The hand and wrist are used in almost all sports and the hand is often the least protected part of the upper extremity, leaving it vulnerable to injuries. Therefore, the hand is the most frequently injured part of the athlete's upper extremity. These injuries vary widely; diagnosis is straightforward for many but not for others. When not diagnosed early and managed appropriately, these injuries may result in long-term disabling conditions. Evaluation begins with a careful physical examination, including localisation of swelling and tenderness and functional testing of joint stability. Radiographic studies are often needed. Treatment of the injuries ranges from immobilization to surgery.

Anatomical Snuff-box Pain - Scaphoid Fracture

One of the most important and most often missed carpal injuries is a scaphoid fracture. The scaphoid is the most frequently fractured carpal bone. With a precarious blood supply of being retrograde from distal to proximal, fracture at the scaphoid waist may lead to nonunion, and has a higher chance of developing osteonecrosis in the proximal fragment. An intact scaphoid is crucial to normal wrist function. Undiagnosed and untreated scaphoid fractures can cause chronic wrist pain, loss of grip strength, and accelerated degenerative changes of the wrist joint.

The mechanism of fracture usually is a fall on an outstretched hand with the wrist in hyperextension. There should be no obvious deformity. The patient may feel a little discomfort, and range of motion is only slightly limited. Palpation is one of the key diagnostic tools in identifying a scaphoid fracture. Tenderness at the anatomic snuff-box is considered pathognomonic for a scaphoid fracture (figure 1). Diagnosis is difficult and should always be suspected in a typical presentation. Radiographs of the wrist should include a scaphoid view that is anteroposterior with 30 degrees supination and ulnar deviation (figure 2). An x-ray study is usually helpful, but fractures can be missed or misdiagnosed even with good films. If radiographs are negative for fracture but a fracture is suspected clinically, the patient should be placed in a thumb spica splint. Clinical symptoms and radiographs are then rechecked in one to two weeks. Plain radiographs may not be able to show an undisplaced fracture line initially; a bone scan or computerised tomography (CT) can be helpful in arriving at the diagnosis.

Treatment of a scaphoid fracture depends on the location and stability of the fracture. Conservative treatment for a non-displaced fracture with a thumb spica cast is acceptable. A displaced fracture is indicated for surgical fixation. Technological advances have improved union rates and accelerated the time to union. Percutaneous screw fixation can provide better compression strength and rigid internal fixation, thus allowing earlier mobilisation and return to usual activities (figure 3).
Wrist Sprain - Carpal Instabilities

Dislocations at and around the lunate are often misdiagnosed as severe wrist sprain. When left unrecognised and untreated, these injuries lead to a high incidence of long-term functional disability and chronic pain. Avascular necrosis of the lunate is a potential complication of lunate dislocation. Carpal instabilities represent a continuum of wrist injury that can lead to lunate or perilunate dislocation. These generally are the result of high-energy traumas to the wrist, with the most common mechanism being a fall on the outstretched hand with the wrist in hyperextension and ulnar deviation.

Scapholunate dissociation is the first stage of carpal instability. This is also the most common and most easily missed type of carpal instabilities. This is characterised by widening of the scapholunate joint on the posteroanterior (PA) view (figure 5). This has been given the eponym the "Terry Thomas sign" after the British comedian with a gap between his front teeth. Standard radiographs are usually normal, so when a scapholunate ligament injury is suspected clinically, additional stress views (ulnar deviation with a clenched fist) will accentuate widening of the scapholunate joint. Perilunate and lunate dislocations are progressions of the same pathologic process. The mechanism is a progressive pattern of carpal ligamentous injuries caused by wrist hyperextension and ulnar deviation. The dislocations may also be associated with specific bony fractures. The hallmark and defining feature of perilunate dislocation is a dislocation of the head of the capitate from the distal surface of the lunate (figure 6). The defining feature of lunate dislocation is disruption of the association between the lunate and the lunate fossa of the distal radius (figure 7).

Hypothenar Eminence Pain - Hook of Hamate Fracture?

The hamate is the medial bone in the distal row of carpal bones, located beneath the base of the little finger. Fractures at the hook of the hamate most often are a diagnostic problem in patients who sustain a direct blow against the hamate from the handle of a tennis racket or golf club during an unbalanced swing. Radiation of pain to the dorsum of the hand is common, and the patient will have point tenderness over the hook of the hamate, located at the ulnar aspect of the palm near the base of the fourth metacarpal. The mechanism of injury can provide a clue to the diagnosis, but the injury could also be a stress injury with a less obvious initiating event.

The diagnosis is often missed or delayed because the x-ray views of the wrist that are usually taken do not demonstrate the lesion. In suspected cases, a carpal tunnel x-ray view or a CT scan may be needed to make the diagnosis of a hook of the hamate fracture (figure 4). Once the diagnosis is confirmed, a trial of casting for 4 to 6 weeks is indicated if symptoms are relieved by simple immobilisation. Operative excision of the fracture fragment is indicated to relieve pain and improve grip strength if the patient remains symptomatic after 6 to 8 weeks of cast immobilisation.
The patient may have diffuse pain on palpation that is difficult to distinguish from other causes of wrist pain. Plain x-rays of the wrist, both PA and lateral views, are essential to diagnose wrist dislocations (as well as other carpal instabilities). On a PA view, 2 arcs should be identified (figure 8). The first arc consists of the radiocarpal row, which should be smooth and continuous. Disruption is suggestive of a lunate dislocation. The second arc consists of the midcarpal row, which also should be smooth and continuous. Disruption of this arc is suggestive of a perilunate dislocation. The appearance of the lunate is important on the PA view. Normally, the lunate is quadrangular. With lunate dislocations, it becomes triangular. This may be an additional clue to dislocation. On the lateral view, visualise the column, which consists of the radius, lunate, and capitate. The lunate should lie within the radius cup and the capitate should rest within the lunate cup. Loss of this normal column implies lunate or perilunate dislocation. Reduction and stabilisation are mandatory for patients suffering from carpal instability injuries.

**Mallet Fingers - Extensor Tendon Injuries**

A mallet finger is one of the most common injuries of the tendon and joint structures of the digit. The mechanism of injury is generally forced flexion of an actively extended distal interphalangeal (DIP) joint. Most commonly, an axial loading force, such as a ball, an opponent, or a wall, will cause the DIP joint to acutely flex, rupturing the extensor tendon insertion at the dorsal base of the distal phalanx. Examination will reveal a DIP joint held in some degree of flexion, hence the term “mallet finger”. Tenderness and swelling may be localised over the dorsum of the DIP joint. The patient will not be able to fully extend this joint actively; however, passive extension should be easily accomplished in a mallet finger. Radiographs should be obtained in suspected mallet fingers to check for bony avulsion.

Treatment involves immobilisation of the DIP joint in an extended position for tendon healing. For a pure tendon rupture, the recommended period of immobilisation is 6 to 8 weeks. The most important instruction given to the patient is that the DIP joint needs to remain in complete extension continuously throughout the splinting period. If the DIP joint is allowed to bend, even once, the entire splinting period is needed to start all over again. For a bony avulsion off the dorsal lip of the distal phalanx, the treatment is similar to that for a pure tendon rupture if the bony fragment is less than 30 percent of the articular surface. For a larger bony avulsion fragment, the DIP joint is potentially unstable and may require surgical treatment.

**Jersey Fingers - Flexor Digitorum Profundus Avulsions**

Avulsion of the flexor digitorum profundus (FDP), or jersey finger, is commonly seen in rugby and football injuries that most often affects the ring finger. This injury is caused by forced extension of a maximally flexed DIP joint, commonly as a result of having a finger caught on the jersey of another player who struggles to pull away quickly. Frequently, jersey finger presents as a swollen “jammed” finger and goes unrecognised because proximal interphalangeal (PIP) flexion is still possible. Unless a high index of suspicion is maintained, these injuries can, and often are, missed. The diagnosis can be made easily by noting the absence of active DIP joint flexion. Tenderness and swelling may be noted over the volar aspect of the DIP joint, or may be present more proximally over the flexor sheath at the area of retraction of the ruptured tendon.

Treatment is always operative, involving reattachment of the FDP tendon. Best results are obtained within the first few days; it is difficult to treat a chronic or late-
presenting FDP tendon rupture. FDP tendon reconstruction techniques are available, but results are not uniformly optimal.

**Gamekeeper’s or Skier’s Thumb - Ulnar Collateral Ligament Tear**

The ulnar collateral ligament (UCL) of the thumb is essential for stabilisation of the first metacarpophalangeal (MCP) joint when the thumb is adducted against the index and middle fingers when gripping objects. The UCL is injured during a forced hyperabduction and/or hyperextension stress of the thumb MCP joint, generally from a fall landing onto the thumb. In skiers who fall with their thumb in an extended position, the ski pole, which is caught between the thumb and the index finger, can force the MCP joint into such a hyperextended position. This may cause a partial or complete rupture of the UCL and resulting in loss of pinch strength.

Clinically, the joint is swollen and the thumb is tender in the region of the ligament. Stress testing is performed by deviating the thumb radially while stabilising the MCP joint in slight flexion. More than 30 degrees deviation or more than 20 degrees deviation compared with the opposite side suggests significant damage to the UCL. Ideally, radiographs should be taken before stress testing because, if an avulsion fracture is present, stress testing may cause further displacement of the fragment. Stress radiographs (stress tests performed under x-ray) can be helpful in assessing the degree of deviation but are not definitive.

An acute partial tear can be managed with 4 to 6 weeks of thumb spica cast immobilisation. A completely ruptured UCL may or may not heal with splinting. The aponeurosis of the adductor pollicis muscle can become interposed between the two torn ends of the UCL. This is known as a Stener lesion. There is no reliable clinical method to distinguish those complete tears with Stener lesions from those complete tears without Stener lesions. Therefore, if a complete UCL tear is suspected, an adductor aponeurosis interposition preventing the possibility of healing has to be considered and surgical exploration and repair is indicated. Surgical results are generally better with early intervention than late reconstruction. An improperly treated complete UCL rupture can result in long-term instability of the MCP joint and weakness in pinch strength.

**Jammed Fingers - Boutonniere Deformity**

The term "boutonniere" comes from the French word for "buttonhole." This injury involves a disruption of the central slip of the extensor tendon at its insertion on the middle phalanx. The mechanism of injury is a blow to the dorsum of the PIP joint, such as when a patient’s hand is stepped on. Occasionally, a small fleck fracture of the middle phalanx is seen at the central slip insertion. Volar dislocation of the PIP joint is thought to be a component in many cases. Little deformity may be noted immediately after an injury that results in a boutonniere deformity. The lateral bands may still act weakly to aid joint extension. Left untreated, the central slip retracts and the lateral bands displace volarly below the axis of rotation, becoming flexors of the PIP joint. Thus, the classic deformity of PIP joint flexion and DIP joint hyperextension is produced (figure 9). Once a deformity becomes chronic or fixed, it presents as a difficult surgical challenge, with potentially permanent functional deficits. Because of the volar dislocations may be reduced spontaneously and the subtle symptoms and signs of such injuries, a high index of suspicion for central slip disruption must be maintained when evaluating any PIP joint injury. Patients may have more pain at the dorsal side, and there is usually weakness or inability to fully extend the PIP joint.

Treatment of an acute central slip injury consists of splinting the PIP joint in full extension for 6 weeks, and DIP joint range of motion exercises are encouraged. Any dislocation that cannot be easily reduced by the usual means may indicate the interposition of soft-tissue structures. This is an indication for open reduction and surgical repair. Surgical reconstruction is the treatment of choice for chronic boutonniere deformity.

References