

## DISEASES &amp; CONDITIONS

# Elbow (Olecranon) Fractures

An olecranon (oh-LEK-rah-nun) fracture is a break in the bony "tip" of the elbow. This pointy segment of bone is part of the ulna, one of the three bones that come together to form the elbow joint.

The olecranon is positioned directly under the skin of the elbow, without much protection from muscles or other soft tissues. It can break easily if you experience a direct blow to the elbow or fall on an outstretched arm. A fracture can be very painful and make elbow motion difficult or impossible.

Treatment for an olecranon fracture depends upon the severity of the injury. Some simple fractures can be treated by wearing a splint until the bone heals. In most olecranon fractures, however, the pieces of bone move out of place when the injury occurs. For these fractures, surgery is required to restore both the normal anatomy of the elbow and motion in the joint.



The olecranon (arrow) is the bony point of the elbow.

## Anatomy

Your elbow is a joint made up of three bones:

- The *humerus* (upper arm bone)
- The *radius* (forearm bone on the thumb side)
- The *ulna* (forearm bone on the pinky side)

The elbow joint bends and straightens like a hinge. It is also important for rotation of the forearm; that is, the ability to turn your hand palm up (like accepting change from a cashier) or palm down (like typing or playing the piano).

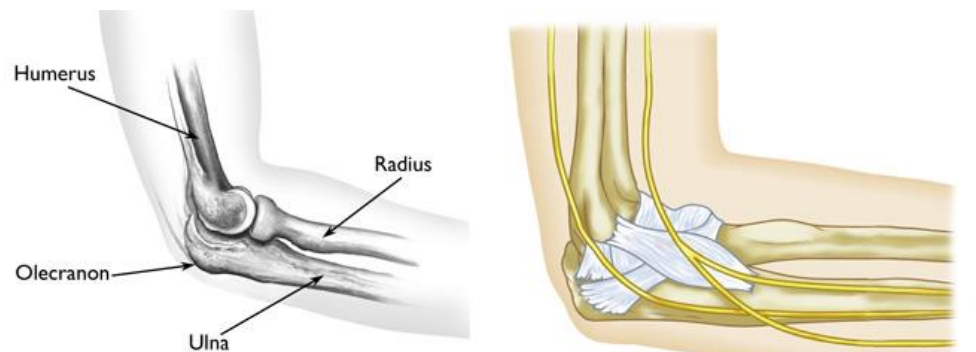
The elbow consists of portions of all three bones:

- The *distal humerus* is the lower end of humerus. It forms the upper part of the elbow and is the spool around which the forearm bends and straightens.
- The *radial head* is the knobby end of the radius where it meets the elbow. It glides up and down the front of the distal humerus when you bend your arm and rotates around the ulna when you turn your wrist up or down.
- The *olecranon* is the part of the ulna that "cups" the lower end of the humerus, creating a hinge for elbow movement. The bony "point" of the olecranon can be easily felt beneath the skin because it is covered by just a thin layer of tissue.

The elbow is held together by its bony architecture, as well as ligaments, tendons, and muscles. Three major nerves cross the elbow joint.

**(Left)** The bones of the elbow. The olecranon is the "tip" of the elbow and is part of the ulna.

**(Right)** The major nerves and ligaments are highlighted.



## Description

Olecranon fractures are fairly common. Although they usually occur on their own, with no other injuries, they can also be part of a more complex elbow injury.

In an olecranon fracture, the bone can crack just slightly or break into many pieces. The broken pieces of bone may line up straight or may be far out of place (displaced fracture).

In some cases, the bone breaks in such a way that bone fragments stick out through the skin or a wound penetrates down to the bone. This is called an *open fracture*. Open fractures are particularly serious because, once the skin is broken, infection in both the wound and the bone are more likely to occur. Immediate treatment is required to prevent infection.

## Cause

Olecranon fractures are most often caused by:

- Falling directly on the elbow
- Receiving a direct blow to the elbow from something hard, like a baseball bat or a dashboard or car door during a vehicle collision.
- Falling on an outstretched arm with the elbow held tightly to brace against the fall. In this situation, the triceps muscle, which attaches to the olecranon, can pull a piece of the bone off of the ulna. Injuries to the ligaments around the elbow may occur with this type of injury, as well.

## Symptoms

An olecranon fracture usually causes sudden, intense pain and can prevent you from moving your elbow. Other signs and symptoms of a fracture may include:

- Swelling over the "tip" or back of the elbow
- Bruising around the elbow. Sometimes, this bruising travels up the arm towards the shoulder or down the forearm towards the wrist.
- Tenderness to the touch
- Numbness in one or more fingers
- Pain with movement of the elbow or with rotation of the forearm
- A feeling of instability in the joint, as if your elbow is going to "pop out."

# Doctor Examination

## *Physical Examination*

Your doctor will talk with you about your medical history and general health and ask about your symptoms. He or she will then examine your elbow to determine the extent of the injury.

During the exam, your doctor will:

- Check your skin for cuts and lacerations. In severe fractures, bone fragments can break through the skin, increasing the risk of infection.
- Palpate (feel) all around your elbow to determine if there are any other areas of tenderness. This could indicate other broken bones or injuries, such as a dislocated elbow.
- Check your pulse at the wrist to ensure that there is good blood flow to your hand and fingers.
- Check to see that you can move your fingers and wrist, and can feel things with your fingers.

Although you may have pain only at the elbow, your doctor may also examine your shoulder, upper arm, forearm, wrist, and hand to ensure that you do not have any other injuries.

## *X-rays*

X-rays provide images of dense structures, such as bones. Your doctor will order x-rays of your elbow to help diagnosis your fracture. Depending on your symptoms, he or she may also order x-rays of your upper arm, forearm, shoulder, wrist, and/or hand to determine if you have other injuries.



This x-ray, taken from the side, shows an olecranon fracture in which the pieces of bone have moved out of place (displaced).

*Reproduced from Konda SR: Fractures around the elbow, in Egol KA, Gardner MJ, eds: Let's Discuss Management of Common Fractures. Rosemont, IL, American Academy of Orthopaedic Surgeons, 2016, pp. 17-30.*

## Treatment

While you are in the emergency room, your doctor will apply a splint (like a cast) to your elbow, and give you a sling to help keep the elbow in position. Immediate treatment may also include:

- Applying ice to reduce pain and swelling
- Medications to relieve pain

Whether or not your fracture requires surgery will be determined. Not all olecranon fractures will require surgery.

### ***Nonsurgical Treatment***

If the pieces of bone are not out of place (displaced), a fracture can sometimes be treated with a splint to hold the elbow in place during healing. During the healing process, your doctor will take frequent x-rays to make sure the bone has not shifted out of place.

Splints are typically worn for 6 weeks before gentle motion is started. If the fracture shifts in position during this time, you may need surgery to put the bones back together.



(Left) The doctor will apply a splint that runs from near your shoulder all the way to your hand. (Right) An elastic bandage is applied to help keep the splint in place.

## ***Surgical Treatment***

Surgery is usually required for olecranon fractures in which:

- The bones have moved out of place (displaced fracture)
- Pieces of bone have punctured the skin (open fracture)

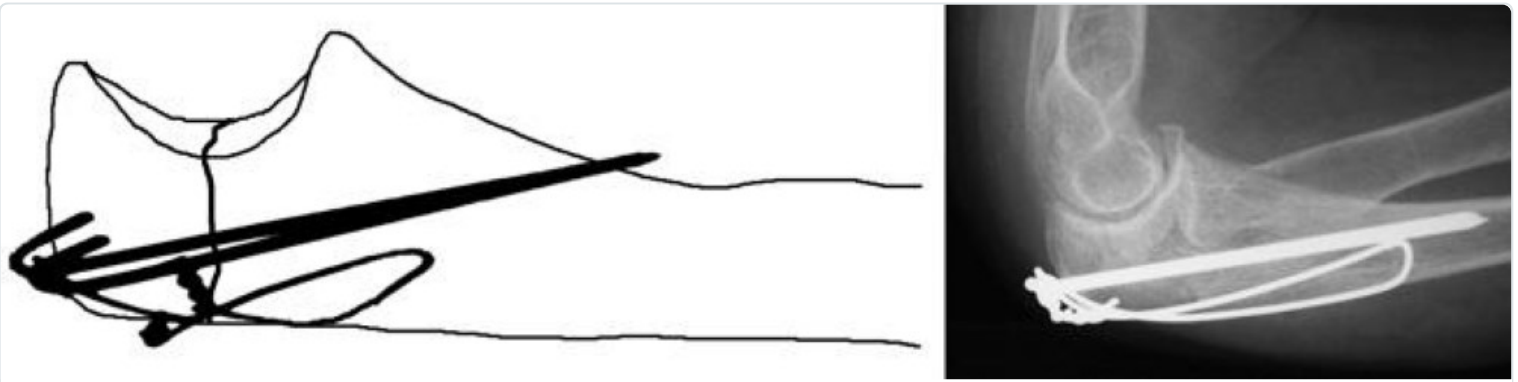
Surgery for olecranon fractures typically involves putting the broken pieces of bone back into position and preventing them from moving out of place until they are healed.

Because of the increased risk of infection, open fractures are scheduled for surgery as soon as possible, usually within hours. Patients are given antibiotics by vein (intravenous) in the emergency room, and may receive a tetanus shot. During surgery, the cuts from the injury and the surfaces of the broken bone are thoroughly cleaned out. The bone will typically be repaired during the same surgery.

## **Surgical Procedures**

**Open reduction and internal fixation.** This is the procedure most often used to treat olecranon fractures. During the procedure, the bone fragments are first repositioned (reduced) into their normal alignment. The pieces of bone are then held in place with screws, wires, pins, or metal plates attached to the outside of the bone.

Some common methods of internal fixation are shown below.

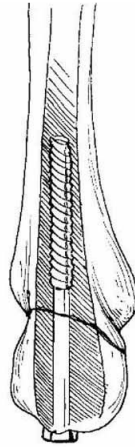


An olecranon fracture may be held together with pins and wires. This is called a "tension band."

*(Left) Reproduced from Boyer MI, Galatz LM, Borrelli J, Axelrod TS, Ricci WM: Intra-articular fractures of the upper extremity: new concepts in surgical treatment, in Ferlic DC, ed: Instr Course Lect 52. Rosemont, IL, American Academy of Orthopaedic Surgeons, 2003, pp. 591-605.*

**(Left)** A single screw, placed into the center of the bone, may be used to keep the fractured bones together.

**(Right)** Plate(s) and screws may be used to hold the broken bones in place.



**Bone graft.** If some of the bone has been lost through the wound or is crushed, the fracture may require bone graft to fill the gaps. Bone graft can be taken from a donor (allograft) or from another bone in your own body (autograft)—most often the hip. In some cases, an artificial material can be used.

**Removal of the fracture fragment.** If the broken bone fragment is too small to repair, it is sometimes removed. When this is done, the triceps tendon, which is attached to the fragment, is reattached to the remaining portion of the ulna.

## Complications of Surgery

There are risks associated with all surgery. If your doctor recommends surgery, he or she thinks that the possible benefits outweigh the risks.

Potential complications include:

**Infection.** There is a risk of infection with any surgery. Your doctor will take specific measures to help prevent infection.

**Hardware irritation.** A small percentage of patients may experience irritation from the metal implants used to repair the fracture.

**Damage to nerves and blood vessels.** There is a minor risk of damage to nerves and blood vessels around the elbow. This is an unusual side effect.

**Nonunion.** Sometimes, a fracture does not heal. The fracture may pull apart and the screws, plates, or wires may shift or break. This can occur for a number of reasons, including:

- The patient does not follow directions after surgery.
- The patient has a health problem, such as diabetes, that slows healing. Smoking or using other tobacco products also slows healing.
- If the fracture was associated with a cut in the skin (open fracture), healing is often slower.
- Infections can also slow or prevent healing.

If the fracture fails to heal, further surgery may be needed.

## Recovery

### *Pain Management*

Most fractures hurt moderately for a few days to a couple of weeks. Many patients find that using ice, elevation (holding their arm up above their heart), and simple, non-prescription medications for pain relief are all that are needed to relieve pain.

If your pain is severe, your doctor may suggest a prescription-strength medication, such as an opioid, for a few days.



Be aware that although opioids help relieve pain after surgery, opioid dependency and overdose has become a critical public health issue. For this reason, opioids are typically prescribed for a short period of time. It is important to use opioids only as directed by your doctor. As soon as your pain begins to improve, stop taking opioids.

## ***Rehabilitation***

Whether your treatment is surgical or nonsurgical, full recovery from an olecranon fracture requires a good effort at rehabilitation.

## ***Nonsurgical Treatment***

Because nonsurgical treatment can sometimes require long periods of splinting or casting, your elbow may become very stiff. For this reason, you may need a longer period of physical therapy to regain motion.

During rehabilitation, your doctor or a physical therapist will provide you with exercises to help:

- Improve range of motion
- Decrease stiffness
- Strengthen the muscles within the elbow

You will not be allowed to lift, push, or pull anything with your injured arm for a few weeks. Your doctor will talk with you about specific restrictions.

## ***Surgical Treatment***

Depending on the complexity of the fracture and the stability of the repair, your elbow may be splinted or casted for a short period of time after surgery.

**Physical therapy.** Patients will usually begin exercises to improve motion in the elbow and forearm shortly after surgery, sometimes as early as the next day. It is extremely important to perform the exercises as often as directed. The exercises will only make a difference if they are done regularly.

**Restrictions.** You will not be allowed to lift heavy objects with your injured arm for at least 6 weeks. You will also be restricted from pushing and pulling activities, such as opening doors or pushing up while rising from a chair. You may be allowed to use your arm for bathing, dressing, and feeding activities. Your doctor will give you specific instructions. He or she will also let you know when it is safe to drive a car.

## Complications of Olecranon Fractures

Even with successful treatment, some patients with olecranon fractures may experience long-term complications.

### ***Loss of Motion***

In some cases, a patient may not be able to regain full motion in the affected elbow. In most of these cases, the patient cannot fully extend or straighten his or her arm. Fortunately, the loss of a few degrees of straightening does not usually affect the overall function of the arm. Patients who have significant loss of motion may require intensive physical therapy, special bracing, or further surgery. This is uncommon for olecranon fractures.

### ***Posttraumatic Arthritis***

Posttraumatic arthritis is a type of arthritis that develops in a joint after an injury. Even when your bones heal normally, the cartilage lining the joint surfaces can be damaged, leading to pain and stiffness over time.

Posttraumatic arthritis is a relatively common complication of olecranon fractures. It can occur shortly after the fracture occurs or can take years to develop. Some patients with posttraumatic arthritis may need further surgery to relieve their symptoms. However, for many patients, there is little pain and no need for further treatment.

## Outcomes

Most patients can return to their normal activities within about 4 months, although full healing can take more than a year. Recovering strength in your arm often takes longer than might be expected.

Although x-rays may show that the fracture has healed completely, some patients report that they still have limitations in movement. These patients will usually continue to improve over time.

## ***Questions to Ask Your Doctor***

If you experience an olecranon fracture, here are some questions you may wish to ask your doctor:

- When can I start moving my elbow?
- How soon can I resume my normal activities?
- What factors will prolong or delay healing?
- If I have to have surgery, what are the benefits and risks?
- What will my recovery be like?

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