Dynamic Chiropractic

SPORTS / EXERCISE / FITNESS

Shoulder Rehabilitation: Part I

It is often difficult to give a coined, generalized answer to the question, "Which exercises do I give my patients for their shoulder problems?" An approach to shoulder rehabilitation can be general or specific, based on an individual's restrictions in range-of-motion and strength, underlying condition(s), or specific sport participation.

The generalized approach is often used by those without a specific focus in sports. This prescription often includes Codman or pendulum exercises, wall-walking, internal and external rotation at the waist, and perhaps an empty-can exercise. These are generally harmless and perhaps helpful, depending on the underlying condition. As a sports specialist, though, it is important to tailor the rehabilitative or preventive program to the individual's sport requirements. The first part of this article will focus on recommendations for exercises based on the underlying problem; the second part will focus on exercises specific to some selected sports.

Avoidance

Prior to prescribing a rehabilitation program for any given patient it is important to understand the restrictions imposed by any underlying pathology. Here are some general recommendations for patients with specific shoulder problems:

- Instability -- Although instability may result from either trauma or from a developmental or acquired "looseness" of the shoulder joint, the imposed restrictions in movement patterns are often similar. For anterior instability it is important to avoid the extremes of abduction, e.g., external rotation coupled with horizontal abduction (horizontal extension). This fits the general rule of thumb with any ligament/capsular injury; avoid the position of injury. Common weightlifting maneuvers that may violate this rule are those that allow the elbow to drift behind the body, often as the starting or end position of a given exercise. Common examples include the beginning stretch position of a "butterfly" maneuver for the pectorals, which can be imposed by an exercise machine or with free weights. Overhead presses with dumbbells or bars may also be dangerous if, in the higher levels of elevation, the elbows drift behind the body. The lat. pulldown which uses an overhead bar attached to a pulley begins with the shoulders in a fully stretched position of elevation. Unfortunately, the shoulders are often relaxed prior to a sudden effort to adduct the arms. This does not allow proper stabilization of the shoulder.

- Impingement -- Impingement may be secondary to instability or due to other functional or mechanical causes. When secondary to instability, it is important to use the above guidelines first prior to focusing on impingement restrictions. Subacromial impingement is likely to be aggravated by the position of abduction (specifically 90-110 degrees) and internal rotation. The most common offensive lifting maneuver is the lateral raise when the arm is in neutral or internal rotation. All overhead presses and Nautilus-type deltoid machines should be initially avoided.

- Biceps tendinitis -- Given that with standard biceps exercises the tendon of the biceps is

relatively stationary in relation to the intertubercular groove, these exercises are not usually the offenders. What does aggravate a biceps tendinitis is either excessive weight with traditional biceps curls or more commonly exercises that causes the tendon to travel up and down through the groove during the exercise. These include forward flexion maneuvers such as forward raises and bench presses.

- Osteolysis of the distal clavicle -- Repetitive grinding or compressive/shear forces may cause erosion of the distal end of the clavicle. Most often, the weightlifter is using heavy weight. It is important to avoid several exercises with this condition: bench presses using a wide grip, dips, and dead lifts. Some weightlifters also complain of pain with overhead presses. Substitution with narrow grip bench presses, cable cross-overs, or incline or decline benching with lighter weights is suggested as an initial approach.

General Shoulder Exercises

There are generally two sources of information with regard to the "best" exercise for a given muscle. The first is anecdotal, emanating from the weightlifting community. The perceptions of weightlifters are often based on rational observations, however they may not always be applied to smaller, less visible muscles. In other words, weightlifters know if an exercise is valuable for a specific muscle by how it "feels," and whether there is an obvious visual increase in tone or definition. The other source is objective information gained from electromyographic (EMG) recordings of specific muscles with specific maneuvers.

Not all exercises have been evaluated objectively, but there is a wealth of information with regards to EMG activity for a variety of exercises. Studies appear to disagree about the optimal position for any given muscle. When reading through the various studies the disparities are often due to several factors:

- Some studies use light weights,[1] others elastic tubing,[2] and others isokinetic equipment.
- Some studies use concentric contractions; others use eccentric contractions.[3]
- Some studies are designed to determine an optimal muscle testing position, rather than an exercise.[4]
- Some studies use a full ROM; others use isometric contraction.[5]
- Within a given study, the response varied throughout a given ROM.

Before extrapolating from these studies, it is important to consider these variables and how they relate to a given patient.

Cognizant of the above stated limitations and limitations based on pain and restricted ROM, a rehabilitative program can be constructed. Rehabilitation for any joint usually progresses through several phases. When ROM is limited, mild isometrics are prescribed in an effort to maintain tone, and at end range to increase ROM. This facilitation phase can be augmented if ROM allows the prescription of elastic tubing exercises. These are performed in a limited arc (20-30 degrees) in two directions (e.g., internal and external rotation) as fast as possible for 60 seconds or until fatigue or pain limit the performance. This can be performed 5-10 times for one set and repeated 2-3 times a day. This phase is followed by training for endurance followed by a focus on strength building.

When ROM is at 75% of normal a program consisting of light weights and 3-4 exercises can be prescribed. One to five pound weight are initially used; 10 pounds after 1-2 weeks. Three sets of each exercise per day are done with a high number of repetitions (15-20).

There is a sequence of emphasis for specific muscles. The first focus is on the stabilizers or rotator cuff. There is then an additive approach, including first scapular stabilizer (serratus anterior and trapezius) exercises, followed by a deltoid focus, and then the large propeller muscles (pectorals and latissimus dorsi). Although there is no specific scientific basis for this sequence, the rationale is to provide stabilization first at the side and then overhead, prior to strengthening the larger muscles. The rationale for using light weights and high repetitions is to train the smaller stabilizing muscles for endurance. When larger weights are used, the smaller muscles are not emphasized while the larger muscles are. If there is underlying instability or impingement, abnormal movement of the humeral head may lead to further injury.

A core group of exercises that I recommend in my shoulder text[6] is based on the EMG work of Townsend et al.,[7] and Moseley et al.[8] These studies were an attempt to determine a standard training program for baseball throwing. Although the results cannot be entirely extrapolated to all athletes, I feel it serves as a good reference point when beginning a shoulder rehabilitation program.

Recommended exercises:

- scaption (abduction in the scapular plane of 30-45 degrees forward in the horizontal plane) or flexion;
- horizontal abduction with external rotation performed prone;
- seated press-ups;
- bent over rows;
- push-ups with a plus (extending the arms at the top of a push-up).

These particular exercises emphasize primarily the rotator cuff and serratus anterior. It is also important to note that at the higher levels of flexion or scaption, almost all of the rotator cuff is recruited. These same exercises might serve as a good warm-up program prior to heavier weightlifting.

Although it is impossible to fully isolate any given muscle, following are some suggested exercises for some specific muscles:

- supraspinatus -- the higher ranges of scaption and flexion, the military press in the first 30 degrees, prone horizontal abduction with the arm at 100 degrees of abduction and externally rotated (elbow extended);
- infraspinatus/teres minor -- prone horizontal abduction with external rotation (shoulder abducted 90 degrees), prone extension of the externally rotated shoulder with the arm at the side, elbow extended, seated or side-lying external rotation with the arm at the side, elbow bend 90 degrees

- subscapularis -- scaption with internal rotation from 120-150 degrees, seated or side lying internal rotation, lifting light weight off the back with the arm positioned so that the back of the hand is against the low back region;

- serratus anterior -- higher levels of abduction and scaption, when not available alternatives include punching (protraction of scapula), push-up with a plus (protract scapula at top of push-up), when used for definition, pull-overs are important;

Next month will be a discussion of specific emphasis for throwers, swimmers, and golfers.

References

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APRIL 1997