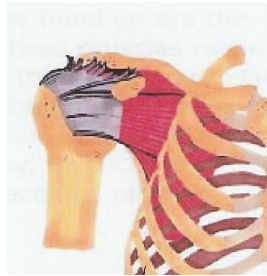


Shoulder Impingement Syndrome in Canoe-Kayak athletes



The shoulder blade zone of the human anatomy is in a way constructed so as to combine two important properties, in other words great mobility on the one hand and great stability on the other hand. The biological materials of the area – bones, ligaments, tendons, muscles and bursae, etc. – during the execution of canoe-kayak motions, undergo increased forces and at times presents signs of disorganization and wear (*Neer C., Foster C. 1980*). The insufficient stabilization of the humeral head in its correct anatomical and functional position results in the appearance of reduced functional ability on the one hand and the creation of inflammation and other accompanying symptoms (*Allen et al, 1998, Hawkins F., Kennedy F. 1980*).

Etiology of the Syndrome

The following comprise the etiology of shoulder rotator cuff impingement syndrome:

1. The repetiveness and force undergone by the rotator cuff muscles in canoe-kayak athletes.
2. The lack of balance in force and speed of contraction between internal and external rotations of the arm and limited muscular flexibility.
3. Previous injury that has not been fully rehabilitated.
4. Thickening of the subacromial bursa.
5. Possible idiomorphic skeletal anatomy of the athletes' acromion.
6. Possible vascular injuries in the hyperacanthion tendon due to overuse.
7. Previous fractures in the area that have not adequately healed or healed in the correct anatomical position.
8. Instability of the shoulder (anterior, posterior or multidirectional), which can be the result of muscular imbalance in the canoe-kayak athletes.

(*Lawrence et al, 2007*).

Stages of the Syndrome

1st stage: characterised by edema and inflammation of the hyperacanthion tendon, which includes the subacromial bursa. This creates pain and kinetic limitation, chiefly at 70⁰ – 120⁰ of the energy abduction. There may also be muscular atrophy around the shoulder, as well as sensitivity of the bicep (long head). The pain increases particularly during the commencement of athletic activity. Mainly responsible for this dysfunction is aggravation of the myotendon junction, muscular imbalance between internal-external rotations and insufficient knowledge of technique on the part of the athlete.

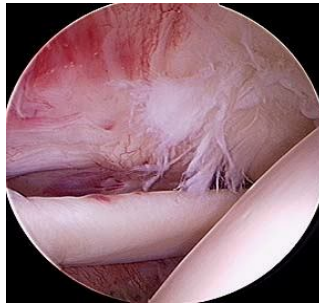
The injury is, however, reversible if the athlete discontinues pressure in the area, alters his/her technique and quickly undergoes physical therapy intervention and frequent ice packs for the space of a week (15' - 20' 3-4 times / day). (*Ecklund K. et al, 2007*).

2nd stage: The intensity of the symptoms of the first stage extends to the clinical evaluation and presents additional tenderness or inflammation in other bursae and tendons. Fibrosis also appears on the tendons of the bicep and the hyperacanthion, resulting in their shortening. The intensity of the pain is increasing, and prohibitive of even the most usual athletic activity, climaxing at night during sleep. The reversibility of the symptoms is difficult and time-consuming. Immobilization of the afflicted area in a special splint is necessary, accompanied by a stringent pharmaceutical regimen and, when the symptoms become milder, physical necessary is recommended for at least 3 weeks. The application of ice packs 4-5 times/day for 20' at a time is important for reducing the intensity of the symptoms. (*Worf B. et al, 2007*).

3rd stage: In this stage, pathoanatomical alterations occur in the cartilage of the area (beginning of arthritis), the tendons (chronic tendonitis) and the muscles (atrophies and asymmetry). Also, frequent tears of the myotendon juncture of the rotator cuffs and other symptoms are also traced.

The intensity of the symptoms makes use of the extremity impossible, and surgical intervention is required. Neer writes that this option should be chosen only after intensive conservative treatment over a period of 18 months and if

the symptoms still persist. (Neer C. 1983, Walch Gilles, 1996, Hagemann G. Rijke A., Mars A. 2004).



Picture from arthrogram of tendon rotator cuff with partial tear.

Rehabilitation: Following the appearance of the injury and its precise evaluation, the patient is subjected, in accordance with the severity of the damage, to either surgery or conservative treatment. The conservative treatment initially entails placement of the extremity in a special splint, a medicinal regimen with anti-inflammatory drugs and physical therapy. If after a space of 15-20 days of treatment the intensity of the symptoms has not diminished substantially, then a local injection of a special mixture of slow-absorption anti-inflammatory medication and 2% lidocaine once or twice. More injections are not recommended due to a risk of degeneration and rupture of the tendon. Physical therapy includes T.E.N.S. thermal treatment, Laser and anything else deemed necessary to relieve the symptoms. The regimen for functional rehabilitation is of particular importance. Evaluation of the entire biokinetic unity of the upper extremity is necessary in order to design an effective regimen. (Mc Carty E., Richie P., Gill H., Mc Farland E. 2007, Watson L. Bapp C. 2000).

Thus, the coordinated synergy of all the joints of the area, beginning from the glenohumerus joint (dynamic stabilizers of the shoulder blade). The importance of this joint has to do with the fact that the adjoining muscles maintain the correct relationship between the shoulder blade and the arm joint, allowing the correct embiokinetic movement during the functional activities in canoe-kayaking.

The first target of the functional rehabilitation regimen is the full and coordinated movement of the joints, followed by stabilisation and improvement of the dynamic of the shoulder's pairs of muscles. The patient begins the regimen with the execution of distending exercises of the muscles of the area, and continue with progressively increasing resistance exercises which, in time, increase in speed of execution and number of repetitions.

Afterwards, eccentric and isometric exercises high-speed exercises are recommended and must be continued to the completion of functional rehabilitation. Plyometric exercises are particularly useful, especially in the final stage of rehabilitation, as they combine strength with speed of execution, and also both types of contraction (eccentric and concentric).

But the frequency of this application must not exceed 2-3 times/week, as they are exceptionally dangerous for the appearance of micro-trauma due to their dynamic nature. The regimen is completed when the patient no longer poses any symptoms and has full muscular dynamics balance in the shoulder blades muscle pairs. (*Retting C., Arthur C. 1998*). The muscle groups that must focus attention are the rotations of the shoulder, particularly the outward rotations, given that they are always deficient, and the shoulder blade stabilizers.

Prevention: Prevention of the Syndrome entails the following:

- 1) Control of the muscular parameters of the muscles of the area (i.e. strength and speed of contractions of muscle pairs, exertion, neuromuscular coordination and flexibility) before the commencement of preparation, and supplementation of possible deficiencies.
- 2) Sufficiency and adequacy of warm-up and rehabilitation.
- 3) Learning ergonomics and technique of execution of the positions and moves of canoe-kayaking in accordance with the physical properties of the athlete.
- 4) Proper and safe selection of equipment (weight, length, etc.).
- 5) Satisfactory stabilization of the spine (adequacy of abdominal and related muscles).
- 6) Planning of competition and training regimens on the basis of the athletes' biological and chronological age. (*Raske A., Norlin R., 2002*)

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