

Dr. Myeroff's Distal Humerus Fracture Information Sheet

What is a distal humerus fracture?

- The elbow is made up of 3 bones (Figure 1 & 2): Each bone has complex 3D anatomy and a cartilage covered joint. It is a highly tuned joint with many functions.
 - The distal humerus (far end of your upper arm bone)
 - The proximal ulna “olecranon” (near end of your inner forearm bone)
 - The radius “radial head” (near end of your outer forearm bone)
- There are several important ligaments (Figure 3) and tendons around the elbow that play a role
 - Medial (ulnar) collateral ligament
 - On the inner side of your elbow, the “Tommy John” Ligament.
 - Often injured in athletes, especially baseball pitchers
 - Lateral ulnar collateral ligament
 - On the outer side of your elbow
 - This is by far the most important ligament in elbow injuries
 - Needed for normal elbow use.

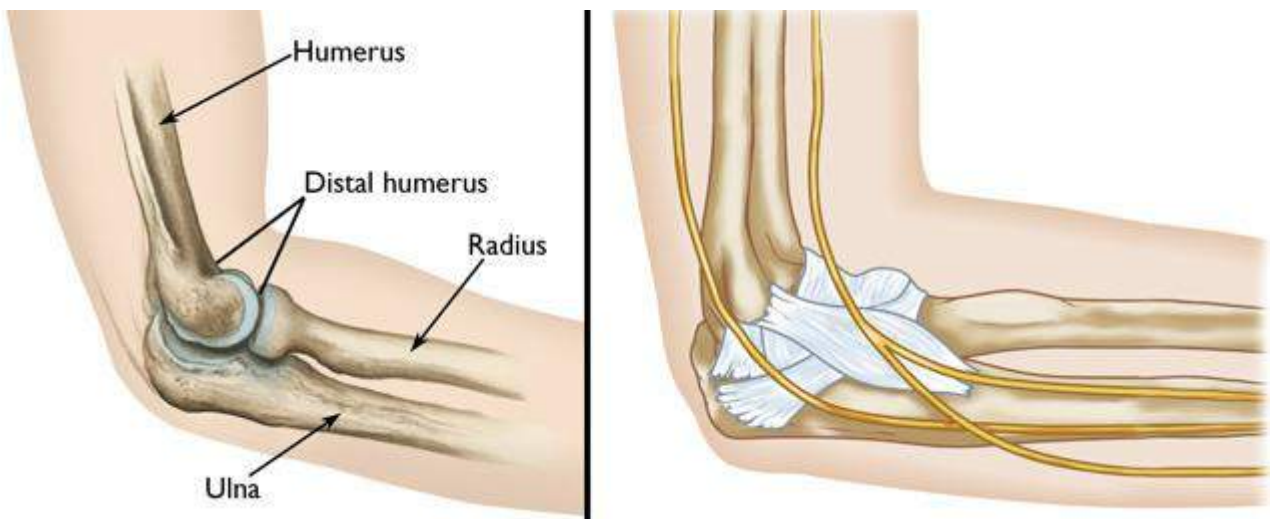


Figure 1(Left) The bones of the elbow. (Right) The nerves and ligaments of the elbow. (<https://orthoinfo.aaos.org/en/diseases--conditions/distal-humerus-fractures-of-the-elbow/>)

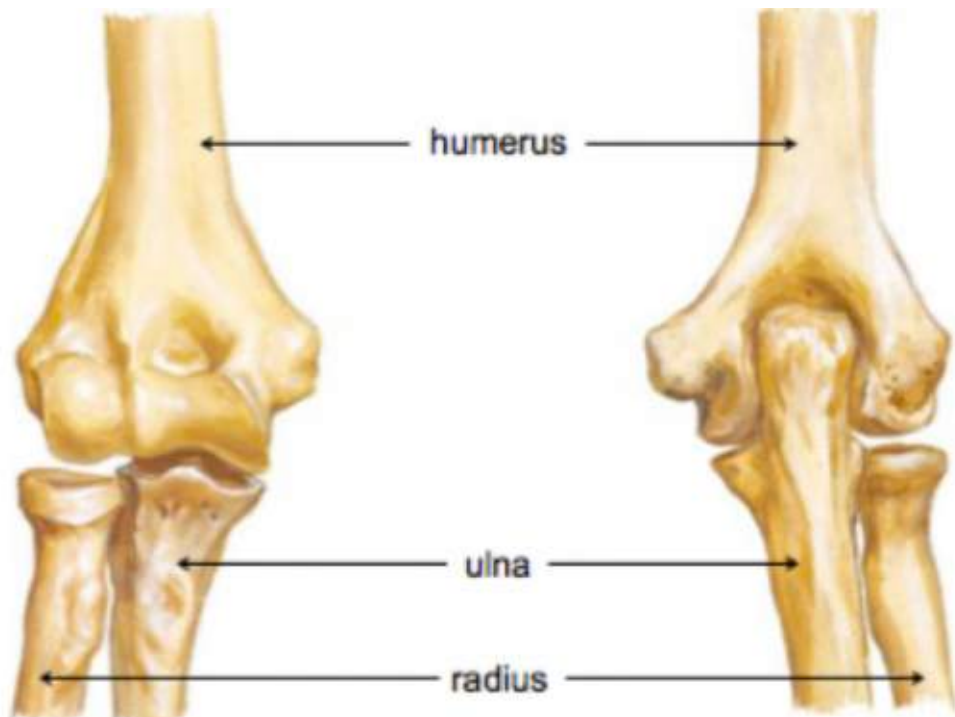


Figure 2 Elbow viewed directly from the front (left) and back (right).

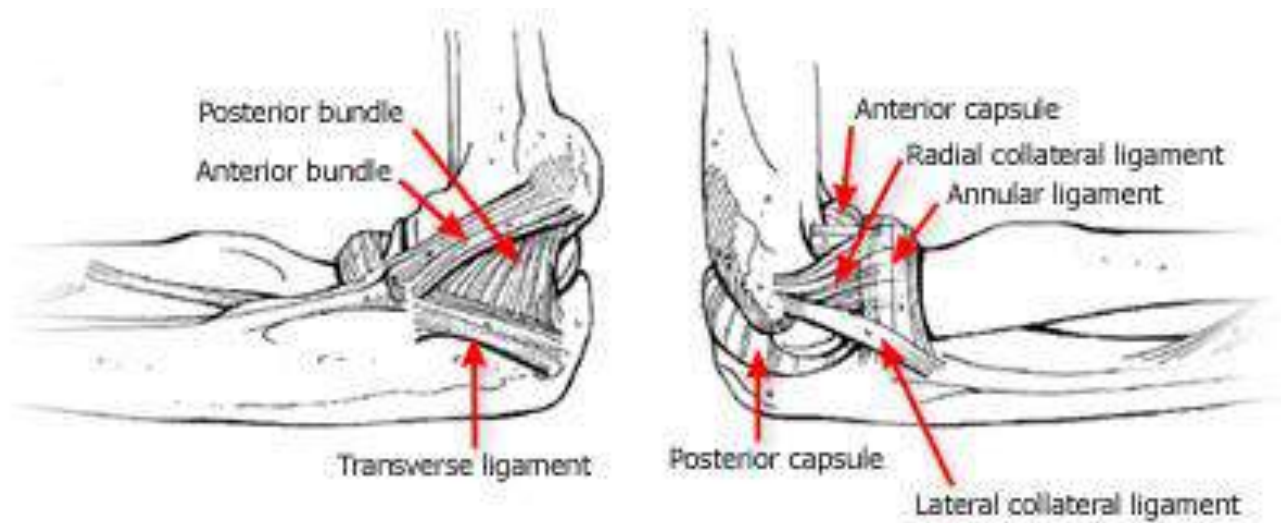


Figure 3 (Left) Medial elbow ligaments (Right) Lateral elbow ligaments

- Distal Humerus Fractures

- The end of your upper arm bone makes up the top half of your elbow (Figure 2). It is a complex 3D shape allowing both bending, and rotation of the elbow.
- The distal humerus can be broken in a simple crack or on many pieces (comminuted; Figure 4a)



Figure 4a (Left) Severe fracture of the distal humerus with multiple breaks into the joint surface. Figure 4b (Right) Anatomic reduction and fixation with plates and screws resulting in bony healing.

- Distal humerus fractures are at risk of two conflicting outcomes
 - **Instability** (dislocation)– Ligament and bony injury (fracture) can cause the elbow can dislocate or be unstable. Fortunately, this is very rare in distal humerus fractures.
 - **Stiffness** – because of its complex anatomy, the elbow is famous for stiffness after injuries.
 - After the first 3 months from injury, it is incredibly hard or impossible to obtain more motion in the elbow without a surgery.
 - Therefore, our window to optimize your lifelong elbow function (mostly in the form of motion) is as soon as safe.
 - You will, however make some gains for up to a year
 - For this reason, our goal is to begin range of motion with therapy as soon as it is safe.
 - This is one of the main reasons surgery is often recommended.

How are distal humerus fractures diagnosed?

- The first thing I do is listen to your story.
- Exam: I will examine your elbow carefully. I will mostly be checking your nerves and ruling out additional injuries (especially elbow, wrist and skin issues).
 - If the bone came through the skin (termed ‘open fracture’) that is an emergency and requires urgent surgery to decrease your chance of infection.

- If you have increasing pain to the point narcotics are not helpful and it is progressive this could be an emergency called compartment syndrome and you should come to our emergency room immediately.
- Imaging:
 - X-Rays: This is the first and most helpful test we can get.
 - X-rays provide a lot of information about your bones.
 - For some severe injuries, I may order a CT scan. This shows me a 3D X-ray of your bones and helps with planning your treatment.

Day of injury

- Typically, you will be seen in an urgent care or emergency room
 - TRIA Orthopaedic Center
 - Regions Hospital
- An exam will be done to check your nerves and arteries.
- Images will be obtained, often including adjacent bones to make sure other injuries are not missed.
- If you have an “open fracture” (poke hole in the skin), you will be given antibiotics and a tetanus shot, and advised to undergo urgent surgery (within 18-24 hours) to decrease your chance of infection.
 - This means being transferred to a Level I Trauma Center like Regions Hospital.
- Your elbow will be immobilized in a splint and you will be given a sling to support the arm.
 - If your sling is uncomfortable we can provide you a different design at your clinic visit.
- It is never too early to work on controlling swelling and finger range of motion discussed below.

How will we get you back to function?

- Your treatment plan is a shared process between you, myself, and your loved ones (if you wish). It is based on your level of activity, your health, and your fracture type. Most importantly it is based on your decision after we have a thorough discussion on the risks and benefits of each option – a process called informed consent.
- Treatment of these fractures is a battle between perfect fracture healing (best done by **NOT MOVING** the elbow) and preventing stiffness (best done by **MOVING** the elbow). Hence, our **dilemma!**
 - The elbow gets stiff very easy so I very rarely recommend keeping the elbow still for very long.
- Goal - Maximize your function by following these steps:
 - Decrease swelling
 - Swelling can increase your scarring, your pain and contribute to stiffness
 - To combat this, I recommend:
 - Routine icing 20 minutes every hour while awake
 - Elevation above your heart as much as possible (Figure 5)

- When possible you should lay on your back (supine) with your elbow propped up over your chest with or without your sling.
 - By using with a pillow folded at your side, and another folded on your chest.
 - This is the only way to truly elevate your elbow above your heart.
 - It is nearly impossible to elevate your arm above your heart without laying down.
- An Ace wrap, tubigrip stocking or other gentle compressive sleeve from the hand to the armpit should be used for at least 4 weeks.
- Finger motion helps pump excess fluid out.
- Restore or maintain your anatomy
 - Restore: Surgery is usually recommended for distal humerus fractures to restore your bone and cartilage alignment, to improve your chances of healing and regaining motion and function.
 - Doing this allows us to safely begin early range of motion with physical therapy to combat stiffness.
 - Maintain: Very specific activities and restrictions help protect the repairs made, or prevent further shifting of your bones.
- Maintain your finger and wrist function (Figure 6)
 - You must come out of your sling 2-3 times per day to work on finger and wrist motion. We don't want to cause stiffness elsewhere just because your elbow is injured.
- Maximize your elbow motion (Figure 7)
 - Once your fracture is stabilized, your splint will be removed ASAP.
 - Timing and degree of elbow exercises depends on many factors but usually begins within 2 weeks of injury or surgery.
 - I will guide you through this and provide instructions to you and your therapist.
 - Remember you have 3 months to beat scar formation in the elbow!
 - Manipulation under anesthesia
 - If you do not make the gains we would expect, we may need to perform another surgery around 3 months where we move your elbow aggressively while you are asleep under anesthesia.
 - We are restricted somewhat by healing. The more healed your injury is, the more aggressive we can be with your exercises.
- Return to function
 - Elbow strengthening is usually not a problem and begins after you have regained full motion and your bones and ligaments have healed.

- Usually starts around 6-12 weeks after injury.
- Expectations
 - **Your results are based on obtaining as normal anatomy as possible and as much motion as possible, not usually your strength.**
 - Expect 3-6 months until you can return to heavy labor, 6-12 months until your recovery is complete.
 - You will be clear to do desk work usually within the first 2-6 weeks after your injury.
 - I recommend discussing work restrictions (and vocational training if needed) with your employer as soon as possible.
 - Our office will provide notes, and complete your employer's paperwork as appropriate.
 - You can expect at least 20 degrees loss of flexion and 20 degrees loss of extension.

What are your treatment options?

- Your treatment choice is a shared process between you, me, and your loved ones.
 - I present all of the information we know and you decide what fits your goals.
 - In rare instances I will make a strong recommendation.
- **Non-operative (conservative) treatment:**
 - Very rarely, distal humerus fractures can be managed without surgery, but this decision should usually be made with the help of an orthopaedic surgeon.
 - Medically unwell
 - Ultra low-demand patients
 - Active infection, open wounds
 - When surgery is ill-advised or unsafe
 - Non-operative treatment involves a period of restrictions, followed by physical therapy for motion once your fracture is stable enough to begin motion exercises.
 - The timing of beginning and advancing your rehabilitation, and time to healing are variable and dependent on many factors unique to you.
 - Benefits
 - Little to no additional medical risk
 - Risks
 - Wounds or Infection
 - Even perfectly placed splints, casts and braces can cause skin or wound issues
 - Please let a provider know if you are experiencing unexpected discomfort or note any blistering, wounds or signs of infection
 - Non-union

- There is a very high chance the bones don't heal
 - Mal-union
 - There is a chance the fractures heal in the wrong position
 - If there is a lot of shift in your fracture (especially if it goes into the joint cartilage surface), this can contribute to pain, stiffness, arthritis and weakness
 - Stiffness (scar)
 - We can't start elbow motion (breaking up the scar) until your fracture shows signs of healing and stability
 - You will likely have some degree of permanent stiffness regardless of your treatment.
 - Especially fully straightening.
 - Our goal is minimizing this as much as possible.
 - Instability
 - It is possible for some fractures or dislocation to continue to be unstable (subluxation or dislocation).
 - This usually requires surgery to repair or replace your ligaments.
 - There is a chance we need to perform surgery later.
 - This could be either bone or ligament repair, bone excision, or motion procedure.
 - Delayed surgery is slightly riskier.
 - Heterotopic ossification
 - For unexplained reasons, elbow injuries are prone to developing extra bone which limits motion and can affect nerves and arteries.
 - Avascular Necrosis (dead bone)
 - The injury can cut off the blood supply to your bone and may result in the bone dissolving.
 - Arthritis
 - Arthritis occurs in 20% of elbow injuries overall
 - The cartilage can be damaged at the time of injury.
 - More common when there is ligament instability (especially when not addressed surgically)
 - Complex Dislocations / Terrible triad
 - Continued pain
- **Surgery**
 - Most distal humerus fractures are best treated with surgery. This is because the fracture is generally not stable and not suitable for early therapy otherwise. (which is crucial to minimize stiffness, instability, and arthritis)
 - Goal (Benefits):
 - Restore anatomy
 - Surgery allows the best chance of your bones healing in normal alignment
 - Early Rehabilitation

- Maximize your range of motion (and function)
 - A stable, well-fixed elbow has fewer restrictions and earlier rehabilitation
 - Limit skin and soft tissue complications associated with casting
 - Goal: Limit splinting or immobilization to <2 weeks
 - Decrease Arthritis
 - Restore your cartilage joint surface as well as possible
 - Address ligament instability
 - Which can cause repetitive cartilage injury.
- **Open Reduction and Internal Fixation**
 - Fixing the fracture with metal plates and screws (4b).
 - This positions and holds your bones and cartilage as close as possible to normal, while they heal.
 - There is some new scar created from surgery, but the new stability allows us to begin early therapy to combat stiffness.
 - I almost always start occupational therapy within 2-weeks of elbow surgery, Often as early as the day after surgery
 - Olecranon osteotomy
 - For severe fractures, I may have to crack open an additional bone (the olecranon) to see the fracture better.
 - If I do this, there is an additional risk that this bone doesn't heal or that the plate used to repair it bothers you.
 - Ulnar nerve surgery
 - Ulnar nerve decompression
 - I always almost expose this nerve to free it and protect it throughout the surgery.
 - This lowers the risk of nerve injury, but can irritate it or potentially cause additional injury
 - Ulnar nerve transposition
 - In some cases, the nerve will be bothered by your metal implants, or will be unstable.
 - If so, I recommend moving the nerve to a new location from behind the elbow to the front. This decision is usually made at the time of surgery.
 - I will discuss this possibility with you.
- **External fixation**
 - Very rarely, we may need to place external pins and bars on the elbow to provide temporary stability
 - I would discuss this with you if there is any risk of needing this.
 - In the setting of very unstable elbows or in severe injuries with profound skin and muscle damage.

- These are generally removed as soon as possible when definitive surgery or elbow stability (healing) is complete.
- Risks
 - Surgery shares many of the same risks as non-operative care:
 - Some risks are higher with Surgery:
 - Infection / wound issues, Heterotopic ossification
 - Some risks are lower with surgery:
 - Non-union, Mal-union, Instability, Arthritis
 - Complications specific to surgery
 - Infection
 - 3-5% risk
 - Nerve or blood vessel injury
 - Up to 20% risk of temporary nerve irritation. This is can rarely permanent.
 - The most at risk nerve is the ulnar nerve, but the median nerve and radial nerve can be injured as well.
 - It is not uncommon to have some forearm numbness after surgery.
 - Symptomatic hardware
 - Some patients are irritated by the implants, up to 20% of patients wish to have them removed.
 - This number is lower in my practice, and I do not remove these types of implants very often.
 - Medical complications
 - Urinary tract infections, pneumonia, cardiac complications, transfusion, blood loss, blood clot
 - Repeat surgery
- **Hospital Course**
 - If elbow surgery is chosen, studies show it is best to be done within 2 weeks of injury.
 - Most surgeries take about 4 hours, but this varies.
 - Usually about half of the day is dedicated to getting ready and recovering.
 - You will speak with the anesthesiologist on the day of surgery to determine the appropriate pain control options.
 - You may be offered a nerve block by the anesthesiologist to numb the entire arm for up to 12 hours.
 - If not, I will place numbing medication in the incision to help.
 - If this is your only injury, surgery is usually done outpatient meaning you go home that day.
 - For more severe fractures, or when there are other injuries, you may stay overnight.
 - A benefit of this is the opportunity for medical management and early physical therapy.

- **Recovery (regardless of treatment choice):**
 - Bone healing takes about 6-12 weeks.
 - Prior to that, the bony fragments are prone to moving out of place if your activity is too aggressive.
 - That's why you will have restrictions to protect the repair.
 - Desk work or light duty is usually appropriate for this period as soon as you feel up to it.
 - You will be released from restrictions after this period if your elbow is healed and you are physically capable.
 - Otherwise you may require continued occupational therapy to complete your recovery.
 - Top ways YOU can help.
 - **Read this packet!**
 - Set your expectations for return to work / sport appropriately.
 - Make arrangements ahead of time
 - Speak with your employer and come up with a plan.
 - Please fax employer or insurance related paperwork to me as early as possible to 651-254-8127.
 - **Stop smoking!**
 - **Smoking doubles your risk of the bones not healing (nonunion), doubles the time it takes to heal, and quadruples your risk of complications.**
 - I recommend nicotine alternatives (gum, patches)
 - I recommend consulting your primary doctor for consideration of Chantix, a medication that has been shown to improve your chances of quitting.
 - Control your diabetes
 - Poorly controlled blood sugars severely increase your risk of medical and surgical complications especially infection.
 - Avoid NSAID Ibuprofen, Advil, Aleve for 6 weeks
 - These may prevent bone healing.
 - Bone health
 - I recommend the following medications to help healing and prevent another fracture:
 - Initiating over the counter supplements (I recommend Citrical petite)
 - 1500mg Calcium daily
 - 2000 IU Vitamin D daily
 - If your fracture occurred from a low energy fall (ground level fall), it is possible you have osteoporosis (thinning of the bones) and I highly recommend and will facilitate bone health workup with labs and a DEXA scan.
 - You will have a consult with our bone health specialist (Donna Marko, NP-AG) to forge a plan to optimize your bone strength.

- You should work with therapy on avoiding future falls:
 - Home safety evaluation
 - Cane / walker / wheelchair
 - Balance / strength training
- Follow by your restrictions with 2 main early goals
 - **Avoid fracture displacement:** Your restrictions are meant to allow safe physical therapy while preventing too much stress on your repair
 - The plates, screws and sutures are strong, but not nearly as strong as your own power.
 - **Avoid stiffness:** You should:
 - Elevate the elbow as much as possible over the chest on pillows while you are lying flat (Figure 5).
 - Swelling contributes to pain, stiffness, and wound complications.
 - Move your fingers, wrist and elbow three times per day starting as soon as you are allowed (Figure 6-7).
 - You will receive personalized rehab protocol. You should view this as a home exercise program. **You should do your exercises three times per day.**
 - Remember: Therapy is a thing you do, NOT a place you go!
 - Therapy is your homework
 - The therapist is your teacher, designed to keep you on track.
 - Be patient... be A patient!
 - You are probably eager to begin strengthening and get back to your activities, but you have to trust the process.
 - You will get your strength back, it is more important you follow by your restrictions, heal your fracture, and regain your motion.

Elbow Elevation



1. Lay as flat as you can comfortably
2. Place one pillow doubled over next to your injured shoulder to keep your upper arm from dropping down
3. Place another pillow doubled over on your chest to support your forearm

- *It helps to have your sling on
- *You should be in this position most of the day for the first 1-2 weeks
- *This is the only reliable way to elevate your elbow above your heart



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Figure 5 Elbow elevation above the heart

Finger Range of Motion



Cycle through the above motions with the assistance of your other hand

- *This will prevent stiffness and swelling



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Figure 6 Finger range of motion

Protected Elbow Range of Motion

For ligament injuries and unstable fractures
Elbow dislocations, Lateral ligament repair, Terrible triad injuries



Flexion



Extension



Avoid varus at the elbow!
-No reaching out and overhead
-Keep your elbow tucked at the side



Pronation



Supination

Only straiten the elbow with the wrist in pronation

Only supinate with the elbow bent to 90°

Types of Motion

Passive: An outside force moves your arm for you entirely

Active assist: Using the power of your injured arm with the assistance of your uninjured arm or an outside force

Active: Using the power of only your injured arm

*Tuck your elbow at your side for all exercises

*Can be done sitting, laying, or standing

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Figure 7 Protected elbow range of motion

Want More information?

- Please visit:
 - twincitiesshoulderandelbow.com
 - <https://orthoinfo.aaos.org/en/diseases--conditions/distal-humerus-fractures-of-the-elbow>
- Regions Hospital / Health Partners Specialty Center
 - Clinical questions: 651-254-8300 option 2
 - To schedule appointments: 651-254-8300 option 1
 - To schedule surgery: 651-254-8399 or 651-254-8338
 - Fax employer or insurance related paperwork ASAP to 651-254-8127.
- TRIA Orthopaedic Center
 - Clinical questions: 952-977-3301
 - To schedule an appointment: 952-831-8742
 - To schedule surgery: 952-977-3414
 - Fax employer or insurance related paperwork ASAP to 952-977-3459.