CASE REPORT

Aneurysm of Circumflex Humeral Arteries in a Volleyball Player

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Introduction

Arterial injuries of the shoulder in “throwing” athletes are not yet very common and usually are the result of subclavian artery damage due to the thoracic outlet syndrome. However, arterial damage can also occur distal to the thoracic outlet in the second and third part of the axillary artery and its branches, especially the anterior and posterior humeral arteries.1

“Hyperabduction syndrome”, a condition in which the second part of the axillary artery becomes occluded by extrinsic pressure from the overlying pectoralis minor, was first described by Wright in 1945.2

Thrombosis of the third part of the axillary artery has been reported as a result of repetitive trauma of the artery from the humeral head at the point beyond the pectoralis minor and exactly anterior to the humeral head. Also, trauma at this point is responsible for axillary and very rarely for posterior or anterior circumflex humeral artery aneurysm formation with or without digital embolisation.3 The “quantrilateral space syndrome” has also been reported in this area caused by compression of the posterior circumflex humeral artery in the quantrilateral space, with pain and paresthesia of the upper extremity.4

Case Report

A 21-year-old volleyball player was admitted to our department with signs of acute ischaemia of the right arm. On physical examination pulse was present in the axillary artery, but absent in the brachial, ulnar and radial arteries. There was a temperature difference between arm and forearm and the hand was cool and pale. He also reported that he had experienced a sudden numbness in his right hand of a few hours’ duration twice, in the previous month. The patient’s past medical history was unremarkable. After a successful transbranchial embolectomy the circulation of the upper extremity has been restored and pulse was detected in the ulnar, radial and brachial arteries.

Thorough postoperative clinical examination did not reveal any pathological findings. X-ray and MRI examination were negative for thoracic outlet syndrome. Heart ultrasonographic examination was also normal. Laboratory tests for hypercoagulative disorders were negative. Colour duplex of the right arm showed a possible aneurysmal dilatation of circumflex humeral arteries. Finally, angiography of the aortic arch and both arms was performed with the use of Seldinger technique. The aortic arch, the proximal brachiocephalic vessels and the arteries of the left arm were normal. In the right arm a 2 cm long aneurysm formation was disclosed at the common origin of circumflex humeral arteries. Since the results of all the additional examinations were normal, the aneurysm of the circumflex arteries was considered to be responsible for the arm embolisation. Subsequent embolisation, with the use of coils (Cook’s stainless steel Occluding Spring Embolus®) successfully eliminated the aneurysm.

During an 8-month follow-up period the patient had no complaints and he had already started playing volleyball without any problems.

Discussion

Arterial injuries of the shoulder are not very common, and they can result in limb-threatening complications.
if they are not diagnosed and treated early. In most cases the thoracic outlet syndrome is the main cause of subclavian and first part of the axillary artery damage. However, arterial injury can also occur remotely from the thoracic outlet and may involve the second and the third part of the axillary artery. Thoracic outlet syndrome is caused by compression of the axillo-subclavian neurovascular bundle (subclavian and first part of axillary artery) between the rigid structures. Anatomic mechanisms of compression have been found to result from the scalene muscles, the clavicle, the first rib, fibro cartilaginous bands, anomaly of the first rib and clavicular fractures.

The second upper extremity vascular compression syndrome is less frequently encountered and is responsible for the damage of the second part of the axillary artery which lies posterior to the pectoralis minor. Thus hypertrophy of this muscle, which is usually seen in athletes, in addition to repeated artery contusion could be responsible for the axillary artery compression and thrombosis at this point.

The third part of the axillary artery lies anterior and medial to the proximal hurnerus. Arterial damage is this area is the result of repetitive arterial contusion from the humeral head during throwing effort, and is identified as the third upper extremity vascular compression syndrome. The act of pitching results in exaggerated shoulder movements. During the “cocking phase” of pitching the shoulder reaches a position of hyperabduction and external rotation. This extreme humeral rotation causes downward displacement of the humeral head and compression of the third part of the axillary artery. A similar movement is usual in volleyball players during the “smash” effort, and damage can also occur to the circumflex humeral arteries. The result could be thrombosis of the third part of the axillary artery, aneurysm formation with or without thrombosis of the circumflex arteries, and digital embolism.

In 1983 Cahill and Palmer introduced the “quantrilateral space syndrome”, a very rare entity caused by compression of the axillary nerve and the posterior humeral circumflex artery in the quantrilateral space which may lead to artery thrombosis or aneurysm formation. The patients suffer from pain and paresthesia of the shoulder, usually in the dominant side. Although the pain is due to axillary nerve entrapment the diagnosis is made by angiography, demonstrating the normal posterior circumflex artery which becomes temporarily occluded away from its origin, while the arm is in extreme abduction and external rotation. Aneurysm formation of circumflex humeral arteries is extremely rare. Reekers et al. in 1993 described two cases with digital embolisation in baseball players. Durham et al. in 1995 described one case with embolic occlusion of the brachial, radial and ulnar arteries, in a baseball pitcher. Kee et al. in 1995 described two cases of aneurysm formation in posterior circumflex and subscapular arteries, with digital embolisation, in baseball pitchers. Finally, Todd et al. in 1998 described another two cases of digital ischaemia in baseball pitchers. Aneurysm of the axillary artery and its branches is a pathological condition that is associated with repetitive abduction and external rotation of the upper extremity in combination with a downward displacement of the humeral head, in healthy baseball and volleyball players. Thrombus formation within the aneurysm is responsible for either occlusion of the anterior or posterior humeral or embolisation of the digital, radial or ulnar arteries, depending on the size of the emboli. Preservation of the posterior humeral circumflex during operation seems to be very difficult, but it should not affect the vascularisation of the humeral head which has been shown to be perfused by the anterolateral ascending branch of the anterior circumflex artery. The posterior vascularises the post-erior portion of the greater tuberosity and a small postero-inferior part of the head.

Athletes who are exposed to repeated hyper abduction and external rotation of the upper extremity are at risk for arterial damage. Since the early symptoms are not specific, prompt diagnosis and treatment is of vital importance in order to avoid the catastrophic complications of arterial thrombosis or embolisation.

References