

Temporary rotator cuff injury in professional boxing: a case report

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DOI: 10.12920/jopola.2018.01

Abstract

The authors report a case of temporary injury to the rotator cuff of a professional boxer. An ultrasound exam shows the lesion. They set out their considerations about pathomechanical theories taking in account the consulted literature.

Keywords: boxing, shoulder, rotator cuff, pathomechanics.

Introduction

Boxing is a sport that calls for a continuous and constant track of the most complex joints of the musculoskeletal system.

Often these anatomical regions undergo to extreme stress in conditions of altered and/or forced biomechanics^{1,2,6}.

Among all the boxing injuries those about the shoulder are less frequent compared to traumatic injuries of the body (especially the head), but the percentage of rotator cuff lesions are increasing (7.4% of all injuries).

Kittel et al.¹ has shown an altered distribution of balance with a greater biomechanical retro position of the upper back and the iliac crest on the frontal plan with a resulting decrease rotation of about 17 degrees.

Various studies^{5,8,3}, have highlighted the importance of gesture during both agonistic and in training and how these may cause to the boxer early changes of the upper

Riassunto

Gli autori riportano un caso di lesione transitoria della cuffia dei rotatori evidenziata ecograficamente in un pugile professionista ed espongono le loro considerazioni riguardo le ipotesi patomeccaniche in relazione alla letteratura consultata.

Parole chiave: pugilato, spalla, cuffia dei rotatori, patomeccanica.

back.

Another problem common in boxing athletes is the instability of the shoulder. Owens et al.³ show a greater likelihood of developing shoulder instability in patients undergoing continuous boxing training 0.43% in patients not undergoing versus 16% in boxer subjects. Boxing also causes shoulder damage in greater percentage compared to other martial arts such as high-impact wrestling Pappas et al.⁶.

The Authors report a case of a professional boxer who have a temporary rotator cuff injury and analyze clinical diagnostic evidence consistent with literature data as well pathomechanic and biomechanics theories causing such shoulder sport injuries.

Case Description

A 25 years old right-handed professional boxer (ortho-

dox boxer), medium highs category, presented with right shoulder and chest pain. At the physical examination, there was mild tissue retraction at the right deltoid sulcus. Deltoid sulcus digital pressure caused pain increase. The patient presented decrease range motion with pain in all plans. He could not keep the “guard position”.

At that first visit, the boxer had 5 years competitive career and was training for fighting a world title match.

Ultrasound scan showed a hypoechoic Power Doppler positive area of the supraspinatus tendon. The bicipital sulcus showed an anechoic halo sited in the portion of insertional inflammatory tendinopathy of the supraspinatus and in the long head of biceps brachii (Figure 1 - A, B).

In the dynamic study, these anatomical structures are hypomobile and hypoelastic compared to the surrounding.

Discussion

Boxing uses the shoulder joint in an extreme and continuous way. The shoulder received the resulting vector of the entire trunk and the lower limbs and transfers it to the hand⁹. The shoulder is then a real point of biomechanical impedance.

The resultant vector of all movements from the lower limbs reach the shoulder through the pelvis and the kinetic chains thoraco brachial cervicothoracic and cervico brachiali.

The shoulder, in order to ensure the balance of the body in space, moves in a circular motion that allows to always having full visual knowledge of the hand location in space.

This biomechanical event is described as the circumduction cone⁹ and is the fundamental pillar through which the shoulder moves and at the same time keeps the balance of the trunk.

Another important mechanism is Codman's paradox of that describes the ergonomic shoulder cycle.

In this sense, there are three axes of movement, in which the various rotations move around an axis of rotation⁹.

The points of high biomechanical importance are the Instant Rotation Centers (I.R.C.). These centers are vector points of movement concentration and ensure the axes on route of the “circumduction cycle”. They are the C1 seat near the inner inferior humeral head; “dispersion circle.”

The abduction at the beginning of the movement up to 50 degrees of rotation of the humeral head involving C1. From 50 to 90 degrees C2 is involved. This guarantees the stability of the shoulder. Boxing can alter this mechanism for several reasons. Many boxers, in fact, have

a more ventral axis of rotation with a consequent total rotation decrease¹.

Another mechanism of damage is due to the speed with which the movement around the axis is performed. Mack et al.⁷ showed that strength in the hook punch and in the direct punch increases not just for the lower limbs pushing action: punch force correlate more strongly to hand speed than to lower body force.

The force that they define as “pre-impact force” is the resultant of the movement speed. A disproportionately large speed would urge the axes of rotation producing damage.

This idea outlines the results reported by Owens et al.³ who affirm a higher incidence of shoulder instability in those boxers that are experiencing “missed punch”.

Probably the high speed is not a stop point in the obstacle but continues increasing the biomechanical axes of the shoulder, especially at the tendon insertion and in the restrain points, causing instability.

The considerations from above are:

1. Boxing alters the rotation center
2. Excessive speed calls for biomechanical critical points
3. Missed punches are the most imputable causes of rotator cuff damage.

The literature studied confirms that boxing movements like the hook or the jab involve critical points of the shoulder biomechanics³.

Our results confirm that the changes are at the insertional portions of the supraspinatus and long head of the biceps brachii. Such changes are present in a considerably manner even during the training and not only during combat racing⁵.

Unsuitable training techniques and untrained healthcare teams for boxing issues could prevent these findings. Doudecki et al.⁸ always highlights the importance of training some parts of the upper limb and select a club and a health team suited to boxing.

Conclusions

Our study confirm the present data in the international literature. Boxing calls for critical points of the scapular humeral producing over time damage through degenerative and inflammatory lesions.

The cause of this is probably an altered biomechanics of the gesture. An unappropriated workout and an untrained healthcare make worse such events.

It is important to encourage studies on a larger number of patients to check out if there are possibilities to set up training programs to increase such injury prevention.

A



B



Figure 1 - A, B.

A) The image shows an anechoic area of the insertional portion of the supraspinatus with changes of the subacromion bag.

B) The image shows an anechoic area in the glenohumeral joint, with changes in the dynamic phase (posterior instability sign).

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