

Vascular Injuries in the Upper Extremity in Athletes



Tristan de Mooij, MD, Audra A. Duncan, MD,
Sanjeev Kakar, MD, MRCS, MBA*

KEYWORDS

- Vascular injury • Athlete • Upper extremity • Thoracic outlet syndrome
- Quadrilateral space syndrome • Posterior humeral circumflex injuries
- Hypothenar hammer syndrome • Digital ischemia

KEY POINTS

- Overhead motions may impinge on neurovascular bundles at the shoulder region through compression; for example, by the humeral head, muscle inflammation, or cysts.
- Athletes may benefit from instrument modification, motion analysis and adjustment, as well as equipment enhancement to limit exposure to blunt trauma or impingement.
- Arterial aneurysms caused by repetitive compression may require surgical treatment with ligation or revascularization to prevent or treat limb-threatening distal embolization.

INTRODUCTION

Upper extremity arterial injuries can occur in athletes performing repetitive, high-stress, or high-impact arm motions. In elite throwers, the internal rotation velocity of the arm during the acceleration phase reaches more than 7000° per second.¹ The increased functional range of shoulder girdle motion, which these athletes require for competition, causes increased stresses on the vascular structures within the shoulder and upper extremity.² In addition, muscle hypertrophy and fatigue-induced joint translation may incite impingement on critical neurovasculature.² The initial presentation of these injuries often mimics more common musculoskeletal injuries found in these athletes, and therefore a thorough evaluation is essential to establish the diagnosis in a timely fashion.³ Arterial disease usually presents with muscular pain at the extremes of effort, acute ischemia from thrombosis or embolus, or an artery may be ruptured during certain sporting activities.⁴

Symptoms of hand ischemia may occur in the form of Raynaud syndrome or large or small arterial occlusion. Athletes particularly at risk include baseball and softball players, but injuries have been reported in volleyball players, weight lifters, swimmers, and many others.^{5,6} Clinical diagnoses are often confirmed with noninvasive vascular laboratory testing and contrast imaging. Most cases can be successfully treated conservatively by means of avoidance of the causative factor as well as instrument and/or equipment modification. However, patients with arterial or venous occlusions and/or aneurysm formation requiring surgical management may have excellent functional outcomes allowing return to play.

This article discusses upper extremity vascular disorders in athletes caused by embolic syndromes (quadrilateral space syndrome, humeral head compression of the axillary artery, and arterial thoracic outlet syndrome [TOS]), vein compression (venous TOS), and direct digital

Disclosure: The authors have nothing to disclose of relevance to this article.
Mayo Clinic, 200 1st Street South West, Rochester, MN 55905, USA

* Corresponding author.

E-mail address: kakar.sanjeev@mayo.edu

Hand Clin 31 (2015) 39–52

<http://dx.doi.org/10.1016/j.hcl.2014.09.004>

0749-0712/15/\$ – see front matter © 2015 Elsevier Inc. All rights reserved.

artery injury (hypothener hammer syndrome), and evaluates pathophysiology, diagnosis, and treatment.

QUADRILATERAL SPACE SYNDROME

The posterior circumflex humeral artery (PCHA) arises from the distal third of the axillary artery and, together with the axillary nerve, courses through the quadrilateral space, which is bordered by the teres minor superiorly, the teres major inferiorly, the humeral shaft laterally, and the long head of the triceps medially. Reported initially in 1983 by Cahill and Palmer,⁷ 18 patients were identified with point tenderness over the quadrilateral space posteriorly that was aggravated by forward flexion and/or abduction and external rotation of the humerus (the cocked position). Included in the differential diagnosis of quadrilateral space syndrome is suprascapular neuropathy, which is frequently seen in volleyball players (ie, so-called volleyball shoulder). However, suprascapular neuropathy is thought to be a mononeuropathy without vascular compromise.⁸ Angiographic confirmation of the quadrilateral space syndrome may be shown with occlusion of the posterior humeral circumflex artery with the arm in abduction and external rotation. Chronic compression and repeated trauma over the artery can occur in overhand motion athletes such as baseball pitchers and volleyball players and may result in artery occlusion or

aneurysm formation causing subsequent embolization (Fig. 1).⁹ In addition, inflammation of any or all of the muscular borders of the quadrilateral space may constrict the space around the PCHA and axillary nerve and cause gradual onset of symptoms.⁸ Other hypotheses regarding the potential mechanisms of quadrilateral space syndrome include (1) traction by the pectoralis major muscle on the PCHA,¹⁰ (2) fixation of the PCHA to the proximal humerus caused by its circumflex course making it prone to traction and subsequent intima injury (this hypothesis is supported by the report from Durham and colleagues¹¹ identifying positional axillary arterial compression with concomitant PCHA occlusion), (3) glenohumeral instability or glenoid labral cyst compressing the PCHA, and (4) chronic overuse with subsequent fibrous bands causing compression within the quadrilateral space.¹²

As with many intermittent compressive syndromes of the upper extremity, in the absence of fixed compression or aneurysm, initial treatment should include correction of the underlying insult (such as poor biomechanics). Physical therapy should focus on gradually rehabilitating the shoulder girdle to prevent repeated compression. If this fails, or aneurysm is present, surgical treatment may be necessary with decompression of the quadrilateral space.^{7,13} In the series by Cahill and Palmer,⁷ surgical decompression in 18 patients resulted in cure in 8, improvement in 8, and no improvement in 2. If an aneurysm has developed,

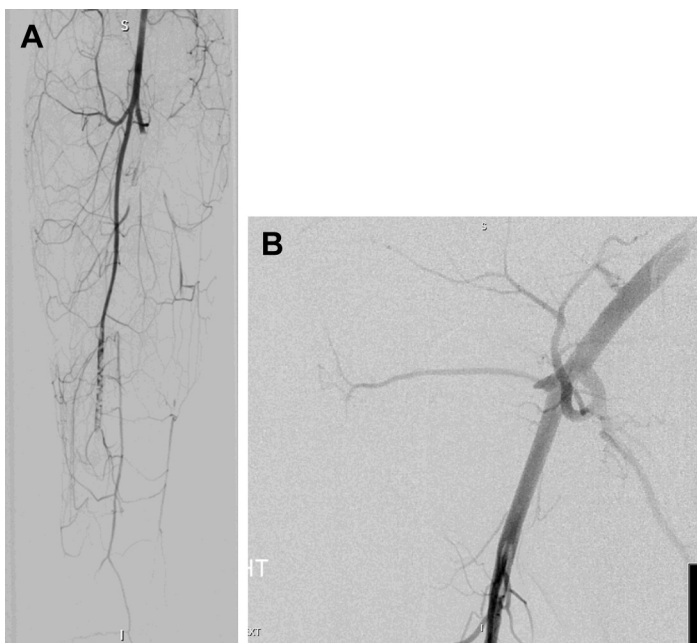


Fig. 1. Digital contrast angiogram of a 20-year-old female volleyball player with acute onset of right upper extremity digital ischemia. (A) Abrupt occlusion of the radial artery 1 cm from its origin and extensive thromboembolism of distal third of the ulnar artery. (B) Proximal imaging identified abrupt occlusion of the PCHA, which was subsequently identified as aneurysmal.

Download English Version:

<https://daneshyari.com/en/article/4058898>

Download Persian Version:

<https://daneshyari.com/article/4058898>

[Daneshyari.com](https://daneshyari.com)