Prevention of Shoulder Injuries in the Throwing Athlete

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A number of shoulder injuries are unique to athletes who repeatedly use the upper extremity in a position that calls for more than 90° of arm flexion or abduction. Baseball players, tennis players, and swimmers are good examples of athletes who fall into this category. Pink and Jobe (1991) describe the problem as an “instability continuum” consisting of problems of overuse, microtrauma, instability, subluxation, impingement, and rotator cuff tears that all of us who care for athletes generally would like to avoid treating. These problems are frequently of subtle onset and often become chronic, resulting in a frustrated athlete, and many times are difficult for the athletic trainer to manage. Therefore, it is in everyone’s best interest to adhere to the philosophy of “an ounce of prevention is worth a pound of cure.”

In this paper I will discuss some current theoretical concepts for preventing these types of injuries and suggest some strategies that have been helpful to our athletes at Ithaca College.

Flexibility

A big concern about preventing overuse injuries in the throwing athlete is how to establish and maintain full joint range of motion and good muscular strength around the joint. Recent research has shown that range of motion and strength imbalances do exist, even in professional baseball pitchers (Magnusson et al., 1994; Wilk et al., 1993).

Typically, over time the posterior capsule becomes tighter and, to compensate, the anterior capsule stretches. This results in a decrease in internal rotation and an increase in external rotation. Along with this adaptation, the internal rotator muscles become stronger while the external rotators and abductors may become slightly weaker.

We found similar motion and strength imbalances in our athletes at Ithaca College. So we developed in-season and off-season training programs to increase the athletes’ internal rotation by stretching the posterior capsule and the external rotators. We also recommend that the athletes concentrate their strengthening efforts on the shoulder abductors and external rotators, both concentrically and eccentrically.

Photo 1: Arm deceleration training using surgical tubing.
Strength

In trying to strengthen the shoulder complex, it is important to develop proximal stability first. In other words, the initial emphasis should be on the scapular stabilizers, then the glenohumeral muscles. This provides a strong, stable platform for the glenohumeral muscles. Subsequent attention should be given to the muscles of the rotator cuff. Recent EMG investigations (Moseley et al., 1992; Townsend et al., 1991) lend support to the use of core exercises for each muscle group used as a framework in our program.

For strengthening the scapular stabilizers, the desired resistance patterns are:

- Scaption (combination of shoulder flexion and abduction in the scapular plane) with the thumb up;
- Rowing;
- Push-ups with a plus;
- Press-ups (dips).

The exercises recommended for the rotator cuff muscles are:

- Scaption, thumb down and thumb up;
- Horizontal abduction with external rotation;
- Press-ups.

The resistance for these exercises is provided by (a) the athlete’s body weight, (b) light dumbbells of 5 or 6 lbs max, and (c) theraband or surgical tubing. Since much of the posterior shoulder musculature must work eccentrically during the deceleration phase of a throwing motion (Dillman et al., 1993), the eccentric phase of each exercise must be emphasized. Research by Panariello (1992) and Pezullo et al. (1995) endorses the importance of training eccentrically to improve performance and prevent deceleration injuries (Photo 1).

Functional Exercises

The need to maintain adequate muscle strength and endurance is only part of the picture. Exercise programs for throwing athletes should also include functional drills. These drills can be used to (a) train and enhance movement patterns, (b) help keep the humeral head centered on the glenoid fossa during the activity, and (c) help develop a more coordinated throwing motion.

Different pieces of equipment can be used to accomplish this, for example mediballs of different weights, a plyoback minitrampoline, or a body blade. The first two provide functional stretch-shortening plyometric drills (Wilk & Arrigo, 1993) for the athlete to practice. We use a 2-lb ball for a kneeling throwing position and for a normal throwing motion (Photo 2). A 9- or 12-lb ball is used for chest passes, overhead passes, and rotational passes.

The body blade is oscillated in 30- to 60-sec work bouts in several positions (Photo 3). Three movements are done with the arm flexed to 90° and the elbow straight (side to side, up & down, forward & backward). Then the blade is oscillated in an anterior and posterior direction in the cocking phase of throwing (90/90 position) for the fourth bout. The final bout with the body blade is done with the arm moved approximately to the release point of throwing. These movements ensure that the head of the humerus stays centered in the glenoid fossa and also en-