Game Day Seminar

Thursday, August 4th, 2005
6:00 pm to 10:00 pm

This course will update athletic trainers and coaches on the following:

- The assessment and safe transport of athletes with head and neck injuries
- The assessment and treatment of athletes suffering from a non-traumatic collapse on the field
- Evaluation and stabilization of orthopedic emergencies

Education Credit
4.0 CEUs (NATABOC Approved Provider)

To register or for more information, please call Carol Mills at (330) 297-9020 x33.

The Football Athlete Seminar

Thursday, June 30, 2005
6:00 pm to 10:00 pm

This course will update health care providers, parents, coaches and athletes on current trends, injury management and physical conditioning of the football athlete.

Education Credit for Coaches

This course satisfies the requirement for pupil activity validation administrative code 3301-27-01 through the Ohio Department of Education. *There is an additional $20 fee to receive your certification from the State of Ohio.*

To register or for more information, please call Carol Mills at (330) 297-9020 x33.

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On The Canal

May 2005

Improving Swimming Biomechanical Efficiency

Troy Smurawa, M.D.
Akron Children's Hospital

Competitive ***swimming*** continues to grow rapidly in the U.S. High school and club league swimming participation is estimated to be over 5 million. The USA Swimming Association has close to 250,000 registered swimmers from preschool to adult master swimmers. The vast majority of registered swimmers are under 18 years of age. Competitive swimmers often train 10,000 to 20,000 yards per day. This amount of swimming puts a great deal of stress on the shoulders and can increase the risk of overuse injuries. With new advances in swimming stroke biomechanics, the incidence of shoulder injuries can be reduced. A better understanding of swim stroke mechanics and pre-season conditioning can help coaches and swimmers significantly reduce the time lost to shoulder injuries as well as improve competitive performance.

SWIM STROKE BIOMECHANICS

Early studies of swim stroke biomechanics thought that freestyle swimming propulsion was primarily due to lift forces. The S-shaped pull was developed out of this principle and designed to lift and pull the swimmer's body forward through the water. More recent studies with the use of computer-aided, three dimensional biomechanical analyses have shown that freestyle propulsion was primarily due to overcoming drag forces through the water. These new studies show that body rotation is an important component of efficient swimming and that the S-shaped pull does not take this into consideration. Thus, a new concept of the ***straight-through pull*** stroke takes into consideration body roll and minimizing drag forces. Further studies have also shown that drag forces produced by the hand stop before the hand reaches the hip. The new swimming stroke now emphasizes the key principles of equal body rotation, early catch, straight-through pull arm stroke and early exit. ***Equal body rotation***, ***balance in the water***, and ***core strength*** are the key components to developing an efficient swim stroke with low drag forces.

FIVE COMPONENTS OF THE FREESTYLE STROKE

Body Position and Balance

Body position should be *streamline* and *balanced* with the head, shoulders and hips in a straight line. This position will create a vessel-like body that has less drag and slips through the water. To develop a balanced, streamlined body position, a swimmer should focus on ***core body strengthening***, ***balance exercises*** and ***streamline position drills***. A good drill is to kick with the arms above the head and while holding your body in a streamline position.

Body Roll

The body should move along the *long axis* and *rotate* as if you were a long pole. The roll comes from the hips and trunk, not the shoulders. The body should rotate 45 – 70 degrees. Good body roll will: 1) allow you to use large muscles in the arm pull; 2) aid in arm recovery; 3) extend the body into a position of less drag; 4) facilitate breathing; and 5) rotate the hips and helps with the kick. A good drill is the side-kicking drill.

Arm Pull

There are three phases to the arm pull: 1) ***Entry***; 2) ***Sweep***; and 3) ***Recovery***. Hand entry should be fingertips first with the elbow up. The thumb first entry places the shoulder in the

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impingement position. The sweep is a straight-through pull with an early exit at the hips. Imagine yourself climbing a ladder at the bottom of the pool. Arm recovery starts with lifting the shoulder out of the water followed by the elbow then the hand. The key to a good arm pull is to keep the fingers and elbows in a straight line and to have the elbow always higher than the fingertips. A good drill is the fingertip sweep drill.

Kick

During distance and open water swimming, the primary purpose of the kick is for ***body stabilization*** and to keep the hips from dropping. This is usually accomplished with a 2 beat or 4 beat kick. During sprints or other strokes, the kick aids in ***forward propulsion***. A 6 beat flutter kick is used in freestyle and backstroke, the whip kick is used in the breaststroke and the dolphin kick is used in the butterfly stroke. Drills using the kick board help to develop a stronger and more efficient kick.

Breathing Pattern

An ***alternate breathing pattern*** produces a more symmetrical stroke. Most swimmers alternate breathes by switching sides every third stroke. One-sided breathing will cause the arm pull on the breathing side to be wider which causes increased shoulder stress and a loss of the streamlined position. The key points to good breathing technique are 1) keep the head in line with the body when not breathing; 2) exhale before turning your head to breathe; and 3) in open water always breathe with the wave and to the opposite side. Make alternate breathing drills a part of every practice session until you develop an efficient, streamlined alternate breathing pattern.

PATHOMECHANICS OF SWIMMER'S SHOULDER

Stroke Flaws

1. ***Hand entry across midline of long axis of body***.
2. ***Thumb first entry***
3. ***Cross-over pull***; a result of cross-over entry
4. ***Poor body roll***
5. ***Unilateral breathing***; causes asymmetric body roll

Biomechanical Factors

Improper head position
Forward sloping shoulders
Scapular instability

Training Factors

Higher number of years swimming
Increased volume of swimming – number of yards/session
Increased frequency of swimming - number of sessions/day, number of days/week
Increased intensity of swimming – percentage of speed work
Unilateral instead of bilateral breathing
Low percentage of backstroke swimming
Extensive dryland strength training
Recent technique or stroke changes
Other concurrent sports activities

KEY FACTORS TO HELP CORRECT ERRORS

Improve Stroke Mechanics

The key to swimming faster is swimming more efficiently. The key to improving efficiency is to develop a smooth efficient stroke. This is accomplished by working specifically on stroke mechanics daily. Develop a straight line stroke by using a straight-through pull with finger first entry. Imagine a ladder at the bottom of the pool and reaching forward to grab the rungs and pull yourself as if climbing a ladder. Video tape analysis or stroke analysis in a flume can help identify errors in your stroke. Concentrate on counting and reducing the number of strokes per pool length.

Improve Body Roll and Balance

Your body should rotate along the long axis equally and at least 45 degrees. The head should be in a neutral position and aligned with the spine. Improve body roll by practicing drills with a pull buoy and developing an alternate breathing pattern. Body balance in the water is obtained by counterbalancing the weight of the head and press the center of buoyancy (sternum) into the water to float the legs. The goal is to keep the whole body positioned on a horizontal plane near the surface of the water. Floating drills with the hands at the side are the best way to learn this technique.

Core Strengthening

Developing core strength from the pelvic girdle to the trunk and scapular stabilizers is the key to mastering good swimming skills. Good core strength is essential to achieving a symmetrical body roll and streamlined position. Abdominal and trunk stabilization strengthening programs should be a part of every swimmer's training. An exercise ball is a good tool to use when performing these types of exercises.

Scapular Stabilization Strengthening

Swimmers tend to develop rounded shoulders and muscle imbalances secondary to tight chest muscles and overstretched, weak posterior shoulder muscles. The development of muscular balance produces a rhythmic scapular motion. Strengthening exercises should concentrate on the scapular stabilizer muscles (posterior shoulder). Exercises that strengthen these muscles are scapular elevation, push-ups with an extra shoulder extension, rowing and press-ups. Strengthening exercises are best done after swimming or as an isolated workout. Strengthening before swimming may increase the risk of a shoulder injury. Including backstroke into your regular swimming schedule also helps in correcting imbalances.

Improve Flexibility

Stretching exercises done regularly will increase flexibility, reduce injuries and improve performance. Swimmers tend to have decreased flexibility in the anterior chest muscles which may predispose them to shoulder impingement. Shoulder stretching should focus on improving the flexibility of tight anterior chest muscles, the latissimus dorsi and the posterior shoulder capsule. Improving hip flexor and ankle flexibility has been shown to increase the efficiency and propulsive forces in a swimmer's kick.□

Look for part two in upcoming Safety Zones or contact us at (330) 297-9020 x32.

Rotator Cuff Tears and Repairs

By Scott McMillen, D.P.T.

Allied Health Rehab Centers

Sports fans commonly associate rotator cuff tears in the shoulder to pitchers in baseball, and baseball pitchers certainly tear their fair share of rotator cuff muscles. However, rotator cuff injuries are not the exclusive property of pitchers and other throwing athletes. In fact, many rotator cuff injuries occur to people who are over 40 years old and have not played sports for many years, if at all. Rotator cuff tears can occur as the result of single, traumatic events (like a fall or a throw), or can develop gradually from repetitive use of the arm, often in overhead activity and often over a period of years.

The rotator cuff is actually made up of four separate muscles, the supraspinatus, infraspinatus, teres minor, and subscapularis. These muscles work together to hold the arm in glenoid fossa (or shoulder socket), especially when the arm is raised overhead. Raising the arm overhead causes the tendons of the rotator cuff to be squeezed between the top of the humerus (arm bone) and the bottom of the acromion bone which cuts off blood flow to the tendons. Repeating the overhead activity, like during throwing, lifting objects, or simply holding the hands above the head during a work activity results in a "wringing out" effect of blood from the tendons. This can cause the tendon to be more easily irritated and ultimately torn.

Once a tear occurs, it is often classified as either partial-thickness or full-thickness. Although full-thickness tears generally require surgery to repair, a partial-thickness tear may not if proper strengthening is done in therapy to allow the surrounding muscles to make up for the torn one. If proper stability cannot be attained, and pain and weakness with normal activities continue, surgery to repair the rotator cuff musculature will be performed. Surgery is typically performed with the goals of decreasing pain, especially resting and night pain in the shoulder, and to improve the function of the shoulder, especially with overhead tasks or athletic activities if the patient is an athlete. Rehabilitation after surgery is a specific and stepwise process usually involving three phases of therapy with each phase having its own priorities and goals.

Phase I in rotator cuff repair rehab usually begins 1 to 2 weeks after the actual surgery and can last anywhere between 3 to 6 weeks depending on the extent of the tear, the age and condition of the patient, and the amount of work done by as well as the personal preference of the surgeon. The goals of phase 1 include decreasing the pain and inflammation from the surgery, protection of the shoulder and incision while healing occurs, and maintenance of elbow and wrist range of motion (ROM). The shoulder can be moved through its ROM but only passively either by a therapist or by the use of a pulley system. Passive elevation of the arm is emphasized first, followed by passive external rotation at the shoulder. Since the patient will be in a shoulder sling for most of this phase, neck exercises are also often performed to prevent neck pain or stiffness from holding the sling.

Phase 2 begins next and lasts for another 2 to 4 weeks during which attaining and then maintaining full ROM is the priority. The ROM exercises can now be performed by the patient but with the help of the opposite "good" arm or use of a wand or stick to help move the arm. Theses exercises allow the repaired shoulder to begin to easily use its own muscles. Easy "isometric" shoulder exercises are also performed here to prevent atrophy of the shoulder musculature. Active strengthening of the elbow and shoulder blade stabilizing muscles are also performed in this phase.

By around 6 to 8 weeks following surgery, the patient is ready for Phase 3. At this point, the patient is finally able to actively move his or her own shoulder and begin resisted strengthening exercises. Shoulder exercises will be performed to strengthen arm elevation, external and internal rotation of the arm, and the ability of muscles (especially the newly repaired rotator cuff muscles) to hold and stabilize the arm in the shoulder socket during arm movement. This phase may continue to progress indefinitely until the patient is able to perform the activities required in his or her life. The person trying to return to a physical job will need to strengthen the shoulder longer than the individual who is retired. The throwing athlete may be able to return to throwing between four and six months following the rotator cuff repair and from that point can slowly progress in a throwing program.□