

Nonunion/Malunion of Proximal Humerus Fracture

Fractures may not heal correctly for a variety of reasons ranging from smoking and poor nutrition to improper early activity. This condition may occur with or without surgical intervention. A nonunion indicates a lack of healing, while a malunion is healing of the fracture in improper alignment. Without intervention, a majority of nonunion/malunions will continue to cause pain and physical limitations.



Nonunion of proximal humerus fracture

Frequent Signs and Symptoms

- Persistent pain
- Pain with attempted motion of the shoulder such as lifting or rotation of the arm



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Etiology (Causes)

- Improper angulation or fixation of the fracture ends (meaning the ends were not lined up correctly when the fracture was healing)
- Inadequate immobilization after injury or surgery
- Poor nutrition and diet
- Lack of necessary blood supply
- Patient noncompliance with restrictions/limitations
- Site of injury (some bones heal better than others)
- Smoking
- Failure of the biology to occur

Risk Factors

- Chronic diseases such as diabetes, anemia, hypothyroidism, etc.
- Smoking
- Older age
- Infection
- Dietary vitamin/mineral deficits
- High-energy injuries that are more likely to damage blood supply

Prevention

- Avoid tobacco products and ensure proper nutrition
- Abide by post-injury or post-surgical guidelines from your medical provider

Outcomes

Nonunion and malunion fractures are diagnosed by evaluating the patient's pain symptoms and imaging (X-rays, MRIs, CT scans) over time. If the fracture is not healing at an appropriate rate, or in an appropriate position, timely treatment is important. Some patients may be given a bone stimulator, which is a device that is placed over the fracture site and sends electromagnetic waves into the bone to promote healing. Otherwise, most patients with nonunion and malunion fractures will require surgical treatment to stimulate healing and re-align the bony ends of the fracture.



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Nonunions and malunions of fractures are difficult to treat and require a careful work up to determine the reason for nonunion and a thorough treatment plan to address and correct all issues such as stiffness, weakness, infection, failed hardware, lack of healing response, fracture stability and alignment, etc.

The surgical procedure can obtain fracture healing, but functional outcomes are often less than those obtained primarily (healing directly after the first injury).

Potential Complications

- Chronic pain, stiffness, loss of motion, or swelling of the shoulder
- Excessive bleeding in the arm, causing pressure and injury to nerves and blood vessels (uncommon)
- Heterotopic ossification (calcification of the soft tissues)
- Injury to the nerves of the upper extremity due to stretching from the fracture, causing numbness, weakness, or paralysis
- Arrest of normal bone growth in children
- Failure to heal
- Hardware pain
- Infection

Treatment Considerations

Surgery usually includes repositioning the bones and holding their position with sutures, wires, rods, plates, pins or screws. Malunion/nonunion patients may also require bone grafting to fill in the “gaps” in bony healing. Bone grafts may be transplanted from another area of the body, or an allograft (cadaver donation) or synthetic material could be used along with the other stabilizing techniques. After immobilization, stretching and strengthening of the injured and weakened joints (elbow and shoulder) and surrounding muscles are necessary because of the injury and the immobilization. These are usually done with the assistance of a physical therapist or athletic trainer. In severe cases where proper bone alignment or healing cannot be achieved, shoulder arthroplasty (replacement) may be necessary. Reverse total shoulder arthroplasty is commonly used in this scenario.



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Possible Medications

- Non-steroidal anti-inflammatory medications, such as aspirin and ibuprofen (do not take within seven days before surgery), or other minor pain relievers, such as acetaminophen, are often recommended. Take these as directed by your physician. Contact your physician immediately if any bleeding, stomach upset, or signs of an allergic reaction occur
- Topical ointments may be of benefit.
- Pain relievers may be prescribed as necessary by your physician. Use only as directed.
- Injections of corticosteroids may be given to reduce inflammation.

Modalities (Heat and Cold)

- Cold is used to relieve pain and reduce inflammation. Cold should be applied for 15 to 20 minutes every two to three hours for inflammation and pain, and immediately after any activity that aggravates your symptoms. Use ice packs or an ice massage with a cloth between the ice and your skin to prevent burning /freezing your skin.
- Heat may be used before performing stretching and strengthening activities prescribed by your physician, physical therapist, or athletic trainer. Use a heat pack or a warm soak.

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