Kickboxing and boxing are an excellent workout regimen, as long as precautions are taken so as not to injure the shoulders, elbows and wrists.

To better understand injuries to these joints, we will start with some basic anatomy:

The shoulder joint, one of the most moveable in the body, is also one of the most easily injured. To have a great deal of mobility, the shoulder joint is not encapsulated in bone, such as the hip joint. The joint is made of 4 individual joints, outline below:

- Sternoclavicular (SC) joint (between the sternum and the collar bone) – this is actually the only bony connection that the shoulder has with the main skeleton
- Acromioclavicular (AC) joint (between the collar bone and the point of the shoulder called the acromion, which is part of the scapula or shoulder blade)
- Glenohumeral (GH) joint between the glenoid part of the scapula – the socket – and the head of the humerus– the ball
- Scapulothoracic (ST) joint (the ‘false joint’ between the scapula and the rib cage that it rides over).

As far as the muscular connections for the shoulder, the main one of concern is the rotator cuff, comprised of the following muscles:
The main mechanism of the rotator cuff is rotation, but these muscles are extremely important for other aspects of movement, as well as stability. Without learned muscle control, any overhead activity, let alone just lifting the arm, would be impossible – the Glenohumeral joint would dislocate or the Head of the Humerus would jam under the arch of the acromion. The muscle group we rely on for this control is the rotator cuff (RC) muscles. They all originate from the scapula and are coordinated together to keep the Humeral head spinning/rotating as close to the center of the glenoid as possible with movement. The long head of biceps tendon running over the front of the Glenohumeral joint also has a stability role to play in conjunction with the RC, especially with the throwing action. The muscles primarily designed to position the scapula for overhead movement are the trapezius (especially lower trapezius), and serratus anterior – called therefore the ‘scapular stabilisers’ – with counterforces being produced by levator scapulae, rhomboids and pec. minor muscles. The larger and more powerful muscles that generate movements of the arm are the deltoids, latissimus dorsi, and pectoralis major. So while the RC muscles co-ordinate the proper positioning of the Humeral head by acting close to the center of the joint, the larger muscles with long lever arms move the arm with speed and force.

The elbow joint is what is commonly called a hinge joint, the 2 bones of the forearm (Radius and Ulna) “hinge” on the Humerus:
The biceps and triceps muscles, along with the deltoids, are the major muscles that attach and are used in the punching motion, as well as the forearm muscles and smaller muscles of the upper arm:

The elbow contains three separate articulations. The humeroulnar joint is a modified hinge joint that allows flexion and extension. The humeroradial joint is a combined hinge and pivot joint that permits flexion and extension as well as rotation of the head of the
radius on the capitellum of the humerus. The proximal radioulnar joint facilitates rotation during supination and pronation.

Four muscle groups act on the elbow. Major flexors include the biceps brachii (which also supinates the forearm when the elbow is flexed), brachioradialis and brachialis muscles. The extensors are the triceps and anconeus muscles. The supinators include the supinator and biceps brachii muscles. Pronation is accomplished by the pronator quadratus, pronator teres and flexor carpi radialis muscles.

The elbow also has complex innervation. The median nerve crosses the elbow medially and passes through the two heads of the pronator teres, a potential site of entrapment. The ulnar nerve passes along the medial arm and posterior to the medial epicondyle through the cubital tunnel, a likely site of compression. The radial nerve descends the arm laterally. It divides into the superficial (sensory) branch and the deep (motor, or posterior interosseous) branch. The deep branch must then pass through the arcade of Frohse, a fibrous arch formed by the proximal margin of the superficial head of the supinator muscle, where it is most susceptible to injury.

The wrist is the last of the upper extremity regions involved in the punching motion. Because it is very mobile, it is also very easy to injure if proper form is not followed.

The wrist is made up of the two bones of the forearm (the radius and ulna) and eight carpal bones (scaphoid or navicular, lunate, triquetrum, pisiform, trapezium, trapezoid, capitate, and the hamate). Many ligaments connect these bones to each other.

A sprain is an injury to the wrist ligaments without any evidence of bone injury (that is, no broken bones or cracks in the bone). With a sprain, there is usually only a partial tearing of the ligaments. In a severe wrist sprain, there can be a complete tear.

A fractured or broken wrist means there is a break or a crack in one or more of the bones of the wrist.

A strain is where there is a tearing of the muscle fibers in the area surrounding the wrist.
INJURIES

Most fractures about the wrist involve the radius and ulna. In preteens and teenagers, growth plate fractures are very common. These should be treated with a long- or short-arm cast, depending upon the injured area, for 4 to 6 weeks then immobilized in a splint for another 2 to 4 weeks while returning to play.

Scaphoid Fractures

Other less common, but far more worrisome, fractures will involve the scaphoid (or navicular), the carpal bone at the base of the thumb. This bone is very important as it is the bridge between the two rows of carpal bones. This bone presents a unique healing problem, it has been given the title of "slowest healer" by many orthopedic surgeons. This is due to its limited blood supply. Only one small artery supplies blood to the scaphoid and it is limited to the proximal pole.

An injury to the scaphoid usually results from a fall on the outstretched hand. There may be swelling of the wrist. The most remarkable symptom is usually pain with palpation of the anatomical "snuff box".

Due to the poor blood supply, this injury heals properly only when diagnosed early. Early x-rays are often negative for fracture. The athlete should be splinted for 7 to 10 days and then re-examined. If the "snuff box" is still tender, repeat x-rays should be taken. If they are still negative, a bone scan or CT scan should be performed to rule out this fracture.

Once the fracture is confirmed, the athlete will be placed in a long arm cast for 6 to 8 weeks. This will be followed up with a short arm cast for 4 to 6 weeks, then
splinting for 4 to 6 weeks. This serial casting and splinting is necessary to give the bone the best environment for healing. If these measures fail, surgical fixation with a screw may be necessary.

Hook Of The Hamate Fractures

The hook of the hamate is a common fracture and can pose problems to athletes that use a club, bat, or racket. Pain with a baseball swing in the volar and ulnar side of the wrist while swinging a bat can be indicative of a hamate fracture.

The hamate has a hook which the flexor carpi ulanris tendon passes thru. The hook acts as a fulcrum to increase the strength of the muscle. Loss of grip strength, especially on the little finger side is another symptom of this fracture.

Standard x-rays usually do not show the hook of the hamate. Many orthopedic surgeons will order special x-ray views to better visualize the bone. A carpal tunnel view will visualize this fracture. If this x-ray is negative, but there is still a strong suspicion of a hamate fracture, a CT may be ordered. Treatment routinely includes casting for 4 to 6 weeks to immobilize the bone. Healing is usually complete in 6 to 8 weeks.

DeQuervain’s Tenosynovitis

Pain that travels along the radius from the wrist up the forearm for about 6 inches could be from DeQuervain’s tenosynovitis. This injury is common in boxing and football. Boxers sustain this injury by sustaining repeated punches that glance off of their opponent. With football players it is generally an injury secondary to a contusion of the radial shaft.

The evaluation of this injury should include the Finklestein test. This test applies a stretch to the abductor pollicus longus tendon. A positive test is signaled by pain that radiates down the forearm to the wrist.

Treatment for this injury should involve the use of non-steroidal anti-inflammatory medications, wrist stretching, gentle strength training, and protection from repeated trauma.

Wrist injuries must be taken seriously. A good differential diagnosis must include all major joints, ligaments, tendons, and nerves. Many long term problems can be avoided by early detection of potentially debilitating injuries.

### Elbow Disorders

#### Anterior Elbow Disorders

*Biceps Tendinosis.* Anterior elbow pain in a patient who has engaged in activities
involving repetitive elbow flexion and forearm supination may indicate the presence of biceps tendinosis. Weak elbow flexion may be an additional complaint.

With biceps tendinosis, the physical examination reveals tenderness of the distal biceps tendon that increases with resisted flexion and supination. The patient with advanced biceps tendinosis may develop elbow flexion contractures and thus may be unable to fully extend the elbow.

The history and physical examination are usually sufficient to identify this disorder. Further testing is generally unnecessary.

**Pronator Syndrome.** This disorder occurs because of median nerve entrapment distal to the elbow. The pronator syndrome often occurs in patients who present with elbow pain subsequent to participation in racquet or throwing sports. Anterior pain and distal paresthesias are characteristic symptoms.

The physical examination frequently reveals a hypertrophied pronator muscle distal to the antecubital fossa, often with a positive Tinel's sign. The patient may or may not have distal numbness. The pain worsens when pronation is performed against resistance. Tingling or paresthesias in the distribution of the median nerve is a sign of pronator syndrome. The patient may also have a positive papal sign (i.e., weak active flexion of the index finger [second digit] and long finger, resulting in finger extension in the resting attitude).

Nerve conduction studies may be helpful in making the diagnosis and may also help rule out carpal tunnel syndrome. However, false-negative nerve conduction study results are possible. Radiographs are usually normal.

**Anterior Capsule Strain.** Activities requiring repetitive hyperextension of the elbow may strain the anterior capsule. The strain results in anterior pain that becomes worse with passive extension or hyperextension stress testing. The antecubital fossa is tender.

A possible related injury is a torn brachialis muscle with associated myositis. Therefore, radiographs should be obtained to rule out myositis ossificans.13

**Posterior Elbow Disorders**

**Triceps Tendinosis.** Posterior elbow pain in the setting of repetitive elbow extension suggests the diagnosis of triceps tendinosis. Forceful extension worsens the pain. Tenderness of the triceps tendon is present at or just superior to the attachment on the olecranon and increases with extension performed under resistance.
Radiographs are usually normal. If osteoarthritis is present, however, the radiographs may show calcifications within the tendon, traction spurs, hypertrophy of the ulna or loose bodies.

**Olecranon Impingement.** This injury, which typically occurs in throwing activities, is characterized by clicking or locking of the elbow with terminal extension. Crepitus and a mechanical extension block are often present. The elbow pain worsens with extension. Subtle valgus instability may be noted, in that ulnar collateral ligament deficiency may occur because of the repetitive valgus stress of throwing.

Radiographs may show osteophytes of the olecranon tip and the medial wall of the olecranon fossa, hypertrophy of the olecranon and loose bodies.

**Olecranon Stress Fracture.** This fracture produces pain that gradually increases with extension in throwing. The olecranon process is tender, and pain is increased with extension performed against resistance.

Radiographs may be negative, but two possible findings are important. First, the lesion may show a transverse radiolucency extending from the posterior non-articular surface to the articular surface. Second, a lucent region surrounded by a sclerotic margin may indicate nonunion of a stress fracture. If the radiographic findings are in question, bone scanning may be required to confirm the diagnosis.

**Olecranon Bursitis.** Painless swelling of the posterior elbow at the outer tip of the olecranon in a patient complaining of repetitive friction to the elbow indicates olecranon bursitis. The pertinent physical findings are localized, nontender swelling without decreased range of motion.

Radiographs are usually normal. Septic arthritis should be ruled out in the patient with any associated pain or erythematous tissue.

**Lateral Elbow Disorders**

**Lateral Tennis Elbow.** The most common overuse elbow injury, lateral tennis elbow is the result of degenerative tendinosis of the extensor carpi radialis brevis muscle. The injury typically occurs because of overuse of the wrist extensors (e.g., in racquet sports).

In lateral tennis elbow, the pain is aching, worsens with activity and frequently radiates down the lateral forearm. The patient may also have night pain. Tenderness is present over the extensor carpi radialis brevis and is generally localized immediately anterior, medial and distal to the lateral epicondyle. The pain increases with resisted dorsiflexion of the wrist, especially with the elbow in extension.
The tennis elbow test reproduces the pain. Radiographs may show calcific deposits in the extensor aponeurosis or spurring but are frequently normal.

**Shoulder Injuries**

Tendons are the tissue that connect muscles to bones. With tendonitis, there is a wearing process that happens over time from excessive, repetitive use, disease or sudden injury. Rotator cuff injuries are the most common of these types of disorders and can occur in athletes as well as non-athletes in accident-injury situations as well. Many times a person can have a partially torn rotator cuff and not know it. They can be involved in an accident where the rotator cuff is torn more severely and renders the shoulder in need of corrective surgery.

The bursa is a fluid-filled sac that covers and protects joints from friction from the movement of the shoulder. Bursitis is the inflammation of this sac and surrounding tissue and often coincides with tendonitis.

Shoulder instability can be caused by an injury or can occur over time. Instability can be caused by a sudden blow causing a partial or complete dislocation of the shoulder from the socket. A dislocated shoulder needs to be stabilized then treated by appropriate medical personnel experienced in diagnosing and treating shoulder problems. A shoulder separation can also occur in sports or by accident and is often associated with an injury to the acromioclavicular joint (AC). A labral tear can also occur due to dislocation of a joint.

Arthritis can also be the cause of intense shoulder pain. Besides long-term wear and tear and inflammation, arthritis can also be related to sports or work injuries. While arthritis in the shoulder is not as common as it is in the knee or hip area, it can be quite painful and involve joint replacement therapy.

**Shoulder Injury Indicators**

- Inability to raise arm or carry objects
- Deformity of joint caused by injury
- Pain while sleeping or resting
- Pain lasts more than several days
- Swelling or bruising around joint
- Fever, redness, warmth or other signs of infection

If any of the above shoulder injury indicators are experienced then a medical examination is in order. Don’t delay as early treatment will yield the most adequate results.
For those with minor shoulder injuries, some common treatments include rest, ice and heat application, stretching and anti-inflammatory medication. For those with moderate injuries physical therapy and cortisone injections may be needed. For the most severe shoulder injury, reparative surgery will be needed. The most important aspect of shoulder injuries, though is early detection and treatment. By seeking medical treatment early many complications may be avoided later.

**PREVENTION**

To prevent boxing injuries: Upper body strengthening is recommended, particularly to the wrists and shoulders. Proper punching, jabbing, and defensive techniques are crucial to avoiding overuse injuries. Wrapping should be done correctly to protect the fingers, hands, and wrists. Protective gear, including headpiece, mouthpiece, chest guards, and groin protectors, should be adequate and fit properly so they are optimally functional. It is suggested to wear well-cushioned, supportive cross-training shoes when training to prevent overuse injuries in the legs, ankles, and feet.

To prevent injuries in exercise classes: Do not take more than three of the same class a week, alternating days with other activities or rest. Do not do any movements or activities or use weights or equipment you are uncomfortable with, and especially avoid those that cause pain. Ask your instructor if you have questions regarding techniques. Make sure you get new shoes every three to six months, especially for high-impact, jumping classes.

**Factors Increasing Risk of Exercise Class Injuries**

- Faster pace of class
- Large motions
- More types of equipment used
- Quick, repetitive movements