

HARRIS ORTHOPAEDICS AND SPORTS MEDICINE

Summer's Shoulder



Introduction

Swimmer's shoulder (or Thrower's shoulder) is the term used to describe the problem of shoulder pain in the competitive swimmer. Swimming is an unusual sport in that the shoulders and upper extremities are used for locomotion, while at the same time requiring above average shoulder flexibility and range of motion (ROM) for maximal efficiency. This is often associated with an undesirable increase in joint laxity. Furthermore, it is performed in a fluid medium, which offers more resistance to movement than air. This combination of unnatural demands can lead to a spectrum of overuse injuries seen in the swimmer's shoulder, the most common of which is rotator cuff tendinitis.

Sport Specific Biomechanics

The 4 basic strokes used in competitive swimming are the freestyle, backstroke, breaststroke, and butterfly.

Strength and power are required for maximal propulsion, while flexibility is required for an efficient and faster recovery. Increased shoulder flexibility and ROM are beneficial to all strokes but can result in increased laxity of the glenohumeral joint capsule and ligaments, the static stabilizers of the shoulder. This laxity must then be compensated for by a stronger rotator cuff, to keep the humeral head centered in the glenoid socket during stroke activity, a requirement for efficient stroke work as well as to avoid injury to the labrum and cuff.

To better understand how the shoulder works in swimming, it may be helpful to think of the upper extremity as a lever or "canoe paddle" mechanism. The swimmer's hand functions as the flat end of the paddle. The rotator cuff functions as a fulcrum stabilizing the glenohumeral joint so that the power muscles of the shoulder are able to pull the arm through the water. This would be analogous to the way in which a canoeist uses one hand to stabilize the upper end of a paddle as a fulcrum, so that the lower hand can pull the paddle through the water more efficiently.

Anatomy

The shoulder girdle is made up of 3 bones (the scapula, clavicle, and proximal humerus), 2 joints (the glenohumeral and acromioclavicular joints), and numerous ligaments, muscles, and tendons. The subacromial bursa overlies the rotator cuff and can provide it with some mechanical protection from the bony acromion above in the face of impingement.

The key ligaments are the glenohumeral ligaments (inferior, middle, superior), which are thickened regions of the joint capsule, of which the inferior glenohumeral ligament is most important. Their role is to help stabilize the glenohumeral joint, in support of the rotator cuff muscles.

The key muscle group of the shoulder is the rotator cuff, made up of (from anterior to posterior) the subscapularis, supraspinatus, infraspinatus, and teres minor. The primary role of the rotator cuff is to function as the dynamic and functional stabilizer of the glenohumeral joint. The long head of the biceps tendon, located between the subscapularis and supraspinatus, also assists the rotator cuff in stabilizing the glenohumeral joint. These muscles and their tendons can be overused and injured in shoulder dominant activities such as swimming, with the most commonly injured portion of the cuff being the supraspinatus. On the other hand, the "power muscles" of the shoulders, including the latissimus dorsi, pectoralis, and deltoid, are responsible for moving the arm through space or water, but only infrequently sustain significant injury.

Finally, the trapezius, levator scapulae, rhomboids, and serratus anterior muscles stabilize and position the scapula and shoulder girdle, and are therefore very important to the swimming stroke. Without a stable platform from which to work, the shoulder and arm cannot function efficiently. Fortunately, they also are only occasionally the source of significant injury in the swimmer.

[Related Document: A Patient's Guide to Shoulder Anatomy](#)

Injury

- As the shoulder is pushed to its limits in terms of strength and endurance, the rotator cuff muscles generally fatigue before the power muscles, allowing micromotion and subluxation of the humeral head. This, in turn, decreases stroke efficiency, while leading to injuries of the rotator cuff, biceps tendon, and glenoid labrum.
 - Superior subluxation of the humeral head is particularly problematic as it can impinge the rotator cuff tendons against the acromion above, leading to tendinitis and/or tears. The overlying subacromial bursa (also referred to as the subdeltoid bursa) often becomes inflamed, leading to painful bursitis.
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Symptoms

What does a swimmer's shoulder feel like?

History

- The adolescent or teenaged swimmer often presents with a history of a recent growth spurt, an increase in the level of training and competition, or both.
 - Pain associated with the condition
 - Initially, the pain is only noted during or immediately after swimming.
 - As the athlete tries to swim "through the pain," it may worsen to the point where it affects nonswimming shoulder activities and might eventually be noted at rest or at night.
 - When the athlete finally stops swimming because of the pain, the condition often improves but recurs with a return to swimming if the rotator cuff has not been specifically restrengthened.
 - The character of the pain in swimmer's shoulder is similar to that of rotator cuff pain. The pain is often poorly localized and felt to be deep within the shoulder.
 - On occasion, the pain can be associated with a particular position or phase of the stroke.
 - A reproducible click or painful catch should alert the examiner to the possibility of a glenoid labral tear.
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Prevention

What could I do to prevent this injury?

Swimmers may have shoulder pain for many reasons. Poor swimming technique is a major factor in shoulder pain. As mentioned previously, if a swimmer crosses mid-line upon hand-entry, this may cause impingement of the long head of the biceps tendon. As well, if a swimmer's hand enters the water with the thumb pointing down and the palm facing outwards, this can result in the same type of impingement.

Overtraining can lead to shoulder pain if the swimmer continues to swim with fatigued muscles. As the muscles fatigue they will work less efficiently which has two poor consequences. First, the muscles will have to work harder in a weakened condition. Second, the swimmer will have to perform more strokes to cover the same distance, which is overusing already fatigued muscles. Together these two factors can result in swimmer's shoulder.

Unilateral breathing may also cause swimmer's shoulder. Swimmers who consistently turn their heads to the same side to breathe are risking shoulder pain in the opposite shoulder as it has to work harder to support forward movement with the head turned to the side.

Overuse of certain training equipment may cause shoulder pain. The use of hand paddles that are much larger than the swimmer's hand, or those paddles that do not have drainage holes place great strain on the shoulder muscles during the pull-through phase of freestyle. Using a kickboard with arms fully extended in front of the swimmer can place the shoulder in a position of impingement. The longer the swimmer uses these items, or uses them incorrectly, the greater the risk of shoulder pain.

Diagnosis

What tests will my doctor run?

- Physical exam
- X-rays
- (Possibility) Magnetic resonance imaging (MRI)

If a labral tear (see [Related Document: A Patient's Guide to Glenoid Labral Tear](#)) is suspected, an MRI arthrogram (MRA) with intraarticular gadolinium could be considered.

[Related Document: A Patient's Guide to MRI](#)

[Related Document: A Patient's Guide to MRI Arthrogram](#)

Treatment

What treatment options are available?

Nonsurgical Treatment

- Rest
- Apply ice or cold therapy to the painful area for 15-20 minutes with 1 ½-2 hours off and can repeat. Remember to use an ice bag or a towel wrapped around the ice to protect against ice burn.
- Return to sport gradually once the pain has eased. If no change see an orthopedic doctor.
- Anti-inflammatory medication such as Ibuprofen or other NSAID's (non steroidal anti inflammatory drugs) may be directed by the doctor.
- Advise on rehabilitation programmes to improve function and decrease pain.
- The doctor may discuss the option of directly injected steroids into the subacromial space to reduce inflammation and reduce inflammation in the local area. A corticosteroid injection may be considered in older patients but is rarely used in the adolescents and almost never youth patients.
- In cases unresponsive to rest and rehabilitation after about a period of 6-12 months, consultation with an orthopedic surgeon and discussing of surgery is possible.

Surgery

Surgical Intervention

Surgical intervention is considered in athletes who continue to have shoulder pain after a minimum of 6 months of guided rest and rehabilitation.

The procedure depends on what is the cause of the pain. Though a number of different tests this would be determined.

Rehabilitation / Recovery

What should I expect after treatment?

Acute Phase

Rehabilitation Program

Physical Therapy

Pain relief, which is the first goal of treatment, involves resting the shoulder. In most cases, the athlete should stop or significantly decrease his or her swimming activities. A physical therapist can help modify shoulder and activities to help avoid re-aggravation of the rotator cuff. Anti-inflammatory treatment in the form of regular icing and nonsteroidal anti-inflammatory medications should also be instituted until the athlete is pain free.

The second goal of treatment is to restore normal strength in the rotator cuff. Regaining strength can be accomplished with a supervised exercise program for the rotator cuff using relatively light weights (2-3 lb, up to a maximum of 5 lb) and high repetitions (12-20 reps per set). These exercises can be performed on a daily basis or every other day.

Working with a physical therapist (PT) can be helpful, particularly one with expertise in treating shoulder injuries and swimmers, who can help the athlete transition from dry land exercises to swimming. The addition of therapist-administered therapeutic modalities, such as ultrasound, phonophoresis, iontophoresis, or electrical stimulation can help further reduce pain and inflammation during the acute phase of injury.

Recovery Phase

Rehabilitation Program

Physical Therapy

A capsulorrhaphy usually requires immobilization in an arm sling or immobilizer for 4-6 weeks to allow the capsule to heal in the surgically-tightened position. This is then followed by a rotator cuff strengthening program in physical therapy. Passive range of motion (PROM) is typically restricted during this time so as not to stretch out the capsule. ROM commonly returns on its own with exercise and normal shoulder use. One can expect about 50-75% of the normal shoulder motion to return by 3 months and 100% of motion by 6 months following successful surgery. Modified stroke work can begin once the athlete achieved a minimum of 80% of normal motion and strength in the shoulder. Return to competitive swimming is anticipated between 6 and 12 months following surgery.

Rehabilitation / Recovery continue...

Maintenance Phase

Rehabilitation Program

Physical Therapy

The maintenance phase is the final phase of rehabilitation. The athlete should be independent with a strengthening program as instructed by his or her athletic trainer or physical therapist. The doctor and physical therapist are involved in re-assessment of swimming mechanics and stroke technique, addressing any errors to prevent recurrence of injury.

* References available upon request