or bath the evening or morning before surgery. This will help decrease the amount of bacteria on your skin.
- A good night's rest is important before surgery.
- Do not wear makeup the morning of surgery.
- Remove nail polish before the day of surgery.
- Take only the medication your physician or nurse tells you to take on the morning of your surgery (with a small sip of water).

Morning of Surgery

- After admission, the nursing staff will take your temperature, pulse, respiration rate, and blood pressure.
- You will be asked to go to the restroom.
- Remove all jewelry (including rings) dentures, and contact lenses.
- You may wear your glasses/ hearing aid if necessary.
- An intravenous (IV) line will be started before surgery.

- Affected wrist may be shaved and scrubbed before surgery.
- The anesthesiologist will discuss the type of anesthesia to be used.
- You will be taken back to the operating room on a stretcher.

Anesthesia

The surgery is most commonly performed under general anesthetic, which means you get put to sleep. In most cases a regional anesthetic block is performed by the anesthesiologist prior to the surgery. This is a nerve block that will numb the nerves to your arm to help decrease postoperative pain for the first 6-18 hrs after the surgery. You may notice some tingling in the arm/hand as the block wears off. There is a very small risk of nerve injury with this procedure but the benefits of pain relief are typically thought to outweigh the risks.

Occasionally, your anesthesiologist may offer a nerve catheter which can help provide pain control for around two days.

Treatments for Distal Radius Fractures

Plate and Screws

There are many treatments used to heal a distal radius fracture, but the most common surgical treatment used is Volar Radius Locking Plates. Volar refers to the palm-side of the bone where the apparatus will be placed while locking refers to the ability of the screws to lock into place. While using the locking screws or pegs, the plate and screws system allows for the creation of an implant that resists movement in the plate and prevents movement of the bone.

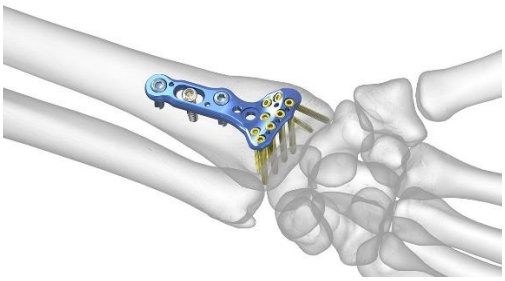


Figure 6: Viewing of a Volar Distal Radius Lock Plate.

Distal Radius Lock Plate Procedure

An incision is made on the palm side of the wrist (as noted in figure 7). The muscles tendons, nerves, and blood vessels are carefully moved aside to allow access to the broken bone. The fracture is carefully cleaned and realigned into its proper position. The plate described above is placed on the exposed bone. Then, with small wires the plate is held into place. X-ray is used to check the alignment of the fracture and the position of the plate. Once everything is in excellent position, holes are drilled for the pegs to go in. Then, small locking pegs are placed through the plate into the holes. Additional screws are used to attached the rest of the plate to the radius. Final alignment is checked. Appropriate muscles are moved back to their anatomic location and then the skin is closed with small sutures after making sure there is no significant bleeding.

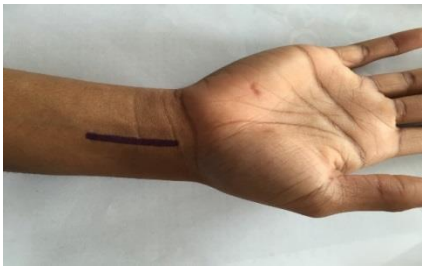


Figure7: Demonstrates incision over the flexor carpi radialis.

Risks Associated with Surgery

Most patients do not experience complications from distal radius fracture surgery. As with any surgery, however, there are some risks. These are usually minor and treatable. Potential risks with any surgery include pain, bleeding, infection, damage to surrounding structures like nerves or blood vessels, failure to heal or cure, need for additional procedures, and any medical or anesthetic complication. Loss of limb or death would be exceedingly rare with outpatient surgery.

Your surgeon will discuss the possible complications with you before your operation and you should ask any questions that you may have.

You can minimize your risk for complications by disclosing all medical conditions and medications you're taking as well as following your doctor's post-procedure orders carefully. This can include instructions on keeping your splint clean and dry.

What to Expect After Surgery

After surgery, you will be moved into the Post- Anesthesia Care Unity (PACU). Your relative(s) will be told when you are in the PACU. One of the most important functions of the PACU is to manage pain and nausea as you wake up from anesthesia. Nurses will monitor your vital signs, alertness, pain level, and need for medication.

In the PACU, you may notice a variety of equipment. The room is brightly lit as you wake up and noise may seem louder than usual. If you feel cold, blankets are available. It is normal to receive oxygen through a facemask.

It is normal to feel pain or discomfort after surgery. Tell the nurse if you are having pain or discomfort. When you have pain, the nurse will ask you to rate your pain on a scale of 0-10 (0 being no pain and 10 being worst imaginable pain). Pain medication can be given to make you more comfortable. Tell your nurse if you experience any other discomfort. If you suspect the pain medication is causing any nausea or other symptoms, let your nurse know.

There are many different medicines that are used for pain control and these are all available to you while you are in the surgery center or hospital.

The average length of stay in the PACU is about one hour. If there is an extended delay, your relative may check with the staff. When the anesthesiologist decides you are ready to leave, your family member will be notified and you will be transported via wheelchair to your car.

First Post-Operational Visit

Patients will typically have follow up appointment scheduled 10-14 days after surgery. If you do not have an appointment, be sure to call the office to set one up. At the first follow up appointment, we will check x-rays to check the alignment of the fracture. Surgeries treated with plate and screws will usually be placed in a fracture brace and will begin the Post-Op Exercise program to regain function. Stitches will be removed and Steri Strips will be placed on the incision site. These can get wet and will eventually fall off. In two weeks, any leftover strips should be removed.

Second Post-Operational Visit

Patients will typically follow up with the surgeon five to six weeks after the first post-operational visit. At this appointment, we will check x-rays to evaluate healing of the bone. We will also check the range of motion for the wrist and elbow. At this point if the fracture is healed, the patient will discontinue fracture brace. If the patient is having difficulty gaining motion/ recovering from stiffness, occupational therapy can be offered.

Third Post-Operational Visit

Patient will follow up with the surgeon again typically 4-6 weeks after the second post-operational visit to check final fracture healing and range of motion. At this time the patient may be released to go back to daily activities but we typically hold off on complete functioning (impact activities and heavy use) until 4 months after the procedure.

Discharge Instructions for Wrist Fractures

WOUND CARE: After surgery, you will be in a bulky dressing (bandage) with a splint that goes from the hand to your elbow with your fingers free. The splint is similar to a cast. The splint cannot be removed and must be kept dry. When showering or bathing, cover the splint and your hand with a plastic bag to keep everything dry. The splint protects the incision and the surgical repair, as well as lessens swelling.

SWELLING: Swelling is commonly experienced after the surgery. To minimize the swelling, elevate your hand and wrist above your heart as much as possible. A couple of pillows or a special pillow called a Carter pillow are good tools used to keep wrist elevated while sleeping. Also keep moving your fingers to decrease swelling.

NUMBNESS/TINGLING: It is not unusual to experience some diffuse numbness and tingling along the operated wrist especially if a nerve block was placed. In most situations, the feeling will return by the next morning. Sometimes if the splint is too tight from swelling this an cause numbness with worsening pain and if this is the case then the splint should be loosened carefully by unwrapping the ace wrap, gently opening the splint (do not remove) and then rewrapping it looser with the ACE wrap. If there is continued numbness, you should contact our office.

STIFFNESS: Move your fingers in moderation following surgery. Work to obtain full straightness of fingers and full bending of fingers as the splint allows. This will prevent stiffness in the fingers and will allow circulation of the blood from your fingers to your heart to help prevent blood clots and decrease swelling.

RELIEF OF PAIN: You will be prescribed pain medication to be used at home after your surgery. This is a narcotic pain reliever. Take 1-2 tablets every 4-6 hours as needed for pain. It is usually recommended to take the pain medicine every 4 hours for the first 24-48 hours, and then take it as needed. Keep in mind that the medication will cause drowsiness and should not be used with alcohol. Also, taking this medication on an empty stomach may result in nausea. It is common to feel discomfort when lying down to sleep at

night, so you may find it beneficial to take the pain pill at bedtime. If unusual side effects occur, please discontinue the medication and contact our office. When additional refills are needed, please contact our office or the pharmacy during regular business hours. Hopefully, in a short period of time you will be able to use over-the-counter medications for relief of pain and save the prescribe medication for use only when necessary.

DIET: The day after surgery, drink lots of fluids and eat soft, nutritious foods. An adequate diet is essential for the healing process.

NAUSEA AND VOMITING: Although unusual, both can be experienced after anesthesia. If you have a tendency for this, please discuss it with the anesthesiologist. Otherwise, it is usually alleviated with a clear liquid diet.

DROWSINESS: After anesthesia, drowsiness may persist for quite a while. It should cause no undue concerns. Do not drive until you feel clear-headed.

Physical Therapy

Once the bone has been mended and the splint removed, a therapy program is initiated to return strength and mobility to the wrist. As healing progresses and mobility returns, you will engage in heavier strength training to restore strength and build muscles in the wrist. Most patients can resume light aerobic activity involving the wrist such as swimming a month or two after surgery. Stationary recumbent biking may be begun1 week after surgery.

Below are some exercises frequently done starting with no weight.

Forearm Pronation and Supination

Make a fist with your palms up. Start with your elbows at your side and your forearms in front of your body at a 90-degree angle, then rotate your fists from the palm up to the palm down position and back again, as described in figure 8.

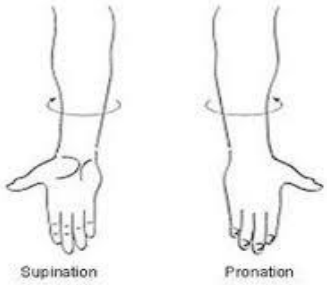


Figure8: Forearm Pronation and Supination

Wrist Circles

Make a fist with your elbows at your side thumb up. Start with your forearm supported by your other hand and then move your hand in a circle. Repeat this pattern in a clockwise direction and then in a counter-clockwise direction.

Wrist Flexion and Extension

With your forearm stationary on a table and your hand hanging over the edge, gently bend your wrist down until you feel a minor stretch. After five seconds, return to the starting position and bend your wrist upward until you feel another stretch. The motion is as if you are knocking on a door.

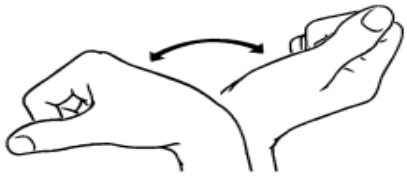


Figure 9 Flexion and extension of wrist

Grip Strengthening

Squeezing a soft ball will be helpful to alleviate swelling and stiffness of the wrist and fingers.



Figure 10: Grip Strength therapy for wrists

When to Contact Your Surgeon

Our doctor will give you instructions about how to care for your stitches or staples. As a general rule, you will want to keep the surgical site clean and dry. Your doctor will often place a surgical bandage over the site that they will remove at a follow-up visit. You can expect some numbness at the incision site, but call your doctor if you begin to experience:

- Swelling with worsening pain
- Redness
- Foul-smelling drainage or odor from the splint
- Fever (temperature above 101.5 degrees Fahrenheit or 38 degrees Celsius for more than 12 hours
- Increased pain that is unrelieved with pain medications
- Severe wrist pain

Future Fracture Prevention

While it's easy to think of your bones as a solid piece of material, they actually have many blood vessels that can promote healing. With time, your body will start to grow new threads of blood cells that will ultimately grow back together, helping to heal the bone. Just remember that even though the fracture has been repaired, it can happen again. Practice caution whenever possible to prevent re-injury. This can include eating a diet rich in bone-boosting foods, such as those that contain calcium and vitamin D. Wearing protective gear, such as pads, braces, or a helmet can all help you prevent a future fracture.

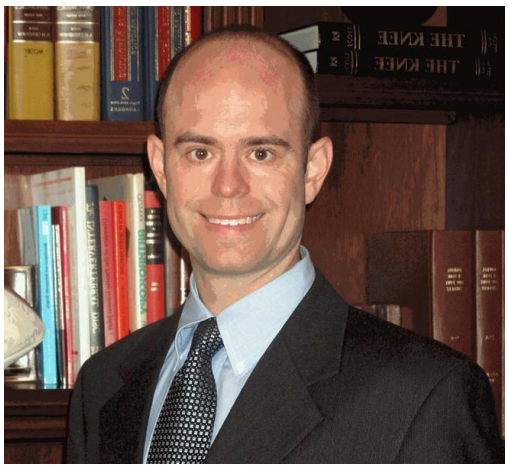
Frequently Asked Questions

1. How long does the surgery take?

   The kinds of distal radius fractures are so varied and the treatment options are so broad that it is hard to describe what to expect. An average surgery is around an hour and a half, but can vary depending on the fracture.

2. When can I return back to normal activity?
   Most patients do return to all their former activities, but what will happen in your case depends on the nature of your injury, the kind of treatment you and your surgeon decide upon, and how your body responds to the treatment. It is suggested to allow 3-4 months of healing before returning completely to daily activities.

About Your Surgeon



Chad Stephen Conner, MD specializes in sports medicine and arthroscopic and reconstructive surgery of the shoulder, hip, knee, and ankle. He is board certified in orthopedic surgery by the American Board of Orthopaedic Surgery with a subspecialty certification in orthopaedic sports medicine.

Dr. Conner grew up in Dallas, Texas and attended Lake Highlands High School. Beginning at age 5 he practiced gymnastics and went on to compete for the University of Minnesota gymnastics team in Minneapolis, Minnesota.

He attended The University of Texas Medical Branch for his medical school training and subsequent orthopedic surgery residency training. Following this, Dr. Conner completed a fellowship at the world renowned Southern California Orthopedic Institute. There he specialized in sports medicine, arthroscopy, and reconstructive surgery of the shoulder, hip, knee, and ankle. He helped care for athletes from the high school level to the professional level. His training also included specialization in shoulder replacement surgery and reverse total shoulder replacement.

Dr. Conner currently practices at the Waco Orthopedic & Sports Medicine Clinic in Waco, Texas and is a team physician for a local high school team. He is a member of the Arthroscopy Association of North America, the American Orthopedic Society for Sports Medicine, and the American Academy of Orthopaedic Surgeons.

He has done extensive research on treatment of massive rotator cuff tears, ACL reconstruction, hip arthroscopy and ankle arthroscopy. He is also involved in teaching hip arthroscopy as an associate master instructor at the Arthroscopy Learning Center in Chicago, IL. With Baylor University, he gives lectures for student classes and is involved in the Baylor Health Science Studies internship program mentoring students interested in orthopedic surgery.

Dr. Conner also volunteers at a community outreach organization called Mission Waco, which strives to provide Christian-based holistic, relationship-based programs that empower the poor and marginalized and was named Business of the Year by Mission Waco for 2013. He leads a monthly orthopedic and rehabilitation clinic at Mission Waco's free health clinic and has partnered with the hospitals to provide surgical care as well.

Outside of the office, Dr. Conner enjoys his wife and children, church, work outs, wakeboarding, and the outdoors.