

## RESISTANCE TRAINING INJURIES – THE ROTATOR CUFF

Common resistance training injuries shouldn't have to be common. In this article we're looking at causes and prevention of resistance training injuries and taking a closer look at the shoulder joint, and rotator cuff injury and post rehabilitation flexibility and strengthening exercises.

Two categories of injuries can result from resistance training: acute/traumatic, and gradual onset. Some resistance exercises are inherently more dangerous than others, but seemingly simple weight lifting exercises can cause injuries if the weight is too heavy and/or incorrect form is used.

### Causes of resistance training injuries

- 1) Resistance training exercises may be intrinsically risky,
- 2) Too much weight used
- 3) Poor form/technique
- 4) The person pushes beyond their limits and loses control of the weight.



### Common resistance training injuries

1. Rotator cuff strain/shoulder impingement
2. Biceps tendonitis
3. Elbow tendon strain
4. Low back strain
5. Groin pull
6. Hamstring cramps
7. Quadriceps tendonitis

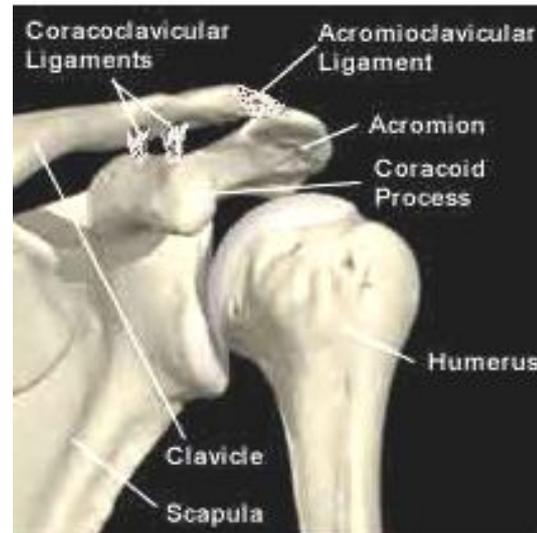
### Shoulder Anatomy

The shoulder joint is a ball and socket, synovial joint, formed by the head of the humerus (upper arm) and the shallow glenoid cavity of the scapula. It is also referred to as the glenohumeral or GH joint. The acromion process of the scapula forms a joint with the clavicle called the acromioclavicular or AC joint, this joint is above the GH joint. The pectoral girdle consists of the clavicle (collar bone) and scapula (shoulder blade) it attaches the upper limb to the trunk and because of its mobility it enhances the range of movement available at the shoulder joint.

### Ligaments

The main ligaments of the shoulder joint are; Coracohumeral ligament – connects the coracoid process on the scapula to the humerus. Glenohumeral ligaments - attach

the glenoid cavity to the neck of the humerus.



### Other structures

Joint/articular capsule – thin loose sac of connective tissue that completely surrounds the joint.

Glenoid Labrum - narrow rim of fibro-cartilage around the edge of the glenoid cavity, it deepens and enlarges the cavity.

Bursae – four bursae of the shoulder joint are subscapular bursa, subdeltoid bursa, subacromial bursa and subcoracoid bursa

### Movement & Muscles

The shoulder joint allows flexion, extension, abduction, adduction, internal rotation, external rotation, horizontal abduction, horizontal adduction and circumduction of the arm. It has more movement than any other joint of the body because of the looseness of the articular capsule and the shallowness of the glenoid cavity. Whilst the ligaments of the shoulder joint provide additional stability, the main strength of the joint is provided by the surrounding muscles in particular the 4 rotator cuff muscles (Supraspinatus, Infraspinatus, Teres Minor and Subscapularis). The rotator cuff muscles work as a group to hold the head of the humerus into the glenoid cavity.

Figure 1 – Supraspinatus



Figure 2 - Infraspinatus



## RESISTANCE TRAINING INJURIES – THE ROTATOR CUFF

Figure 3 - Teres Minor

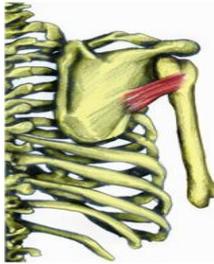


Figure 4 - Subscapularis



Three of the four rotator cuff muscles are visible on the posterior and upper surface of the scapula, the supraspinatus, the infraspinatus and the teres minor. The subscapularis is not visible because it is on the anterior surface of the scapula and can only be viewed from the front.

### **ROTATOR CUFF INJURY**

A rotator cuff injury is an injury to one or more of the four muscles in the shoulder. This shoulder injury may come on suddenly and be associated with a specific injury such as a fall (acute), or it may be something that gets progressively worse over time with activity that aggravates the muscle (chronic). Occasionally, even a simple act like rolling over in bed can result in a rotator cuff injury.

The type of injury can range from an inflammation of the muscle without any permanent damage, such as tendonitis, to a complete or partial tear of the muscle that might require surgery to fix it.

If you've ever felt pain in your shoulder when pressing overhead, you may very well suffer from shoulder impingement syndrome. This can make bench presses, lateral raises, and shoulder presses next to impossible. Whatever you do, don't ignore shoulder pain. Doing so can result in bone spurs and a torn rotator cuff.

Impingement syndrome is defined as a compromise of the space between the head of the humerus and the acromial arch. In simple terms the top of your upper arm bone is too high and close to your Acromion process of the scapula. This decrease in space can come from either a structural problem (usually bone) or a functional problem (usually muscular).

When you raise your arm, a complex chain of events takes place. A group of muscles called the scapular stabilisers (serratus, trapezius, levator scapulae, rhomboids, and teres major) function in a very precise

manner to ensure that the scapula is in the right place at the right time. At the same time, the 4 rotator cuff muscles finely coordinate the movement of the humerus to ensure proper alignment in relation to the scapula. If these muscles do not coordinate this movement perfectly, the head of the humerus is likely to rise up and forward and bump into the bottom of the acromion.

When this impingement occurs, the supraspinatus muscle and tendon, as well as the subacromial bursa, are trapped between the humerus and the acromion. This results in swelling and tenderness of this bursa (bursitis) and the supraspinatus muscle and tendon (tendinitis).



### **Causes**

- ✓ Improper technique
- ✓ Weight too heavy during chest or shoulder exercises.
- ✓ Over-training
- ✓ Repetitive overhead arm movements
- ✓ Falling on a outstretched Hand
- ✓ Falling directly onto the shoulder

### **Signs & Symptoms**

- ✓ Pain – vague & hard to pinpoint
- ✓ Pain can refer to upper arm, even though injury site is shoulder joint.
- ✓ Pain when raising arm above head or up to side, plus pain during chest and/or shoulder exercises.
- ✓ Weakness
- ✓ Inability to raise arm overhead
- ✓ Inability to place arm behind back
- ✓ Loss of shoulder range of motion when compared to uninjured arm – flexion, external rotation, internal rotation & abduction, horizontal abduction & adduction also affected.

### **Treatment**

- ✓ Rest from painful activities.
- ✓ Ice to control inflammation and pain. Never apply ice prior to exercise.
- ✓ Heat to help increase blood supply to area.

## **RESISTANCE TRAINING INJURIES – THE ROTATOR CUFF**

- ✓ Flexibility training for the 4 Rotator Cuff Muscles & Deltoids, Latissimus Dorsi, Pectoralis Major, Biceps & Triceps.
- ✓ Strengthening exercises for Rotator Cuff Muscles.
- ✓ Never train through pain. (Pain = no gain)
- ✓ Assessment and treatment from a sports injury professional.
- ✓ Doctors may prescribe anti-inflammatory medicine to help reduce inflammation.
- ✓ Doctors may prescribe cortisone injections into the area.
- ✓ In severe cases surgery may be required.

### **FLEXIBILITY / STRETCHING EXERCISES**

**If you have shoulder pain or injury, consult a physician or sports injury professional before doing any of the following shoulder exercises.**

#### **Pendulum Swings**



Stand and lean over with arm hanging. Begin slowly swinging the arm in small circles and gradually enlarge the size of the circles. Repeat 10 times.

#### **Rotator Cuff Stretch I**

Stand or sit. Bend elbow at 90-degree angle, keeping elbows close to body, lower arms are pointed forward and parallel to floor, thumbs pointed up. Move hands away from body until stretch is felt in shoulder. Hold stretch for 30 seconds. Rest and repeat.

#### **Rotator Cuff stretch II**

Stand in front of door frame bend elbow at 90-degree angle and place palm against door frame. Move forward slowly to stretch rotator cuff.

#### **Rotator Cuff Stretch III**

Sit or stand. Hands on waist, thumbs facing frontward. Bend at hips until body is resting on lap if sitting or parallel to floor if standing. Let arms hang toward floor to stretch the shoulder joint. Hold stretch for 20 seconds.

#### **Towel Stretch I - Internal Rotation**

Place right hand behind back. With the left hand, dangle a towel behind the back. Grasp the towel with the right hand. Gently pull the right hand upward by raising the left arm to stretch the right shoulder. Towel should be in vertical position. Hold for 30 seconds. Repeat on other side.

#### **Towel Stretch II - External Rotation**

Place right hand behind back. With the left hand, dangle a towel behind the back. Grasp the towel with the right hand. Pull right hand downward to stretch the left shoulder. Towel should be in vertical position. Hold for 30 seconds. Repeat on other side.

#### **Back of shoulder stretch**

Reach arm right across chest, use left hand to grasp arm just above elbow and gently pull arm farther across body until you feel a stretch in the back of the shoulder. Hold stretch for 30 seconds. Rest and repeat. Repeat on other side.



#### **Overhead Stretch**

Place hands on edge of counter top. Bend upper body at hips at 90-degree angle. Reach and stretch shoulders.



#### **Wall Climb - front**

Stand about 18 inches from a wall. Face the wall. Place the fingertips of

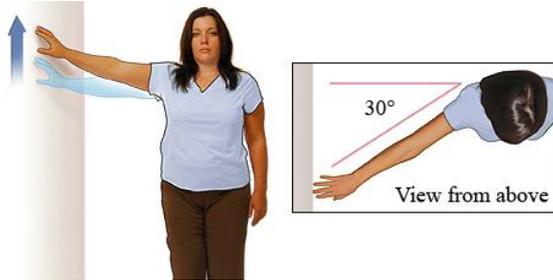


both hands against the wall and walk the fingers up the wall until you feel a stretch in your shoulders. Hold the stretch for a count of ten. Repeat ten times.

## RESISTANCE TRAINING INJURIES – THE ROTATOR CUFF

### Wall Climb II

Turn sideways. Place the fingertips on the wall.



Arm should be slightly toward the front of body, rather than straight out to the side (at about a 30 degree angle to the front of the body) Walk the fingers up the wall as high as they can go until you feel a stretch under the shoulder, without too much discomfort. Arm should be slightly toward the front of body, rather than straight out to the side (at about a 30 degree angle to the front of the body) Hold the stretch.

### **STRENGTHENING EXERCISES**

The rotator cuff is vital for stabilising the shoulder joint both statically and dynamically. The following exercises contribute to general rotator cuff strength and are used in the prevention and rehabilitation of rotator cuff injuries.

#### Before you start

The exercises described below can help you strengthen the muscles in your shoulder (especially the muscles of the rotator cuff). These exercises should not cause pain. If you feel any pain, stop exercising. Start again with a lighter weight. To warm up, stretch your arms and shoulders, and do pendulum exercises (as per the 1<sup>st</sup> flexibility exercise above).

If returning to exercise after a rotator cuff injury each time you finish doing all 4 exercises, put an ice pack on your shoulder for 20 minutes. It's best to use a plastic bag with ice cubes in it or a bag of frozen peas, not gel packs. If you do all 4 exercises 3 to 5 times a week, your rotator cuff muscles will become stronger, and you'll get back normal strength in your shoulder.

Keep repeating each of the following exercises until your arm is tired. Use a light enough weight that you don't get tired until you've done the exercise about 20 to 30 times. Increase the weight a little each week (but never so much that the weight causes pain). Perform the exercises slowly:

### Exercise 1

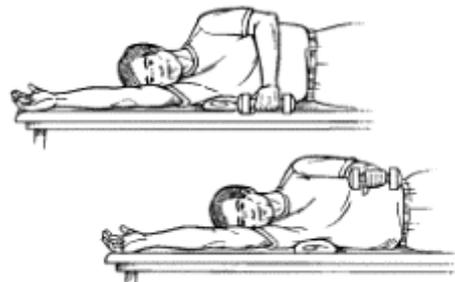
Start by lying on your stomach on a table or a bed. Put your left arm out at shoulder level with your elbow bent to 90° and your hand down. Keep your elbow bent, and slowly raise your left hand. Stop when your hand is level with your shoulder. Lower your hand slowly. Repeat the exercise until your arm is tired. Then do the exercise with your right arm.



Exercise 1

### Exercise 2

Lie on your right side with a rolled-up towel under your right armpit. Stretch your right arm above your head. Keep your left arm at your side with your elbow bent to 90° and the forearm resting against your chest, palm down. Roll your left shoulder out, raising the left forearm until it's level with your shoulder. (Hint: This is like the backhand swing in tennis.) Lower the arm slowly. Repeat the exercise until your arm is tired. Then do the exercise with your right arm.

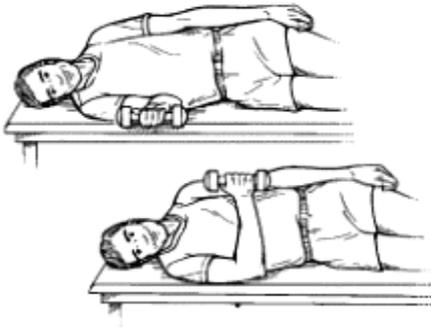


Exercise 2

### Exercise 3

Lie on your right side. Keep your left arm along the upper side of your body. Bend your right elbow to 90°. Keep the right forearm resting on the table. Now roll your right shoulder in, raising your right forearm up to your chest. (Hint: This is like the forehand swing in tennis.) Lower the forearm slowly. Repeat the exercise until your arm is tired. Then do the exercise with your left arm.

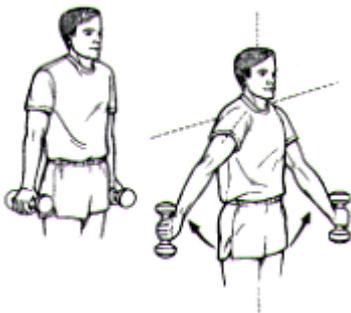
## RESISTANCE TRAINING INJURIES – THE ROTATOR CUFF



Exercise 3

### Exercise 4

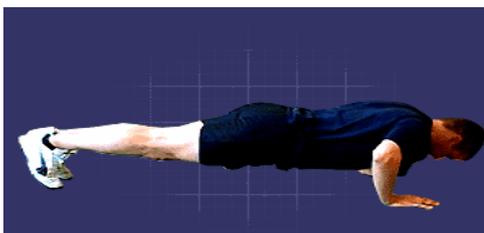
In a standing position, start with your right arm halfway between the front and side of your body, thumb down. (You may need to raise your left arm for balance.) Raise your right arm until almost level (about a 45° angle). (Hint: This is like emptying a can.) Don't lift beyond the point of pain. Slowly lower your arm. Repeat the exercise until your arm is tired. Then do the exercise with your left arm.



Exercise 4

### DYNAMIC STABILISATION EXERCISES

Dynamic stabilisation exercises are designed to help re-establish neuromuscular control of the affected joints and muscles, they also develop muscular strength. A good dynamic stabilisation exercise for the shoulder joint and pectoral girdle is the press up, initially the press up should be done on a stable surface. To progress the exercise the press ups can be done using vibration plates, wobble board, bosu or a stability ball.



### PREVENTION

Prevention is always much better than Cure. Anything you can do to prevent an injury from occurring is worth it. The prevention of shoulder injuries comes down to the conditioning of the shoulder muscles and tendons, which ultimately involves both stretching and strengthening of the shoulder joint.

The following exercise modifications can help prevent shoulder impingement syndrome –

**Lateral Raise** – normally done with palm facing downwards, to limit potential impingement of the rotator cuff try slightly externally rotating your arms by pointing your thumbs towards the ceiling.

**Upright Row** – limit elevation to 80 degrees.

**Pullover** – reduce the range of motion and avoid hyperflexion of the shoulder joint.

**Lat pulldown** – pull down towards the chest and not behind the back.

**Shoulder Press** – perform with hands and elbows slightly anterior to the shoulder joint.

**Bench Press** – avoid an overwide grip by limiting the grip to less than 1.5 times your shoulder width, or limit range of motion.



The general guidelines below will help to reduce risk of common weight lifting injuries:

- ✓ Warm up properly.
- ✓ Perform lifting exercises with proper form. Do not jerk or rush through any lifting exercises. Keep spine neutral and shoulders relaxed throughout weight lifting exercises.
- ✓ Do not lift more than you can handle with decent form.
- ✓ Use a spotter for extra heavy lifts.
- ✓ For intrinsically risky weight lifting exercises, like barbell squats, dead-lifts and bench press, practice proper

## RESISTANCE TRAINING INJURIES – THE ROTATOR CUFF

form with light weights until you master it.

- ✓ Warm up the joint that's going to be used. Don't just dive into heavy lifting without first stretching the muscles around that joint; precede heavy lifting with light lifting for several sets.
- ✓ Keep hydrated throughout your lifting session.
- ✓ The minute you feel pain or odd sensations in a joint, STOP the set. Pain in a joint is a warning that a tendon or cartilage is close to injury, or already has been injured.
- ✓ Avoid the “Too Much-Too Soon” pitfall. Find a well-thought-out training schedule and stick to it! Increase your training gradually.
- ✓ Ice and rest a tender joint as soon as discomfort is noticed. All serious over-use injuries start out as something minor.
- ✓ Find a health care professional who takes your training seriously. Work with them to develop a rehab plan that works for you.

***If you suspect an injury to go a Doctor or a qualified Sports Injury Professional, for diagnosis and treatment.***

***If in doubt about the suitability of any of the exercises mentioned in this article for you or your client's situation then you should discuss the matter with the relevant health care professional.***



Internet, [www.getbig.com](http://www.getbig.com), accessed Mar 2010  
 Internet, [www.health.yahoo.com](http://www.health.yahoo.com), accessed Mar 2010  
 Internet, [www.merck.com](http://www.merck.com), accessed Mar 2010  
 Internet, [www.shoulder-pain-management.com](http://www.shoulder-pain-management.com), accessed Mar 2010  
 Internet, [www.thestretchinghandbook.com](http://www.thestretchinghandbook.com), accessed Mar 2010  
 Internet, [www.tmuscle.com](http://www.tmuscle.com), accessed Mar 2010



### References:

Grisogono, V., 1994, *Sports Injuries, A Self Help Guide*, The Crossing Press.  
 Moore, K., Dalley, A., 1999, *Clinically Oriented Anatomy* (4<sup>th</sup> ed), Lippincott, Williams & Wilkins  
 Peterson, L. Renstrom, P., 2005, *Sports Injuries, Their Prevention and Treatment*, Taylor & Francis.  
 Prentice, W., Voight, M. 2001, *Techniques in Musculoskeletal Rehabilitation*, McGraw-Hill  
 Tortora, G., Grabowski, S., 2003, *Principles of Anatomy & Physiology*, John Wiley & Sons Inc.  
 Internet, [www.associatedcontent.com](http://www.associatedcontent.com), accessed Mar 2010  
 Internet, [www.bodybuilding.com](http://www.bodybuilding.com), accessed Mar 2010  
 Internet, [www.emedicinehealth.com](http://www.emedicinehealth.com), accessed Mar 2010  
 Internet, [www.familydoctor.org](http://www.familydoctor.org), accessed Mar 2010