HealthPartners Specialty Center

Twin Cities Shoulder & Elbow

TRIA ORTHOPAEDIC CENTER

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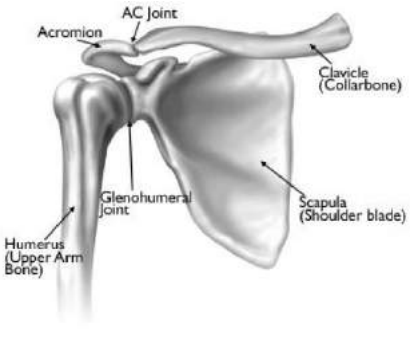
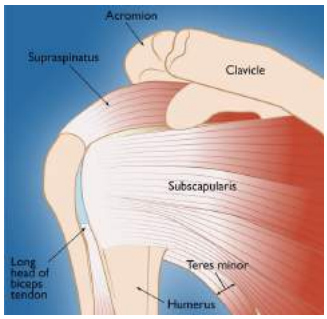
Dr. Myeroff's Proximal Humerus Fracture Information Sheet

Shoulder Replacement

What is a proximal humerus fracture?

- The shoulder joint includes the top portion of the arm bone (proximal humerus; the "ball") and the shoulder blade (glenoid - part of the scapula bone; the "socket") (figure 1).
- The rotator cuff consists of 4 relatively small, highly synchronized muscle-tendon units that come from the socket and attach on the proximal humerus (figure 2). They have a significant role in shoulder motion and strength. They make small coordinated changes that allow your big muscles (deltoid and latissimus) to provide efficient strength.
    - 4 Tendons: Supraspinatus, Infraspinatus, Teres Minor, Subscapularis.
- When the bone breaks near the rotator cuff and there is shifting of the bones, the shoulder function can severely affected.
- How do these fractures occur?
    - An Injury (trauma):
        - High energy injuries: Car crash, fall from ladders, sporting injuries
        - Low energy: Ground level falls
            - These injuries are concerning for osteoporosis and warrant evaluation and treatment of your bones to prevent another fracture!
- Types: There are multiple varieties of proximal humerus fractures
    - Parts: I will give your fracture a grade, 1-4, based on the number of pieces (figure 3).
        - 1 – part: There is a fracture line that is barely displaced.
            - almost normal alignment
        - 4 – part: There are 4 distinct displaced pieces, the highest grade
        - Head Split: This means the ball portion itself is cracked
        - Fracture-Dislocation: The bone is both broken, and dislocated.





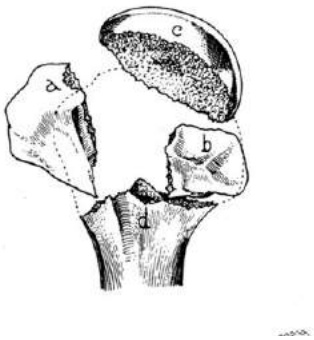


Figure 1 Normal Shoulder Bony Anatomy. https://orthoinfo.aaos.org/en/diseases--conditions/arthritis-of-the-shoulder

Figure 2 https://orthoinfo.aaos.org/en/diseases--conditions/rotator-cuff-tears/

Figure 3 The parts of a proximal humerus fracture. Codman 1934

How are proximal humerus fractures diagnosed?

- The first thing I do is listen to your story, which usually includes an injury.
- Exam: I will examine your shoulder carefully. I will mostly be checking your nerves and ruling our additional injuries (especially elbow, wrist and skin issues).
- Imaging: If you haven't already had them recently, I will obtain X-rays (Figure 4a, 6a).
    - In proximal humerus fractures, I will look for the number of pieces (fragments) that are broken and how much they have moved (displacement) (Figure 3).
    - For some severe fractures, I may order a CT scan. This provides me a 3D image of your facture and helps with planning your treatment.

How will we get you back to function?

- Treatment decision is a shared process between you, myself, and your loved ones. It is based on your level of activity, your health, 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 shoulder) and maximizing your motion (best done by **MOVING** the shoulder. Hence, our **dilemma**!
- Goal: Regardless of treatment chosen, our goal is to maximize your function with the following steps:
    - Restore or maintain your anatomy
        - Restore: Surgery, or rarely, gravity alone can restore your anatomy
        - Maintain: A period of protection in a sling can minimize further bone movement while your body heals the fracture.
            - Treat your arm like a limp noodle to avoid the rotator cuff muscles from pulling the bones apart.
    - Maintain your finger (Figure 7), wrist and elbow (Figure 8) function
        - You must come out of your sling 2-3 times per day to work on elbow wrist and finger motion. We don't want to cause stiffness elsewhere just because you are in a sling!
    - Safely regain shoulder motion once your fracture is stable enough (Figure 9)

What are your treatment options?

- Treatment is always shared decision making between you, me, and your loved ones.
    - I present all of the information we know and you decide what fits your goals.
    - Factors include your level of activity, your health, your fracture type.
    - Treatment plans often evolve based on your fracture, your recovery, and your preferences.
    - In rare instances I will make a strong recommendation.

- Most importantly it is based on your decision after we have a thorough discussion on the risks and benefits of each alternative – a process called informed consent.

- **Non-operative (conservative) treatment:**
  - I treat over 80% of proximal humerus fractures without surgery.
  - I recommend this in patients where a surgery would add little to no benefit in your outcome.
    - Minimally displaced and simple fracture patters
      - Where the rotator cuff (and bones they attach to) are in good position
      - Regardless of age or activity
    - Lower demand patients
    - Medically unwell
      - When surgery is ill-advised
  - Non-operative treatment involves a period of restrictions, followed by physical therapy once your fracture is stable enough to work on motion.
  - The speed of rehab and final outcome are variable and dependent on many factors (fracture pattern, speed of healing, your comfort).
  - In general, for simple fractures we aim to get your shoulder to 60-90% of your pre-injury function depending on how severe the fracture is.
  - Benefits
    - Little to no medical risk associated with surgery like infection, blood vessel or nerve injury
  - Risks
    - Non-union: There is a chance the bones don't heal
    - Malunion: There is a chance the fractures heal in the wrong position
      - Poor position can result in pain, stiffness and weakness
      - Anatomy – Some degree of malunion is predictable since we have little ability to improve the bony alignment, sometimes it can worsen with time and muscle forces.
    - Stiffness (scar)
      - We can't start shoulder motion (breaking up the scar) until your fracture shows signs of healing
      - From that point we do all we can to regain motion with therapy.
    - There is always the chance we need to perform surgery later.
      - Delayed surgery is slightly more complex and more costly as far as time.
    - Avascular Necrosis (Dead Bone)
      - Regardless the treatment we choose, the blood supply to your bone has been injured by this fracture and may result in the bone dissolving.
        - Occurs in about 10% of overall fractures

            - More common in high grade (4-part fractures, fracture-dislocations, head split fractures).
                - Up to 90%
            - When it occurs, it may require surgery.
        - The good news: It is only symptomatic in 10% of the patients it occurs in.
    - Continued pain
    - Need for future surgery

- **Surgery**

  When the fracture alignment is not compatible with the function you need (Figure 4a), surgery can improve the alignment and chance of meeting your goals. It can also stabilize the shoulder enough to allow earlier rehabilitation. There are really 3 surgeries routinely performed for proximal humerus fractures. If surgery is needed, ideally we can fix the bones with plates and screws (open reduction and internal fixation). Sometimes this is not possible and replacement is a better option. I am equally comfortable with all of these surgeries and will recommend, and perform what is right for you.

  - **Open Reduction and Internal Fixation**
    - Fixing the fracture with internal plates and screws (Figure 4b)
      - I recommend this in about 15% of the patients I treat.
      - This restores your bony anatomy and the position of your rotator cuff as close as possible to normal.
      - There is some new scar created from surgery, but solid fixation allows us to begin earlier therapy.
        - You will have a similar, but accelerated, protocol compared to those treated without surgery.
    - What is involved?
      - Hospital stay
        - Sometime this injury can be treated with same day surgery (young patients with isolated injury).
        - More commonly you will stay overnight for pain control and therapy.
      - The actual surgery takes about 2-3 hours.
      - Usually about half of the day is dedicated to getting ready and recovering
      - Most of my patients stay overnight in the hospital
      - You will be offered a nerve block by the anesthesiologist that will numb your arm for about 12 hours and decrease the pain medications you need in that time.
    - Risks
      - There is a low 1-3% risk of each of the following:
        - Infection

- Nerve or blood vessel injury
- Symptomatic hardware
    - Screw malposition (or shifting) requiring return to the operative room
    - Irritation (Impingement) of the plate
- Medical complications
    - Urinary tract infections, pneumonia, cardiac complications, transfusion, blood clot
- Nonunion (failure of the bones to heal)
- Malunion (healed in wrong alignment)

▪ Overall:
- You have a 15% risk of a complications
- Your risk of needing another surgery is 13% within the next 10-years.
- Many patients have some degree of permanent stiffness.

○ Benefits
▪ Reconstruction of you shoulder bones into as normal position as possible
- Best chance of your fracture healing in a good position

▪ Earlier rehabilitation
▪ Higher potential function (pain, motion, strength)

○ What does surgery not do?
▪ I do not recommend surgery for acute pain, but rather it would be offered to maximize your long term pain and function.
▪ While surgery does allow us to start therapy sooner sometimes, it does not necessarily accelerate your final recovery.

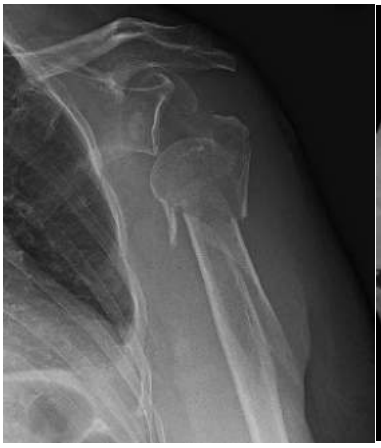


Figure 4a: Displaced 3-part proximal humerus fracture with extension into the shaft

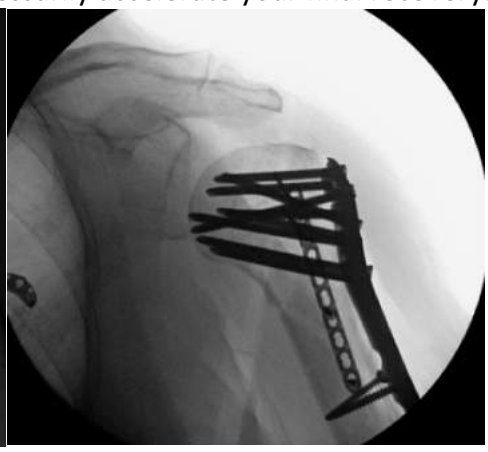


Figure 4b: 3-part fracture after open reduction and internal fixation with plates and screws

- **Shoulder Replacement**
    - Our preference is to avoid surgery, or fix your own bones in appropriate position.

        - Sometimes that is not possible.
            - If you are at risk, I will discuss this with you ahead of time.
            - This may require being prepared for both options ahead of time "fixing versus replacing"
                - In this case we plan for a replacement as a backup option.
                - With your permission, I decide in the operating room what is best or frankly, what is possible.
    - Shoulder replacement is recommended in several situations
        - Fractures so bad that the bones cannot be adequately reassembled.
        - When the bone is badly broken, and very frail (osteoporosis)
            - Plates and screws may be inadequate to allow stable fixation and early motion.
        - Pre-existing shoulder arthritis, rotator cuff tears, or dysfunction.
    - What are the types of replacements?
        - **Hemiarthroplasty**
            - Partial replacement of the ball (humeral head) with metal. I leave your normal socket (glenoid) as is.
                - This is used to replace the humeral head (ball joint) when we are unable to adequately repair your shoulder.
                - I then repair your tuberosities (bone attached to the rotator cuff) back to the implant.
            - Indications
                - Highly active patients <60 years-old with severe injuries.
                    - When there is a high chance of avascular necrosis (bones dying from loss of blood supply).
            - Risks
                - Loss of function
                    - If your fracture is not repairable, the hemiarthroplasty is the next most likely option to restore excellent function, but only a 50% of patients will achieve this.
                - It is possible that bone attached to the rotator cuff heals in the wrong position (malunion) or does not heal at all (nonunion). The bone may actually dissolve (resorption). This compromises your outcome.
                    - Tuberosity malunion (6%)
                    - Tuberosity nonunion (6%)
                    - Tuberosity dissolving ('resorption' 13%)

        - Glenoid arthritis – Over a period of years, the metal from the head may ware out the cartilage on the socket (glenoid). This may require another surgery to replace the socket.
        - Further Surgery
            - Higher likelihood of repeat surgery compared to reverse shoulder arthroplasty
        - While each of the below risks is low (around 1%), it is important you know they are possible albeit unlikely. In decreasing order of frequency, the risks include:
            - Implants loosening or wearing out, instability, rotator cuff tear, bone fracture, infection, blood loss, blood clot, neurovascular injury, medical complications.
        - Overall:
            - You have a 11% risk of a complications
            - Your risk of needing another surgery is 5% within the next 10-years.
    - Benefits
        - Eliminates the risk of your own head later dyeing away
        - Decreases the chance of your bones shifting after fixing with plates and screws.
        - Best chance of excellent function in severe fractures in young active patients.
            - Better shoulder rotation compared to reverse shoulder arthroplasty
- **Reverse Total Shoulder Arthroplasty**
    - What is it?
        - Your socket is replaced with a ball, and you ball is replaced with a socket (hence "reverse") (Figure 5b, 6b).
            - Used in setting when we expect the rotator cuff to no longer be effective
                - Like when the portions of your fracture with the rotator cuff attached (tuberosities) are badly injured and do not heal appropriately.
                - This allows your deltoid to do more of the work!
        - The reverse shoulder arthroplasty was FDA approved in 2003. While long term data is limited, it has quickly become the most common type of shoulder replacement worldwide due to such predictable results even in severe cases.
    - Indications
        - This is indicated in lower demand patients >60 years-old with severe injuries that are not able to be well fixed.

- Risks (in decreasing order of frequency)
    - Instability (dislocation), implant loosening, nerve or vascular injury, bone fracture, blood loss or blood clot, infection
        - Overall:
            - You have a 18% risk of a complications
            - Your risk of needing another surgery is 5% within the next 10-years.

- Benefits
    - Reverse shoulder arthroplasty does not offer perfect function, but it does provide the most predictable outcome for very bad fractures
        - Does not require bony fracture healing
        - Quickest surgery, most routine
        - Lower chance of repeat surgery compared to fixing the fracture.

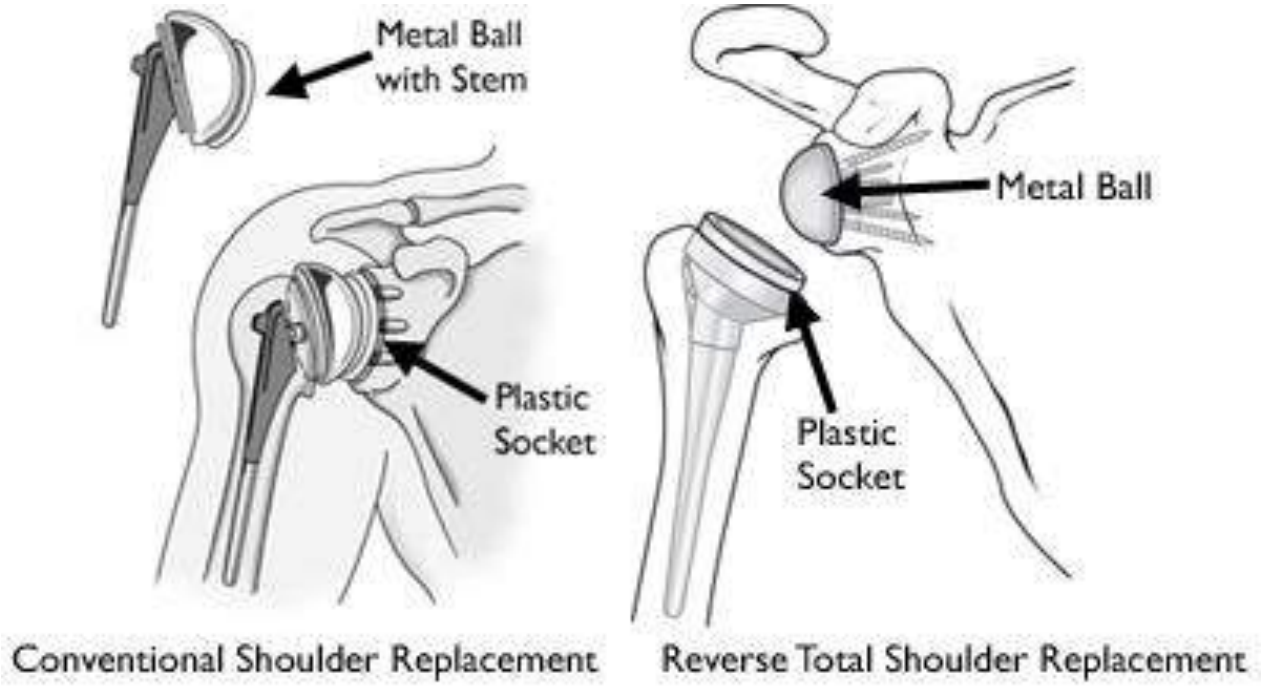


Figure 5a (Left) A conventional total shoulder replacement (arthroplasty) mimics the normal anatomy of the shoulder. 5b (Right) In a reverse total shoulder replacement, the plastic cup inserts on the humerus, and the metal ball screws into the shoulder socket. Available: https://orthoinfo.aaos.org/en/diseases--conditions/arthritis-of-the-shoulder

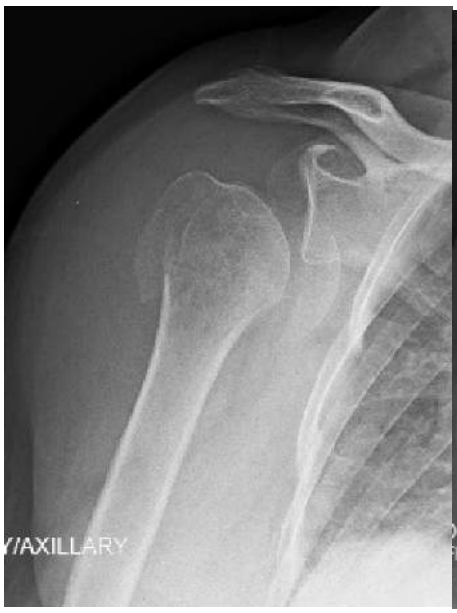


Figure 6a: Displaced head split 3-part proximal humerus fracture with a dislocated portion of the head

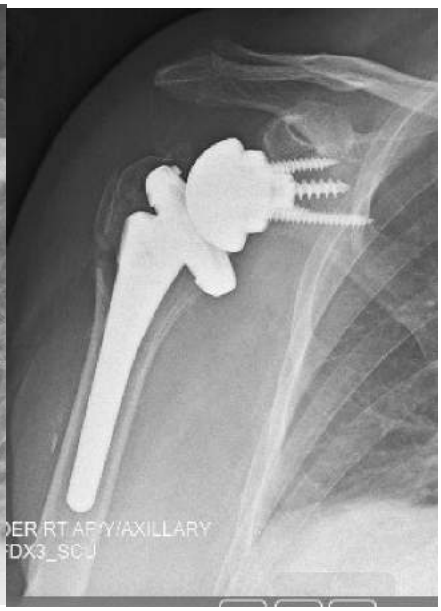


Figure 6b: Head split fracture after reverse shoulder arthroplasty.

- **Recovery:**
  - The biggest complaint patients have is an insufficient communication of the time, discomfort and rehab associated with the recovery.
  - Bone healing takes about 6-12 weeks.
    - Prior to that, the bony fragments are prone to shifting further.
    - For this period of time you will have restrictions to protect the repair.
  - How can you help?
    - Read my open shoulder surgery packet
      - Follow my pain regiment, ice
      - Sleep upright for comfort
      - Swelling control (stocking, elbow finger motion)
    - Stop smoking
    - Close diabetes control
    - Avoid NSAIDs (ie ibuprofen, advil, alieve) for 6 weeks
    - Bone health
      - I recommend:
        - Initiating over the counter suppliments
          - 1500mg Calcium daily
          - 2000 IU Vitamin D daily
        - If your fracture occurred from a low energy mechanism (ground level fall), it is likely 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 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

- Abide by your restrictions with 2 main early goals
    - **Avoid fracture displacement**: You must avoid active motion (using your own muscles) of the shoulder. This includes no reaching, lifting, pulling with the shoulder to prevent loss of alignment of the bones before they heal. Early in I will ask that you treat the shoulder like a wet noodle.
        - This will help prevent your rotator cuff from pulling on the bone pieces.
    - **Avoid stiffness:** You should move your fingers, wrist and elbow Once safe, you will work with therapy and at home on passive shoulder motion (without using your own shoulder muscles).
- 0-6 weeks: You will wear your sling full time except for basic therapy. You can return to desk work.
    - Work on early passive range of motion
        - Having an assistant, your other arm, or something else (pulleys) move your shoulder for you while relaxing the muscles in your injured shoulder.
        - This allows you to prevent and break up scar tissue but minimizes the risk of further displacement of your fracture (pulling on your fragments by the rotator cuff).
        - This is initiated once there is adequate but not complete healing
            - Usually 2-4 weeks after injury
                - Sooner after surgery.
            - In general, surgery does allow us to begin earlier range of motion because the bones are more secure, but surgery also adds additional scar tissue we need to break up.
- 6-12 weeks: Your sling is removed, therapy increases, you can drive if it I feel it is safe. You can return to 'light duty'.
    - Shoulder strengthening, and more aggressive motion exercises are initiated once the fracture is healed
        - Usually starts around 6-12 weeks after injury or surgery
        - Can take up to 6 months!
- 3 months: You will begin strengthening, you will begin full duty work when you are cleared by your therapist as being safe

- You should plan on working on shoulder range or motion for up to 6 months as this is usually the limiting factor in your recovery.

- **Expectations**
  - In my experience, your outcome is based on obtaining as normal anatomy as possible and as much motion as possible.
    - While these injuries are a spectrum, you can expect to regain 60-90% of your pre-injury function depending on these factors.
  - Expect at least 6 months until your return to heavy labor, 12 months until your recovery is complete.
    - You will be clear to do desk work within 0-2 weeks from surgery.
    - Heavy labor and sports are allowed once you are healed and strong enough (6-12 months).
    - I recommend discussing work restrictions (and vocational training if needed) with your employer as soon as possible.
      - Respective heavy lifting is strongly discouraged for life after reverse shoulder arthroplasty.

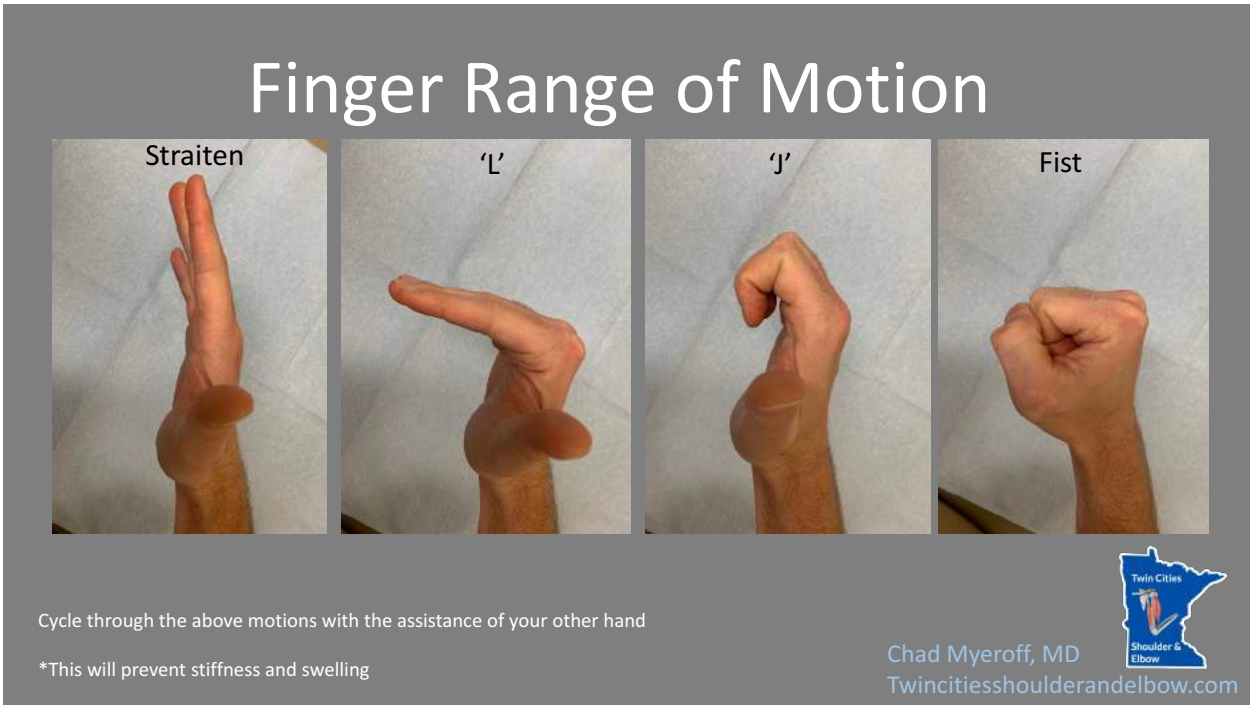


Figure 7 Finger range of motion

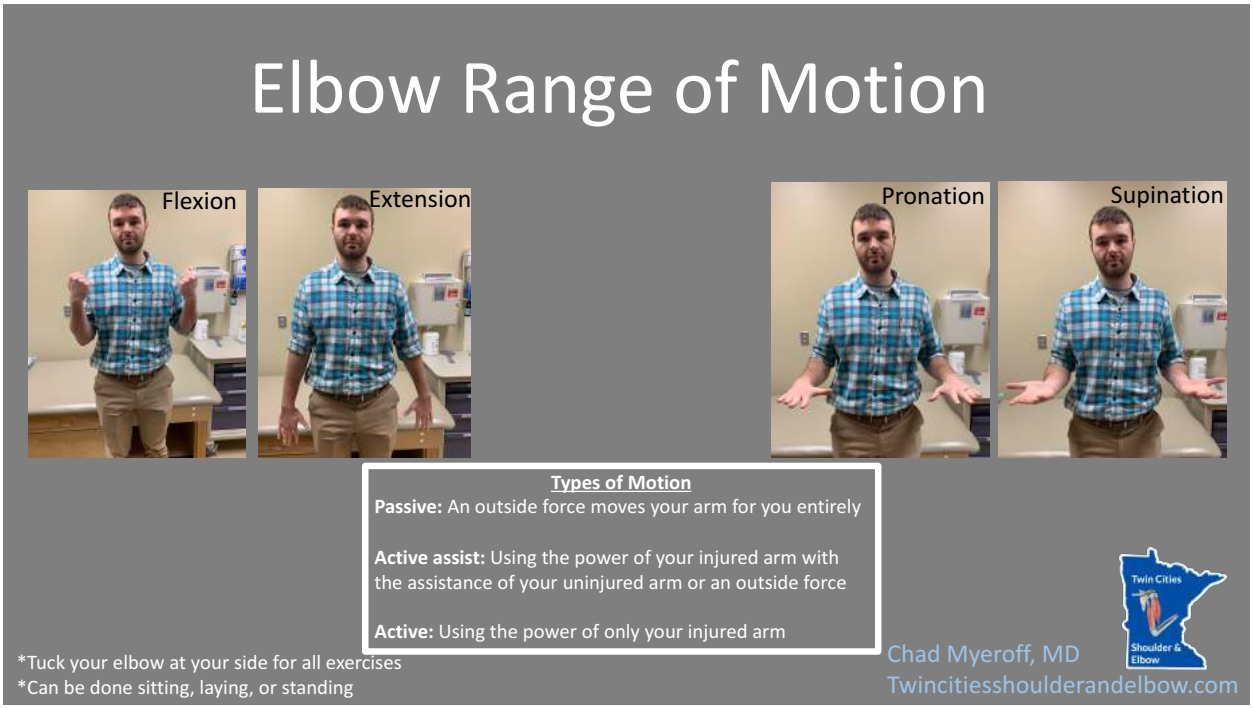


Figure 8 Elbow range of motion

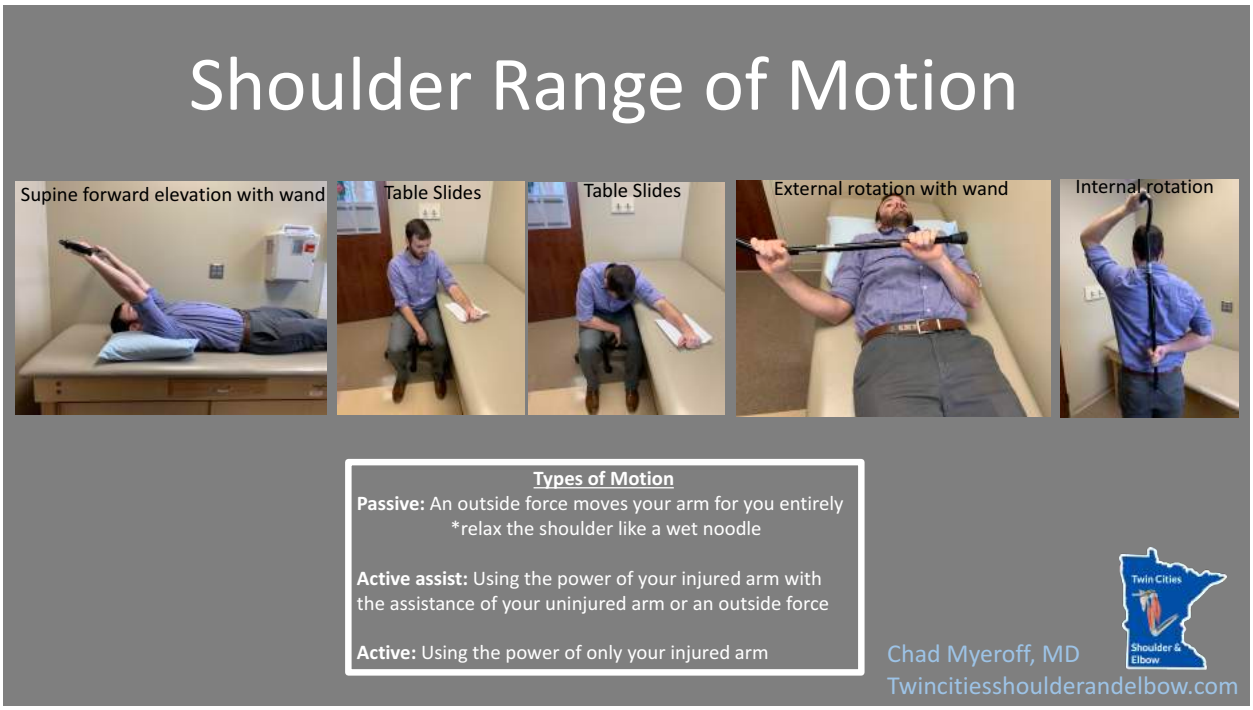


Figure 9 Shoulder range of motion

Want More information?

- Please visit:
  - twincitiesshoulderandelbow.com
  - https://orthoinfo.aaos.org/en/diseases--conditions/shoulder-trauma-fractures-and-dislocations Please contact my care team with questions: 651-254-8300 option 2
- 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.