

# Chapter 19

## The Elbow

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Rebecca A. Perz, MSN, NP-C, ONP-C

### Objectives

- Recognize common interventions to provide safety and prevent injury for patients with elbow conditions.
- Describe the pathophysiology of common elbow conditions.
- List the potential life-changing and limiting consequences of elbow conditions.
- Identify assessment criteria for each elbow condition or injury.
- Identify key subjective components in obtaining the history of the elbow condition.
- Select common tests to establish definitive diagnoses.
- List potential differential diagnoses related to elbow conditions.
- Describe outcome criteria for patients with elbow conditions.
- Develop nursing diagnoses and interventions for patients with elbow problems.

The elbow joint is one of the most useful joints in the body. It allows for basic functions such as eating, grooming, and other self-care activities, as well as allowing the individual to push, pull, or lift objects. Full function of the elbow is particularly important when the injury or condition pertains to the individual's dominant arm.

The elbow may be injured or dislocated in both children and adults. It is susceptible to injury due to repetitive use such as with manual laborers or those participating in sports activities (especially tennis players, golfers, and baseball pitchers). As the elbow is essential for full function of the arm, the patient who sustains an injury must not only heal the injured area but attempt to regain range of motion (ROM) as soon as possible in order to achieve the best possible outcomes. This often requires sound decision making on the part of the provider caring for the patient, a team approach to care including therapists, and motivation and understanding of the potential severity and complications of elbow injuries by the patient. Team efforts are needed to coordinate this patient care. This includes prehospital and first aid care, emergency/urgent care, and follow-up care in the hospital such as an orthopaedic unit or in the outpatient clinic setting. Most injuries to the elbow benefit from physical and occupational therapy to promote the highest level of functioning possible for these patients.

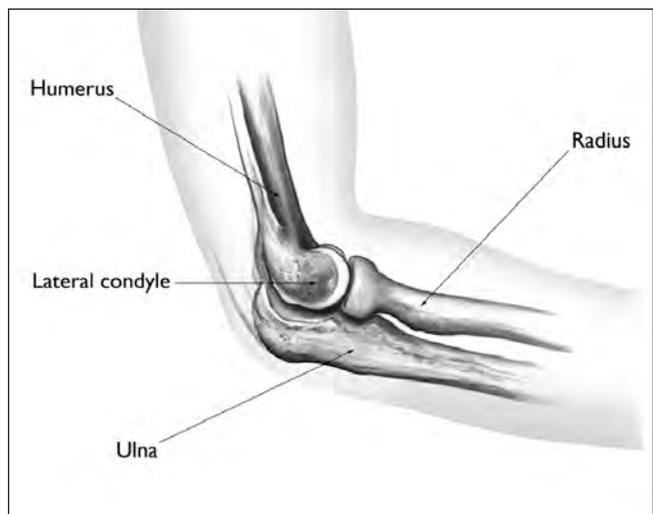
Care of the elbow has changed significantly in recent years. Elbow replacements (whether full or partial), arthroscopy, suture anchors for repair of tendon rupture, and other elbow-specific hardware have all made an impact in the care of the patient with an elbow injury.

## Anatomy and Key Points Related to the Elbow

It is important to understand the anatomy of the joint to better clarify the potential problems that can arise from an injured or diseased elbow. The elbow is a hinge joint, consisting of the distal humerus (including medial epicondyle and lateral epicondyle), proximal ulna, olecranon, proximal radius, and radial head (see Figure 19.1). Each of these bones has significant muscular attachments that allow the entire joint to flex, extend, supinate, and pronate. The shoulder and wrist muscles are both connected at the elbow, and this partnership of anatomy needs to be disrupted as little as possible. Elbow injuries will thus affect the joints above and below them significantly, with associated weakness, stiffness, atrophy, and other problems.

The elbow is stabilized by the coronoid process and the radial head, preventing posterior displacement, and by the olecranon, preventing anterior displacement. The articulation of these bones allows the greatest ROM, and provides medial and lateral stability.

**Figure 19.1**  
**Elbow Anatomy**



From "The 2003 Body Almanac" by the American Academy of Orthopaedic Surgeons, 2003. Reprinted with permission.

When radiographs are taken of the elbow, two views should always be obtained: anteroposterior (AP) and lateral. Elbow fractures may not be visible when the patient presents to be seen. It is important to always look for a "fat pad sign" on the lateral x-ray, which may be noted on the anterior and posterior aspects of the humerus (see Figure 19.2). It arises when the adipose tissue overlaying the joint capsule displaces if there is an effusion or hemarthrosis due to fracture (Egol, Koval, & Zuckerman, 2010). A positive fat pad sign is generally

**Figure 19.2**  
**Lateral X-Ray Image of Positive Fat Pad Sign**



From "Interactive Atlas of Signs in Musculoskeletal Radiology" by A. Gentili, M. Beller, S. Masih, and L. Seeger, <http://www.gentili.net/signs/images/400/Elbowfatpadarrow.jpg>. Reproduced with permission.

**Figure 19.3**  
**X-Ray Image of MO of the Elbow**



From "Myositis Ossificans Mimicking Compartment Syndrome of the Forearm" by E. Melamed and D. Angel, 2008, *Orthopedics*, 31(12). [orthosupersite.com/view.asp?rID=32936](http://orthosupersite.com/view.asp?rID=32936). Reproduced with permission.

indicative of fracture, and the patient should be treated as having a fracture until proven otherwise.

Any patient with an elbow injury, whether pediatric or adult, has the potential to develop heterotopic bone, also known as myositis ossificans (MO). (See Figure 19.3.) Incidence of MO can be as high as 30% in elbow fracture-dislocations (Strauss et al., 2011). In these cases, injured muscles change into heterotopic bone, which causes capsular tightness and often leads to a significant loss of function in the elbow as the muscles lose their ability to stretch (Berg, 2000; Egol et al., 2010). This will be noted on subsequent x-rays after a crush injury, dislocation, or fracture with associated soft tissue trauma. It occurs in 3% of dislocations, and 18% when associated with fracture/dislocations (Egol et al., 2010). It is seen more often in patients under the age of 30, and men are more affected than women (Reiser, Baur-Melnyk, & Glaser, 2008). Treatment for MO is aimed at prophylaxis, i.e., avoiding prolonged muscle trauma in reducing dislocations (particularly if the reduction was attempted several times), using ice after muscle trauma, and treating with either non-steroidal anti-inflammatories (NSAIDs) to prevent development. Indomethacin 75mg SR (given once or twice daily, pending surgeon preference) is often the drug of choice, but in the pediatric population, ibuprofen or other NSAIDs may be used. If MO develops, careful monitoring of functioning, early mobilization, and occasionally surgical removal of the heterotopic bone may be performed (Berg, 2000; Reiser et al., 2008).

Research on the use of radiation therapy for elbow trauma is inconclusive. One recent retrospective study

noted that patients who received a single prophylactic dose of radiation therapy within the first day after surgery, in addition to NSAIDs, had significantly smaller incidence and amount of MO. The amount of MO did not impair the patients, and no adverse side effects were noted from the single dose of radiation therapy. This may be considered an adjunct of therapy in high-risk patients (Strauss et al., 2011). Another study evaluating the use of radiation therapy in prophylaxis of MO after elbow trauma, however, noted an increased incidence of nonunion in the patients. The significance of nonunion of these fractures was high enough that the study was terminated (Hamid et al., 2010). Because of these conflicting results, treatment at this time will most likely continue with use of NSAIDs.

### Common Elbow Treatment Modalities

Physical therapy (PT) and occupational therapy (OT) are essential for maximizing healing for the patient after injury, surgery (from minor releases to major surgery such as replantation), and other trauma sustained to the elbow. Essential orthopaedic care includes therapy to regain joint function, control pain, maximize healing, and manage wound care. Many soft tissue sprains can be treated with the **PRICEMM** acronym: **P**rotection, **R**est, **I**ce, **C**ompression, **E**levation, **M**edications, **M**odalities (see Chapter 20—The Wrist).

**Edema Reduction.** Therapy can reduce edema by many modalities, including use of compressive dressings, early range of motion, splints, and passive ROM.

**Wound Management.** Physical and occupational therapists will examine the healing wound for different stages of healing. Different modalities, including use of whirlpool, ultrasound, medications and debridement may be used to manage the wound and optimize healing.

**Scar Management.** Therapy may reduce the development of hypertrophic scars, keloids, and disorganized collagen depositions, which alter the cellular matrix for healing. Scar management is also managed with massage and exercises such as pressure therapy with use of splints.

**Range of Motion.** Therapy will assist with active as well as passive ROM, allowing for earlier tendon strength, healing and preventing joint contracture. Skilled therapists will begin tendon glides and other means to increase ROM, but will follow protocols to prevent too early aggressive motion, which may cause rupture of the tendon repair.

**Desensitization and Sensory Re-education.** The nervous system's signals to the affected extremity are disrupted, and the stimuli received by the injured extremity need to be redirected so the central nervous system does not interpret these signals as painful or

noxious stimuli. Desensitization uses different textures and surfaces to stimulate healing, including massage, contrast baths, fluid therapy, exposure to different textures, such as towels, rice, sand, and dried beans, to decrease hypersensitivity.

**Other Modalities.** Other modalities used by physical and occupational therapists include soft-tissue mobilization, strengthening, work hardening, and conditioning. The therapist may use different techniques in addition to the above described contrast baths and ultrasound, which include fluidotherapy, cryotherapy, continuous passive motion, phonophoresis, iontophoresis, transcutaneous electrical nerve stimulation, and neuromuscular electrical stimulation.

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## Lateral and Medial Epicondylitis

### Overview

**Definitions.** *Lateral epicondylitis* is irritation and inflammation of the extensor tendons that originated from the lateral epicondyle of the distal humerus. *Medial epicondylitis* is irritation and inflammation of the common flexor origin at the medial epicondyle of the distal humerus. The pain is at the flexor/pronator origin at the distal humerus.

**Etiology.** The common name for lateral epicondylitis is “tennis elbow” because this irritation comes from repetitive wrist motion in supination and extension (particularly repetitive backhand strokes for tennis players). The tendon gets inflamed and eventually develops microscopic tears, which is quite painful. The common name for medial epicondylitis is “golfer’s elbow” because this irritation comes from repetitive activity in pronation (necessary for golf swings).

**Pathophysiology.** The extensor carpi radialis longus (ECRL) and extensor carpi radialis brevis (ECRB) originate at the lateral epicondyle. This tendon develops microscopic tears in lateral epicondylitis from repetitive trauma. The common flexor pronator (the common flexor origin) originates at the medial epicondyle and sustains a similar injury (Abrahams, Marks, & Hutchings, 2003; McMahon & Skinner, 2003). Cadaveric studies note that the tendons tear longitudinally, not intrasubstance but at the musculotendinous junction or avulsion fractures off the bone (Bunata, Brown, & Capelo, 2007).

**Incidence.** Lateral and medial epicondylitis are seen more frequently in patients who play tennis and golf, as suggested by the common names. In addition, patients who work in industries that involve significant repetitive squeezing activities of the hand are more susceptible to these tears and injuries. Examples of these activities include using hammers, trigger or spray

guns, power washers, and paint guns (Garberina, Fagelman, & Getz, 2008a).

**Complications.** Complications of either lateral or medial epicondylitis are related to prolonged treatment or severe conditions. Either condition can be treated simply if caught early, but if not caught early, the treatment can be prolonged and may require surgery to repair. The patient may experience ongoing pain or functional limitations, including flexion contractures (Wise, Owens, & Binkley, 2011).

### Assessment

**History.** Determine the mechanism of injury, repetitive use, and dominance of hand. It is important to note occupational and recreational/hobby activities that may precipitate development of either syndrome. Determine what treatment measures the patient has already tried, what relieves the symptoms, and what exacerbates the symptoms. Ascertain if the patient has a history of neck injury or pain, as some of the symptoms may be related to cervical radiculopathy (Garberina, et al., 2008a).

**Physical Exam.** Test the strength of the affected extremity compared to the nonaffected extremity, including biceps and triceps strength. Assess for neurovascular symptoms distal to the elbow, particularly if there is numbness or tingling noted. Assess ROM. Palpate along the lateral epicondyle and/or the medial epicondyle. Patients will often complain of significant pain with light or deep palpation of the area.

**Diagnostic Tests.** Two-view radiographs may be taken if there is concern of an avulsion injury to the elbow. Calcium deposits may be noted if calcific tendinitis has developed (McMahon & Skinner, 2003). On occasion, an electromyogram may be performed if there is subsequent numbness, tingling, or other neurological symptoms distal to the elbow.

### Common Therapeutic Modalities

Conservative treatment measures should be attempted first, but in spite of vigorous care and therapy, it is noted that 5%-10 % of individuals fail conservative treatment (Wise et al., 2011).

**Decreasing Risk Factors.** The first line treatment is generally avoidance of the repetitive activity and rest of the affected extremity.

**Pain Management.** Generally, NSAIDs will be given as analgesics. Ice may be used for pain control, applying 20 minutes at a time every 2 hours while awake, using a cross-friction massage technique.

**Tennis Elbow Band or Wrist Extension Splint.** Use of a tennis elbow band will displace the tissues on the proximal forearm, thus reducing the inflammation and