Avoiding Shoulder Injury From Resistance Training

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Responsibilities of Exercise Scientists

- Educate clients in proper exercise techniques
- Design exercise programs that are appropriate and safe for each client
- Be sure to avoid exercises that are more likely to lead to injury
Shoulder Injuries are Common among Weight Trainers

- Shoulder injuries can be career-threatening to those at the competitive level
- Fortunately, most shoulder injuries from resistance training are minor musculo-tendonous strains, or ligamentous-capsular sprains
- Unfortunately, resistance training may exacerbate or contribute to glenohumeral joint hyperlaxity, instability, or impingement
Glenohumeral Instability

- Gleno-humeral joint is very mobile but lacks bony congruency
  - Renders it vulnerable to hyperlaxity/instability
- Hyperlaxity may occur as the result of a congenital hypermobility, a traumatic injury, or a gradual loosening of the ligamentous-capsular restraints
  - If a ligament or capsule is loosened significantly, surgery may be necessary to restore stability
Glenohumeral Instability

- When the static glenohumeral ligamentous-capsular restraints are excessively lax, the dynamic rotator cuff muscles are thought to exert greater force to stabilize the humeral head.

- This compensation often results in fatigue followed by rotator cuff tendinitis and pain.

- Avoid exercises that impart significant stresses to the glenohumeral ligamentous –capsular restraints.
Anterior Glenohumeral Instability

- Anterior Glenohumeral joint capsule is the most common site of hyperlaxity and instability in the shoulder.
- Shoulder external rotation combined with abduction and horizontal abduction stresses the anterior capsule, therefore, it should be avoided during resistance exercises in individuals with anterior hyperlaxity or instability.
Exercises that put the Glenohumeral Joint in “At Risk” Position

- External rotation combined with abduction and horizontal abduction.

- These exercises include:
  - Latissimus Pull-Down performed behind the neck
  - Shoulder Press performed behind the neck
  - Wide –Grip Bench Press
  - Pectorals Fly
Alternatives for Exercises

- Exercises commonly performed behind the neck, (shoulder press, lat pull-down) should be performed with the elbows 30 degrees anterior to the shoulder in the plane of the scapula to decrease stress to the anterior glenohumeral joint capsule.
Alternative for Lat Pull-Down

- The latissimus anterior pull-down to the chest can be substituted to train the latissimus dorsi, rhomboids, and elbow flexors without compromising the anterior glenohumeral joint.
Alternative for Shoulder Press

- Overhead shoulder presses are typically performed behind the neck placing shoulders in at-risk position.
- Performing the shoulder press with the hands and elbows anterior to the shoulder is preferable whether using a bar, dumbbells, or a machine.
Alternative for Back Squat

- Back Squat is usually performed with the weight positioned behind the neck.
- Clients should be instructed to use either a modified center of mass bar, or perform a front squat instead.
- The elbows are positioned anterior to the shoulder when using a modified center of mass bar or performing a front squat, substantially decreasing anterior glenohumeral ligament stress.
Alternative for
Wide-Grip Flat Bench Press

- Cases of bilateral anterior shoulder dislocation during bench pressing have been reported as a result of the horizontal abduction stresses on the anterior glenohumeral ligaments combined with heavy resistance.
- This can be avoided by limiting hand spacing to 1.5 times the shoulder width, placing a cushion or roll on the chest, or using a ROM limiting stop on a machine or self-spotting rack.
Alternative for Incline Press

- Clients with hyperlaxity or instability should approach the weighted bar incline press with caution as the arms are maintained in an at-risk position the entire time.
- Alternatively, dumbbells may be employed during the incline press with careful avoidance of the at-risk position.
Alternative for Decline Press

- Conversely, throughout the entire movement of the decline press, the arms are maintained in a safe position below 90 degrees flexion and 45 degrees abduction with minimal external rotation.

- This form makes this exercise reasonably safe for pectoral strengthening with a weighted bar or dumbbells.
Alternative for Push-Ups

- Like the bench press, hand spacing during push-ups should be limited to reduce horizontal abduction.
- For performing a push-up, while using a standard weight bench, this exercise can be performed from a kneeling or standard push-up position.
- In addition to reduced stress on the anterior glenohumeral ligaments, clients have reported less wrist discomfort, with this push-up technique compared with the standard push-up technique performed on the floor.
Alternative for Pectoralis Fly

- Excessive horizontal abduction should be avoided when performing this exercise to minimize anterior capsular distention.
- Instruct clients to initiate the movement with their elbows slightly in front of their shoulders and maintain their elbows below shoulder level throughout the entire movement.
- This form should be used to reduce shear across the subacromial space, which may irritate the rotator cuff tendons and bursa.
Alternate Pectoral Stretch

- Stretching the pectorals with the arm horizontally extended and externally rotated should be avoided in individuals with anterior glenohumeral joint capsular hyperlaxity or instability.

- An alternate technique for pectoral stretching is resting shoulder to be stretched against the corner of a wall using a towel cushion. Initiate stretch by retracting shoulder blades.
Posterior Glenohumeral Instability

- The posterior glenohumeral joint capsule is stressed when weight is borne through the arm with the shoulder flexed, or when the flexed shoulder is pulled forward or across the chest.

- Stretching and strengthening exercises that stress a posteriorly unstable shoulder may need to be avoided entirely.
Exercises to be Avoided in Posterior Glenohumeral Instability

- The cross chest stretch should be avoided if a posterior instability is present.
- In addition, rowing exercises should be modified to reduce the amount of arm distraction during the eccentric phase of the row.
- Dead lifts and power cleans might also need to be avoided. The hang clean may be substituted for the power clean.
Subacromial Impingement

- Repeated compression of the rotator cuff tendons and bursa against the overlying acromion and/or coracoacromial ligament may lead to irritation and inflammation.

- When the cuff tendons and/or bursa are often inflamed, the subacromial space is further diminished and the tendons and bursa are often impinged in the subacromial space.
Subacromial Impingement (Primary Impingement Syndrome)

- Individuals with a primary impingement often experience pain when lifting their affected arm because of compression of the inflamed and sensitized cuff tendons and bursa.
Modified Exercises
(Primary Impingement)

- Several resistance exercises should be modified to prevent inducing or exacerbating a primary impingement.
Modified Lateral Raise

- Lateral raise is performed with the palm facing down, which can lead to rotator cuff impingement. During elevation, if the arm is internally rotated, the greater tuberosity of the humerus pinches the rotator cuff tendons and bursa against the acromion.

- To minimize compression, elevation exercises should be performed with the arms externally rotated. Clients should use a neutral grip done by pointing their thumbs toward to ceiling to promote arm external rotation.
Modified Upright Row

- During this exercise the arm is maintained in an internally rotated position throughout the full range on elevation.
- Avoid this exercise entirely or limit elevation to 80 degrees and keep elbows lower than the shoulders to avoid rotator cuff impingement.
Modified Pullover Exercise

- The pullover exercise performed supine with free weights or on a machine forces the rotator cuff tendons and bursa against the undersurface of the acromion when the arms are hyperflexed.

- Make this exercise safer by limiting flexion to the normal physiological limits or a comfortable ROM.
Subacromial Impingement (Secondary Impingement Syndrome)

- Exercises that contribute to the hyperlaxity of the anterior glenohumeral joint can also contribute to the development of a secondary rotator cuff impingement.
- If the arm does not remain centered in its shallow fossa during movement, rotator cuff tendons and bursa can be repetitively compressed and become inflamed.
- The rotator cuff muscles must also work harder in an attempt to restore stability and become prone to fatigue, tendonitis, inflammation, and subsequent impingement.
Subacromial Impingement (Secondary Impingement Syndrome)

- Because the impingement develops secondary to hyperlaxity or instability, it is considered secondary impingement.

- With this condition, it is sensible to avoid repeated stress to the anterior capsule restraints by limiting exercises that combine arm external rotation with horizontal abduction.
Modified Exercises
(Secondary Impingement)

- Modifications for anterior shoulder instability or hyperlaxity should be followed when prescribing exercises for an individual with secondary impingement.
Internal Impingement Syndrome

- Internal impingement of the articular side of the supraspinatus and infraspinatus tendons against the posterior glenoid labrum may occur when the shoulder is in the at-risk position.

- This syndrome involves repetitious shoulder external rotation combined with abduction and horizontal abduction, which can impinge the tendons against the labrum.
Recommended Shoulder Exercises

- Exercises that develop the larger shoulder muscles as well as the smaller shoulder muscles are recommended.

- This combination of exercises, rowing, push-up with a plus, press-up, and horizontal abduction with external rotation has shown to elicit high levels of EMG activity in all of the shoulder muscles.
Recommended Shoulder Exercises

- Internal and external rotation exercises in neutral or at 90 degrees abduction are also commonly prescribed for patients with shoulder dysfunction.

- Inadequate RC strength can lead to excessive humeral head elevation and subsequent impingement of the soft tissues beneath the acromion.
Practice Exercises Described

- Proper exercise technique is vital to the safety of any resistance training program.
- Develop an awareness of appropriate and inappropriate exercises for a variety of pathologies.
- When in doubt, consult with certified manual physical therapist.