Upper Extremity Injuries in Adolescent Athletes

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In recent years much has been learned about the anatomy, pathophysiology, and treatment of injuries to the upper extremity in adolescents. Injuries to the upper extremity and shoulder complex can be divided into two groups based on etiology: traumatic and overuse injuries. The goal of this article is to review salient traumatic injuries to the upper extremity and to highlight important characteristics of these injuries that are important for athletic trainers and therapists who evaluate and treat these athletes to know. The second goal is to update treatment strategies for these injuries, with emphasis on what is new and controversial.

Fractures

Fractures are defined by location as either midshaft, proximal one third, or distal one third. Midshaft fractures are the most common and typically heal in adolescents with no complications. Although some physicians might still use a figure-8 splint to treat these fractures, studies show that sling immobilization for a few days, followed by early range of motion, results in healing in most cases (Andersen, Jensen, & Lauritzen 1987). There are no universally accepted criteria for operating on these fractures except for a painful nonunion, which occurs in less than 5% of cases. It is important to remember that the physes, or growth plates, of the proximal and distal clavicle are the last to fuse, so injuries to these areas in adolescents represent fractures, not sternoclavicular dislocation or acromioclavicular sprains (Figure 1). These proximal and distal clavicle fractures in adolescents almost never require surgery. The only fracture of the clavicle that is a major concern is a fracture of the proximal growth plate with posterior displacement of the clavicle. In this instance the clavicle end can compress the trachea, esophagus or great vessels, so an athlete with this injury should be carefully assessed and sent for immediate evaluation in the emergency room.

Traumatic fractures of the proximal humerus or scapular body are rare. Glenoid-rim fractures resulting from dislocations ("bony Bankart" lesions) are common but are often missed by standard radiographs of the shoulder. Stress fractures of the proximal humerus are common results of throwing and can be successfully treated with rest. Fractures of the
elbow are uncommon in adolescents, although radial-head fractures can occur in conjunction with elbow dislocations. Radial-head fractures are most commonly seen after a fall on an outstretched arm, with immediate onset of pain and no deformity. There typically is loss of motion with swelling in the “soft spot” of the lateral elbow, where the anconeus muscle is located. Aspiration of the joint is helpful for pain relief, but radiographs are necessary to confirm the diagnosis. Most of these are nondisplaced and can be treated with protected motion for 4–6 weeks.

Forearm fractures are unfortunately quite common in adolescents (Chung & Spilson, 2001; Fischer & McElfresh, 1994; Kocher, Waters, & Micheli, 2000). Most often these fractures are in the distal third of the forearm, with most of them within a centimeter of the joint space. In adolescents with open growth plates, these fractures often involve the growth plate at the wrist. Wrist sprains are uncommon in this age group, and when an athlete presents with wrist swelling and pain, the most frequent diagnosis will be a distal forearm or wrist fracture (Kocher et al.). It is important to have these evaluated as soon as possible and not let the athlete return to play until a diagnosis is made. In some cases the fractures can be treated in a splint, which will allow the athlete to continue to compete, but in most cases casting for 4–6 weeks followed by splinting is recommended. Scaphoid fractures and tears of the triangular fibrocartilage are other possible injuries that can occur in the adolescent wrist and should be included in the differential diagnosis when evaluating these injuries.

Metacarpal and phalanx fractures are common in adolescents and can be the source of a fair amount of disability. In any finger or metacarpal fracture, the most important thing is to evaluate the fracture for angulation or rotation deformity. If the digit is rotated at the fracture site and heals in that position, it can be a significant detriment to finger function and cosmesis. The technique for evaluating rotational deformity of the fingers is to look at the fingers end-on and see if they line up (Figure 2a). Also, you can have the patient flex down the fingers, and they should all point toward the tuberosity of the scaphoid (Figure 2b). With the exception of obviously deformity or dislocated joints, bilateral comparison should be made between the injured hand and uninjured hand.

The most common fractures in the hand are of the fourth or fifth metacarpal and are sustained from hitting an opponent, the ground, or a wall. These “boxer fractures” can be very angulated, and the knuckle will be depressed. Fortunately, the fourth and