

## **Hand and Upper Extremity Injuries in Outdoor Activities**

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### **Biographical Sketch**

Dr. Schneider is an orthopedic surgeon that specializes in the treatment of hand and upper extremity injuries. He is a graduate of Marquette University and attended medical school at The Medical College of Wisconsin. He performed his orthopedic surgery residency at the Creighton University/University of Nebraska program in orthopedic surgery and rehabilitation. In addition, he performed a hand and upper extremity fellowship at the Indiana Hand Center. Dr. Schneider participates in skiing, biking, running and sailing.

### **Introduction**

Hand and upper extremity injuries make up a large percentage of injuries from outdoor activities. These injuries can range from fractures to sprains and strains. Many of the injuries occur from repetitive use or trauma and can be avoided with proper conditioning and technique.

### **Injuries involving the hand and Wrist**

- Flexor Tendon Rupture (Jersey Finger)
- Extensor Tendon Rupture (Mallet Finger)
- Rupture of Ulnar Collateral Ligament of Thumb (Skier's Thumb)
- Scaphoid (Navicular) Fracture
- Median Nerve Impingement at the Wrist (Carpal Tunnel Syndrome)
- Ulnar Neuritis at the Wrist (Biker's Wrist)

### **Injuries Involving the Elbow**

- Lateral Epicondylitis (Tennis Elbow)
- Medial Epicondylitis (Baseball or Golfer's Elbow)
- Ulnar Neuritis at the Elbow (Cubital Tunnel Syndrome)
- Distal Biceps Tendon Rupture

### **Injuries Involving the Shoulder**

Acromioclavicular (AC) Joint Separation (Shoulder Separation)  
Glenohumeral Joint Dislocation (Shoulder Dislocation)  
Biceps Tendon Rupture  
Subacromial Bursitis and Rotator Cuff Tendonitis  
Rotator Cuff Tear

### **Flexor Tendon Rupture (Jersey Finger)**

Injuries to the flexor tendons can result in inflammation or frank rupture of the tendons. The flexor tendon may be pulled off of its bony attachment when excessive forces are applied to a contracting tendon. The most common cause of this type of injury is seen in football players when a finger catches the jersey of their opponent. This or similar injuries may also occur in rock climbing.

The treatment for minor injuries or inflammation of the tendons (tendonitis) is rest, anti-inflammatory medications and stretching. This is followed by a strengthening program. Flexor tendon avulsions or tears usually always require operative treatment to repair the tendon. The surgery is followed by a very specific rehabilitation program that lasts approximately twelve weeks.

### **Extensor Tendon Ruptures (Mallet Finger)**

Ball sports are a common cause of extensor tendon injuries. They occur when a ball or other object strikes the extended fingertip. This strong force causes the thin ribbon like extensor tendon to tear off of its attachment at the end of the finger. This results in swelling and the inability to straighten the fingertip.

Most often these injuries are treated non-operatively with an extended period of finger splinting. The joint towards the fingertip is held out straight, allowing the tendon to heal. Surgery is usually only required when a dislocation of the finger joint occurs along with the tendon injury.

### **Rupture of Ulnar Collateral Ligament of Thumb (Skier's Thumb)**

Skiing and other activities that involve gripping an object may result in an injury to the thumb ulnar collateral ligament. This ligament is located at the ulnar (index finger side) of the large thumb joint. Excessive strain to the ligament, which can occur when falling with a ski pole in your hand, can cause a partial or complete tear. This renders the thumb unstable and painful with gripping or pinching.

Treatment of sprains (incomplete tear) of the ligament should involve ice, anti-inflammatory medication and a period of immobilization. The length of immobilization depends upon the severity of injury (4 to 8 weeks). Complete tears often require surgical repair of the ligament followed by a course of immobilization.

### **Scaphoid (Navicular) Fracture**

The scaphoid or navicular is a small bone located at the radial (thumb) side of the wrist. Falls onto the wrist that cause severe wrist extension (backwards bending) can cause fracture of this bone. On occasion this fracture can be confused with a severe wrist sprain. Indications of a fracture would be severe pain, bruising or significant symptoms that persist beyond a few days. It is important to treat this fracture early as it can be difficult to heal. Failure of the fractured scaphoid to heal often leads to severe arthritis of the wrist.

A scaphoid fracture that is not out of place can be treated with casting. Fractures that are displaced require surgical treatment to align the fracture. A screw is often used to hold the fracture together allowing it to heal. Operative treatment of scaphoid fractures that are not out of place is becoming more common in patients with high physical demands, such as athletes, allowing for a quicker recovery with a shorter period of casting.

### **Median Nerve Impingement at the Wrist (Carpal Tunnel Syndrome)**

Carpal tunnel syndrome is caused by impingement of the median nerve at the wrist. The median nerve runs down the center of the wrist and supplies sensation to the thumb, index, middle and ring fingers as well as controls the muscles about the thumb. Symptoms of carpal tunnel syndrome include pain at the wrist or thumb, weakness of grip, and numbness of the thumb, index, middle or ring finger. These symptoms initially come and go. They become constant with increasing severity and duration of the impingement.

Repetitive activities involving the wrist and forearm and activities that require a fixed position of the wrist for long periods of time (particularly biking) can contribute to carpal tunnel syndrome. Usually multiple factors such as a small wrist size, arthritis and general health conditions contribute to the development of carpal tunnel syndrome.

Initial treatment of carpal tunnel symptoms includes avoidance of aggravating activities, wrist and forearm stretching exercises, wearing gloves that pad the palm, and wrist splinting. If conservative measures fail to resolve the symptoms, surgical release of the carpal tunnel can be performed.

### **Ulnar Neuritis at the Wrist (Biker's Wrist)**

The ulnar nerve, like the median nerve, can be impinged and irritated at the wrist. The ulnar nerve runs down the ulnar (small finger) side of the wrist. It supplies sensation to the small and ring fingers as well as controls the small muscles of the hand. Signs of impingement of the ulnar nerve are numbness of the ring and small finger and loss of grip and pinch strength. Similar factors as those seen with carpal tunnel syndrome can contribute to ulnar neuritis. Direct pressure on the nerve for long periods such as during biking, is a significant contributor to the problem. Trauma or a fall on the palm may also bring about symptoms.

Initial treatment consists of avoiding direct pressure on the ulnar nerve (small finger side of the hand) and wearing padded gloves. These measures usually improve the symptoms. Only rarely is surgical release of the ulnar nerve at the wrist required.

### **Lateral Epicondylitis (Tennis Elbow)**

Lateral epicondylitis or tennis elbow occurs from repetitive injuries to the origin of the extensor muscles of the elbow. Symptoms consist of pain at the lateral (outside) portion of the elbow. This pain is increased with grasping objects, particularly with the elbow out straight and the palm facing downwards. Improper technique and tennis racquet grip size are common contributing factors to this problem.

Anti-inflammatory medications, icing the area, forearm stretching exercises, proper grip size and avoidance of painful activities (lifting with the palm down and the elbow extended) are the initial steps in treating this problem. Formal therapy and cortisone injections can also be helpful. Surgical debridement and repair is reserved for those circumstances in which extensive conservative treatment has failed.

### **Medial Epicondylitis (Baseball or Golfer's Elbow)**

Medial epicondylitis or baseball elbow is similar to lateral epicondylitis and occurs from repetitive injuries to the tendon origin at the medial (inside) aspect of the elbow. Pain is localized to the inside aspect of the elbow with throwing, swinging a golf club or using a racquet.

Anti-inflammatory medications, icing the area, forearm stretching exercises, and avoidance of painful activities (lifting with the palm up and the elbow extended) are the initial steps in treating this problem. Formal therapy and cortisone injections can also be helpful, with surgical debridement and repair utilized for those circumstances when extensive conservative treatment has failed.

### **Ulnar Neuritis at the Elbow (Cubital Tunnel Syndrome)**

Irritation or impingement of the ulnar nerve at the elbow (cubital tunnel syndrome) can occur from activities in which repetitive elbow flexion and extension is performed or when the elbow is held in a bent position for long periods of time. The ulnar nerve supplies sensation to the ring and small finger as well as supplies muscles of the forearm and hand. Symptoms of cubital tunnel syndrome include numbness or tingling of the small and ring fingers, weakness of grip and pinch, and pain at the medial (inside) aspect of the elbow.

Initial treatment of cubital tunnel syndrome involves forearm flexor and extensor stretching exercises, night splinting of the elbow in an extended (near straight) position and avoidance of pressure on the nerve that runs at the medial (inside) aspect of the elbow. If symptoms persist despite these forms of conservative treatment, surgical release of the nerve may be performed.

### **Distal Biceps Tendon Rupture**

The distal biceps tendon attaches to the radius (one of the forearm bones) at the elbow. The biceps muscle provides strength with flexion (bending) of the elbow as well as supination (twisting the palm upwards such as in using a screwdriver). Indications of rupture of this tendon are bruising about the elbow, deformity of the biceps muscle, pain and weakness with elbow flexion and twisting of the forearm. Complete tears are often associated with the perception of a “pop”.

Partial tears of the distal biceps tendon can be treated with a period of immobilization in a splint or cast, icing the area and anti-inflammatory medications. Complete tears of the tendon are generally treated with surgical repair of the tendon back down to the bone. Newer techniques allow for early motion, limiting stiffness and providing for a faster recovery.

### **Acromioclavicular (AC) Joint Separation (Shoulder Separation)**

Injuries to the acromioclavicular joint are common in activities such as hockey, football and rugby. A blow to the outside aspect of the shoulder can cause pain, inflammation and possibly separation of the AC joint. A separation occurs when the ligaments holding the clavicle to the shoulder bone (scapula) are disrupted. There are varying degrees of disruption that may occur are related to the force of the injury.

The treatment of an AC joint separation that involves none or a mild amount of separation is immobilization in a sling, icing and anti-inflammatory medications. As the ligaments heal, shoulder motion is initiated. Severely displaced shoulder separations require surgery to repair the ligaments and realign the acromioclavicular joint.

### **Glenohumeral Joint Dislocation (Shoulder Dislocation)**

The glenohumeral or ball and socket joint of the shoulder provides the shoulder with its large degree of motion. This joint consists of a shallow socket (glenoid) that the humeral head sits in. This joint can become dislocated if trauma causes disruption of the ligaments that hold the shoulder joint together. When this occurs, there is significant pain, deformity and limited motion of the shoulder.

When a shoulder dislocation occurs, the initial treatment is reduction of the joint (placing the humeral head back on the glenoid), followed by a period of immobilization. Once the ligaments have had time to heal, motion and strengthening of the shoulder is performed.

If the shoulder remains unstable or multiple dislocations occur, surgical repair of the ligaments and tightening of the glenohumeral joint is required.

### **Proximal (long head) Biceps Tendon Rupture**

The biceps tendon has two attachments at its proximal or shoulder region. Rupture of the long head of the proximal biceps tendon can occur. This tendon enters the glenohumeral joint and is the thinner of the two proximal tendons. Signs of rupture of the long head of the biceps tendon include bruising, pain and deformity of the proximal (shoulder) portion of the biceps muscle. Often the perception of a “pop” occurs at the time of injury.

Generally, no specific treatment other than comfort measures is performed for this injury. These include anti-inflammatory medications, icing the area and possibly the use of a sling. Patients are usually pain free by four to six weeks. This injury produces minimal loss of function and weakness.

### **Subacromial Bursitis and Rotator Cuff Tendinitis**

Subacromial bursitis occurs from performing repetitive overhead activities that cause pinching of the rotator cuff under the acromium (shoulder bone). When this occurs for an extended period of time, inflammation of the rotator cuff tendon (tendonitis) may occur. Symptoms include pain with motion of the shoulder, particularly with overhead reaching and reaching behind your back.

Initial treatment includes anti-inflammatory medications, shoulder range of motion exercises, physical therapy and limitation of painful activities. This is followed by strengthening of the rotator cuff to help prevent recurrence of the problem. If these measures do not improve the

symptoms, a cortisone injection into the subacromial space may be helpful. On rare occasions surgical debridement is required.

### **Rotator Cuff Tear**

Rotator cuff tears can occur from traumatic injuries such as a fall to the shoulder or they may occur over a long period of time due to impingement of the rotator cuff tendon. Symptoms of a rotator cuff tear are similar to that of rotator cuff tendonitis. They, however, are usually more severe, incompletely resolve with conservative treatment, and result in shoulder weakness.

Small, incomplete tears of the rotator cuff can heal with activity limitation followed by shoulder range of motion exercises and strengthening. If the symptoms should persist or should there be a large tear of the rotator cuff, surgical repair is usually required. Repair of the torn rotator cuff tendon is performed back down to its previous site of attachment. After a period of immobilization, allowing the tendon to heal, range of motion exercises of the shoulder and rotator cuff strengthening is performed.

### **Summary**

In summary, injuries to the upper extremity are common in outdoor activities. Many of these injuries can be prevented with appropriate conditioning, technique and equipment. If you should develop pain or discomfort, the first step in treatment is avoidance of painful activities. Icing the affected area and anti-inflammatory medications can be helpful to aid in healing. Stretching and range of motion injuries should be performed once the symptoms resolve followed by strengthening to get you back to your pre-injury level of functioning. If symptoms persist or are severe, more formal medical treatment may be needed.