Neurovascular Compression After the Latarjet Procedure

JOSEPH W. GALVIN, DO; JAMES R. ROMANOWSKI, MD; ROBERT E. BOYKIN, MD; JOSEF K. EICHINGER, MD; LAURENT LAFOSSE, MD

Abstract

The Latarjet procedure is an established and effective option for the treatment of recurrent anterior shoulder instability. Symptomatic compression of the vasculature around the shoulder and adjacent brachial plexus is uncommon and may be difficult to diagnose and treat. The purpose of this report is to describe a patient with neurovascular compression of the axillary artery and brachial plexus after an open Latarjet procedure. This is the first known report of documented combined vascular and neurologic thoracic outlet syndrome after a Latarjet procedure. Evaluation of this suspected problem requires a detailed clinical examination and a dynamic angiogram to verify which neurovascular structures are compressed. Treatment includes decompression of the brachial plexus and axillary vasculature by releasing tethering scar tissue or the remaining pectoralis minor that is creating a constricting sling effect. An arthroscopic approach provides for a careful and specific decompression. Additionally, the authors provide a review of the literature for neurologic complications and management for these complications. [Orthopedics. 2015; 38(12):e1164-e1168.]

The authors are from Madigan Army Medical Center (JWG, JKE), Tacoma, Washington; the Charlotte Shoulder Institute (JRR), Charlotte, and the Blue Ridge Bone and Joint Clinic (REB), Asheville, North Carolina; and the Alps Surgery Institute (LL), Clinique Générale, Annecy, France.

The authors have no relevant financial relationships to disclose.

The views expressed in this manuscript are those of the authors and do not reflect the official policy of the Department of Army, Department of Defense, or US Government. Drs Galvin and Eichinger are employees of the US Government. This work was prepared as part of their official duties and as such, there is no copyright to be transferred.

Correspondence should be addressed to: Josef K. Eichinger, MD, Madigan Army Medical Center, 9040 Fitzsimmons Dr, Tacoma, WA 98431 (joe.eichinger@gmail.com).

Received: November 29, 2014; Accepted: March 23, 2015.

doi: 10.3928/01477447-20151123-09
The Latarjet procedure is an established treatment option for the management of recurrent anterior shoulder instability and its effectiveness is well documented.\(^1\)\(^2\) Although complications have been reported, symptomatic compression of the vasculature around the shoulder and adjacent brachial plexus is uncommon and may be difficult to diagnose and treat.\(^3\)\(^4\) The purpose of this report is to describe a patient with neurovascular compression of the axillary artery and brachial plexus after an open Latarjet procedure. In addition, the authors reviewed the literature for neurovascular injury after the Latarjet procedure.

**Case Report**

A 21-year-old healthy right-hand–dominant woman initially presented to the authors’ institution 24 months after an open Latarjet procedure (autologous coracoid transfer). She reported pain, paresthesias, and alterations in temperature of her left upper extremity. The procedure had been performed through an open approach using two 4.5-mm malleolar screws for fixation of the coracoid graft.

There were no noted intraoperative complications, but in the immediate postoperative period the patient developed a spectrum of neurovascular complaints involving sensory symptoms in a median, musculocutaneous, and axillary nerve distribution and a sensation of “feeling cold” in her arm extending from her shoulder to hand. These were believed to be due to retraction during the case. However, during her rehabilitation the symptoms gradually worsened and were noted to be particularly severe when her arm was placed in an overhead position. She had no further symptoms of instability. Conservative management was continued with the expectation that her extremity symptoms would improve with time.

She reported no response to physical therapy and rest. Her examination revealed diminished but intact sensation in her digits. No frank weakness was noted in motor function in the extremity, including axillary, median, radial, and ulnar nerve distributions. Her contralateral upper extremity was asymptomatic on physical examination and her constellation of complaints was thought to be consistent with a possible neurovascular compression or injury. Radiographs revealed a healed and well-placed coracoid graft (Figure 1). An upper extremity angiogram showed dynamic compression of the axillary artery at the level of the coracoid transfer (Figure 2). Normal flow was noted with the arm in a neutral position; however, in 90° of abduction compression of the axillary artery was clearly shown by blockage of arterial flow just proximal to the branches of the anterior and posterior humeral circumflex arteries. Based on these findings, it appeared that a localized compressive le-
sion of the brachial plexus and axillary artery of uncertain etiology was responsible for the neurovascular symptoms.

Given the failure of conservative treatment and the severity of symptoms, the patient elected to proceed with surgical exploration with identification of a likely compressive lesion with treatment and neurolysis. An arthroscopic approach was chosen for the following reasons: less morbidity, improved visualization of the neurovascular structures, and the ability to evaluate the compression and etiology dynamically without having to dissect in the previous scar tissue planes that would be required using the previous open approach.

An arthroscopic neurolysis was performed in the beach chair position. First, a standard posterior portal was placed and a diagnostic arthroscopy revealed Grade I chondral changes diffusely on both the glenoid and humeral head without evidence of other intra-articular pathology. Reconstitution of the anterior joint capsule occurred after the previous Latarjet procedure. The coracoid graft was noted to be in an appropriate position, incorporated to the native glenoid and stable.

An anterosuperior portal was then established using needle localization under direct visualization. An arthroscopic electrocautery device was used to open the rotator interval. The interval between the deltoid and subscapularis musculature was entered and visualized. The camera was then placed in the anterosuperior portal, providing the ability to view both the glenohumeral joint and anterior shoulder space (in front of the subscapularis) through the same portal.

A low anterior portal was then established as a working portal. The path of the conjoined tendon through the subscapularis muscle was identified and served as a landmark for identification of the altered anatomy. An anterolateral portal was created and the camera was placed here to approach the subcoracoid space and ultimately the brachial plexus and axillary artery.

Finally, a medial portal was created using a spinal needle for localization to protect the neurovascular structures. This approach allowed for a safe, systematic approach to the neurovascular structures. A dynamic compression, or kinking, of the axillary artery was visualized when the arm was passively elevated in abduction, which was evidenced by loss of color in the artery distal to the adhesions. An arthroscopic shaver and electrocautery device were used to release the adhesions and scar tissue from the plexus and artery (Figure 3). After completion of this, the dynamic compression was relieved.

At follow-up 2 months after the procedure, the patient showed full, painless range of motion without instability. She continued to have some residual global distal paresthesias but had improved pain. At the most recent follow-up (34 months after the arthroscopic neurolysis), the patient reported complete resolution of her neurologic symptoms when at rest and with motion of her arm, including overhead activities. Using the 10-point visual analog pain scale, the patient reported improved scores from 8 preoperatively to 2 at follow-up, and an overall subjective shoulder value improvement of 50/100 compared with 20/100 preoperatively.

**Discussion**

The Latarjet procedure provides a reliable method of treating anterior glenohumeral instability primarily through 3 elements—reestablishment of the osseous glenoid, the sling effect of the conjoined tendon, and augmentation of the...
Neurologic complications following the Latarjet procedure have been described but no vascular complications have been reported. Burkhart et al\(^7\) reviewed the outcomes of 102 patients who underwent a modified Latarjet procedure. The most common complications were a recurrent dislocation or subluxation (4.9%), hematomas (2.0%) and a fibrous nonunion (1%). There was no mention of postoperative neurovascular dysfunction.\(^3\)

More recently, Shah et al\(^4\) published a series of short-term complications of the Latarjet procedure and found a complication rate of 25% (12 of 48). This report included 5 procedures with neurovascular complications: the musculocutaneous was involved in 2, axillary in 2, and radial in 1. The musculocutaneous and radial neurapraxias resolved, but the patients with an axillary nerve injury continued to have a sensory disturbance (2 of 2) and motor weakness (1 of 2) at final follow-up.\(^4\)

Richards et al\(^5\) reported 8 patients sustaining brachial plexus injuries during Putti-Platt (2 patients) or Bristow-type coracoid transfers (6 patients) who were treated with open exploration of the brachial plexus. The majority of complications were believed to be related to limited incisions and lack of knowledge concerning the anatomy. The majority of nerve injuries involved the musculocutaneous nerve, whereas additional injuries included the axillary artery and the radial, median, axillary, and ulnar nerves.\(^3\) Bach et al\(^6\) also published a case report of a patient with symptoms in an ulnar nerve distribution after a Bristow procedure exacerbated by abdution. An exploration revealed a large amount of scar tissue around the transferred conjoined tendon, prominence of the coracoid graft, and a proximal location of the musculocutaneous nerve. The ulnar nerve symptoms were attributed to compression and traction on the plexus. Two years after a lysis of adhesions and trimming of the bone graft, the patient had normal strength and motion, with improved but continued paresthesias.\(^6\)

Compressive etiologies of the brachial plexus are most often discussed in relation to the thoracic outlet. Thoracic outlet syndrome is usually associated with compression of the lower trunk of the plexus and subclavian artery with the first rib. Novak et al\(^7\) reported an evaluation of 50 patients considered to have thoracic outlet syndrome. Only 1 patient (2%) had electromyographic evidence of neurologic compromise at the level of the brachial plexus. Furthermore, 49 of 50 (98%) of the patients had normal 2-point discrimination.\(^7\) These findings suggest that compression of the brachial plexus may be dynamic in nature.

**Conclusion**

Although rare, neurovascular problems after the Latarjet procedure secondary to alterations in the normal anatomy of the shoulder and resultant scar tissue formation may occur even after an appropriately placed graft. Neurologic complications following the Latarjet procedure have been described. This is the first case of combined neurologic and vascular compromise complicating a Latarjet procedure. Decompression of the brachial plexus and vasculature can result in improvement of symptoms if this scenario is encountered.

**References**

2. Latarjet M. Treatment of recurrent dislo-


