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CASE REPORTS

Iatrogenic bipolar clavicular instability managed with clavicular lengthening and sternoclavicular and acromioclavicular stabilization: a case report

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As acromioclavicular joint (ACJ) injuries comprise 9% of all shoulder girdle injuries,[3] it follows that symptomatic arthritis or osteolysis at the lateral end of the clavicle is a common orthopedic scenario. Arthroscopic or open Mumford (distal clavicle resection) procedures are effective in reducing pain when nonoperative management fails.[26] However, researchers have found that excessive resection can be associated with symptomatic acromioclavicular instability.[23] Current recommendations are for less aggressive bone resection[2,6,17] compared with that in the original articles published by Mumford[19] and Gurd.[10]

The surgical management of symptomatic arthritis at the sternoclavicular joint (SCJ) is less common as this joint is less frequently injured (<3% of shoulder injuries).[3] Guidelines for resection vary widely,[28] but as with the ACJ, the recommended amount of resection seems to decrease as time goes on, as anatomic studies are carried out and as clinical experience is gained. We describe a case of successful shoulder girdle stabilization in a patient who experienced symptomatic medial and lateral clavicular instability after undergoing excessive clavicular resections and multiple failed attempts at stabilization.

Case report

The patient is a 30-year-old male amateur bodybuilder with a complicated history of acromioclavicular and sternoclavicular injury and instability. In 2008, he injured the ACJ while exercising. Two ACJ excisions performed the same year did not improve his pain. In 2009, he sustained an injury to the SCJ during a chiropractic manipulation. This injury led to more pain, popping, and catching in the SCJ, as well as scapulothoracic bursitis and scapular winging. The orthopedist believed the patient's pain was from impingement at the ACJ and resected even more of the lateral clavicle.

Despite the aforementioned procedures, the patient's pain continued and he felt even less stable at both ends of the clavicle. In 2012, one of his instructors in physical therapy school noticed how loose the SCJ was. In an attempt to avoid surgery, the patient pursued nonoperative measures including nonsteroidal anti-inflammatory drugs, physical therapy, and stem cell and protein-rich plasma injections without relief.

In 2013, the patient saw a different surgeon, who performed an ACJ dog-bone reconstruction as well as an SCJ débridement in another attempt to manage the patient's symptoms. This procedure left him with worse winging of the scapula and more anterior protrusion of the medial clavicle. Despite the reconstruction, his continued ACJ symptoms led to a plating procedure across the ACJ, but the plate was subsequently removed later in 2014 because of worsening pain. He had continued SCJ pain for which another SCJ resection

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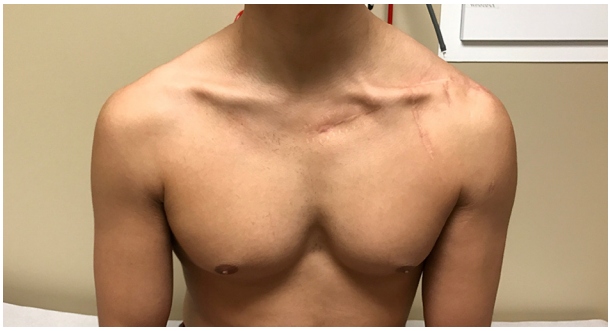

Figure 1 Clinically evident preoperative medial clavicle elevation, clavicular shortening, and scapular drooping.

with concomitant reconstruction was performed in 2014 by a third surgeon. During the resection, over 1 cm of bone was removed from the medial clavicle. The patient briefly enjoyed improvement of his symptoms before his instability and pain eventually became unmanageable again and constant sling wear was needed for symptomatic relief.

In 2016, the patient came to the University of Washington for evaluation (Fig. 1). Objectively, he rated his pain at rest as 8-9 of 10, the Single Assessment Numeric Evaluation score was 30%, and the Simple Shoulder Test score was 6 of 12. He had instability of the clavicle with anterior translation of the medial clavicle at rest, which worsened with arm elevation and with extension. He had difficulties moving the shoulder, problems with scapular winging and bursitis, and a painful catching sensation when the distal clavicle would displace underneath the acromion with certain arm motions. In addition, he could demonstrate instability of the ACJ manually and with horizontal adduction of the arm. He was uncomfortable standing with his arm hanging at his side, and raising his arm above shoulder height was extensively limited by pain, inhibiting activities of daily living. In addition, imaging showed scapular malpositioning with protraction and a measure of scapular drooping. Computed tomography imaging showed the clavicle had been shortened by approximately 2 cm (Fig. 2). During this saga, the patient became depressed and began self-medicating with alcohol.

Figure 2 Preoperative 3-dimensional computed tomography image with clear sternoclavicular joint disruption and clavicular shortening.

After the patient's depression was treated and alcohol use curtailed, we proceeded with reconstructive surgery. Examination under anesthesia demonstrated multidirectional instability at the SCJ that was profound but showed only anteroposterior instability at the ACJ. The old incisions were reopened over the SCJ and extended over to the acromion. Beginning medially, our dissection first defined the sternoclavicular graft from a prior operation. The graft was stretched out, and the medial clavicle was grossly unstable. The medial clavicle was held in a reduced position while this graft was divided and then imbricated by approximately 15 mm. We added a semitendinosus allograft that had been prepared with 2 No. 2 heavy nonabsorbable sutures and tensioned on a graft preparation system. The graft was routed through 2 tunnels in the anterior cortex of the manubrium with a 1-cm bone bridge. This was then passed out of the clavicular facet of the manubrium into the intramedullary canal of the clavicle and routed out through an anterior clavicle tunnel. The medial clavicle was held in a reduced position while the new graft was sewn to itself with No. 2-0 permanent suture and augmented with a No. 5 heavy nonabsorbable suture that was also placed through the tunnels (Figs. 3 and 4). Excellent stabilization of the SCJ was noted with no ability to translate the clavicle medially with axial loading or anteroposteriorly with a towel clamp.

The midshaft of the clavicle was exposed, and a supraclavicular nerve was identified and preserved. Two parallel Kirschner wires were placed in the clavicle to control rotation. An osteotomy was made between the deltoid and pectoralis major origins, and lamina spreaders were used to develop a 2-cm separation. A 2-cm bicortical autograft was harvested from the inner table of the ipsilateral iliac crest and placed such that the superior cortical layer was posterior and

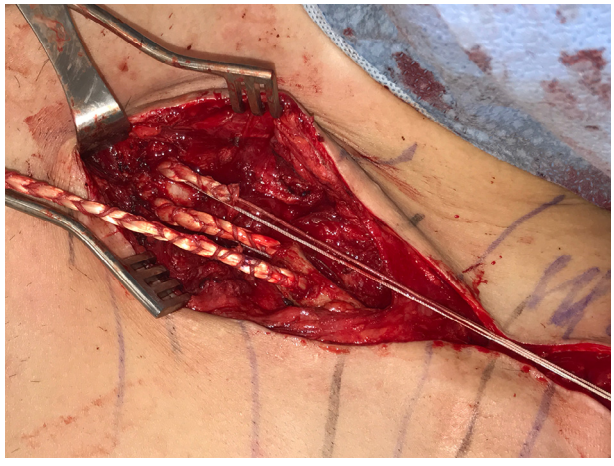

Figure 3 Semitendinosus allograft is prepared with 2 No. 2 nonabsorbable sutures, routed through 2 tunnels in the anterior cortex of the manubrium with a 1-cm bone bridge, and then passed into the intramedullary canal and routed out through an anterior clavicle tunnel.