Case Report

Suprascapular Artery Aneurysm Secondary to Severe Shoulder Joint Osteoarthritis

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Keywords

Suprascapular artery aneurysm · Suprascapular artery · Thyrocervical trunk · Aneurysm ·
Osteoarthritis

Abstract

Aneurysms of the thyrocervical trunk and collateral branches are rarely encountered. Upon literature review, no documented cases of a suprascapular artery aneurysm resulting from osteoarthritis have been previously described. A 64-year-old female was found to have focal aneurysmal formation within the suprascapular artery. The extensive osteoarthritic changes to the glenoid, including medialization of her joint line, is hypothesized to have led to arterial injury and the observed aneurysm formation. Chronic mechanical stress on small vessels from abnormal bony contact in the setting of osteoarthritis can lead to aneurysmal formation. Arthritis as a cause of aneurysm formation in collateral vessels of the thyrocervical trunk has not been previously described.

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Introduction

Aneurysms arising within the thyrocervical trunk or its respective branches are rarely reported [1–3]. Of the small number of reported cases, direct trauma, central venous cannulation, repetitive overhead arm motions in certain athletes, thoracic outlet syndrome, and speculated anomalous origins have all been implicated [1–4, 5]. Congenital causes, such as an arteriovenous malformation leading to a cirroid aneurysm and connective tissue disorders such as Ehlers-Danlos syndrome, have also been identified [6, 7]. There have been no reported cases describing osteoarthritis as an underlying cause of aneurysms occurring in the thyrocervical trunk or collateral vessels. This article reports a unique case of a suprascapular artery aneurysm in a patient with chronic and severe osteoarthritis of the left glenohumeral joint.

Case Presentation

A 64-year-old woman with profound bilateral glenohumeral osteoarthritis presented to the emergency department for left shoulder pain and swelling. Up to this presentation, the patient had an extensive orthopedic history. There were no neurologic or rheumatic personal or family histories. She previously underwent right reverse total shoulder arthroplasty in 2012 due to osteoarthritis with subsequent removal of hardware after hematogenous infection of her prosthesis in 2015 secondary to *Staphylococcus aureus* endocarditis. The prosthesis was removed with placement of an antibiotic spacer and revision arthroplasty in 2018, further complicated by anterior dislocation. A revision right shoulder replacement was performed with an ensuing, unfortunate anterior dislocation of hardware. With ongoing correctional operations for the right shoulder, the patient presented with insidious onset of intense pain of the left shoulder for 2 weeks. Her pain was exacerbated by all movements. Given a history of a right prosthesis infection, an infection workup was completed along with a computed tomography (CT) scan of the left shoulder. A large left shoulder joint effusion was noted, suggestive of a large hemarthrosis with fluid collections within the supraspinatus muscle and posterior deltoid muscle. The CT scan also demonstrated focal aneurysmal formation of the suprascapular artery (Fig. 1). Severe erosive changes of the left humeral head and glenoid fossa were apparent, with significant medialization of the joint line.

Outcomes and Follow-Up

Within the left glenohumeral joint were destructive changes with complete erosion of the glenoid fossa and medialization to the base of the coracoid process. The proximal humerus had also undergone erosive changes, and a significant hematoma was present. Formal irrigation and an excisional debridement of the joint were performed for tissue culture. Cultures remained negative and the patient was eventually discharged.

After approximately 1 month, the patient again presented and was admitted with recurrence of excruciating left shoulder pain. Left shoulder X-rays were obtained (Fig. 2) showing severe degenerative changes and marked remodeling of the glenohumeral joint. The superior aspect of the humeral head had evident subchondral sclerosis and cystic changes. CT scan at that time demonstrated a multiloculated effusion within the left glenohumeral joint extending inferiorly to the anterolateral chest wall, increased in extent when compared to the prior CT. There was an interval increase in collections within the supraspinatus and posterior deltoid

muscle. Synovial fluid was obtained, which was red in color and had 117,000 red blood cells and 500 white blood cells. No crystals were noted. Acid-fast bacilli, fungal, aerobic and anaerobic cultures, and Gram stain were all unremarkable. CRP was elevated. Broad-spectrum, empiric antibiotics were begun (after aspirate was obtained), and the patient was followed by Infectious Disease. MRI did not demonstrate signs of periarticular osteomyelitis. Cervical films were negative for pathology that would explain referred pain. Aspirate cultures were again negative, and the patient was discharged with pain control and outpatient follow-up to explore the etiology of the pain. After a multidisciplinary musculoskeletal board meeting, it was hypothesized that chronic degenerative changes led to an erosive response that caused medialization of the humeral head at the level of the glenohumeral joint. This contact pressure then led to formation of an aneurysm that subsequently became symptomatic.

Discussion

Aneurysm formation is thought to be the result of endothelial dysfunction or injury that leads to a pressure gradient which results in an abnormal vessel enlargement and potential space. Known risk factors that weaken the type 4 collagen-derived endothelial basement membrane include aging, hypertension, smoking, oxidative stresses, diabetes, hyperlipidemia, and inflammation. An aneurysmal sac may result from collagen weakness with an intact intima, and a dissecting aneurysm can be due to a tear in the intima creating a potential channel for anterograde flow (i.e., true vs. false aneurysm). These arterial changes can range from microvascular to macrovascular circulations with varying clinical consequences. For smaller caliber vessels, angiography can be utilized to detect changes in luminal diameter [8].

The thyrocervical trunk is one of the four main branches originating from the subclavian artery, arising distal to the internal mammary and vertebral arteries and proximal to the costovertebral trunk [1]. The suprascapular artery, normally the first branch off the thyrocervical trunk, extends across the posterior triangle, running superior and posterior to the clavicle [9]. It initially courses laterally and anterior to the anterior scalene muscle and phrenic nerve while covered by the sternocleidomastoid muscle, and then passes anteriorly to the third subclavian division and cords of the brachial plexus [1, 9]. The artery continues posteriorly around the edge of the omohyoid inferior belly to finally reach the superior scapular border where it passes over the superior transverse scapular ligament [9]. From the supraspinous fossa to the infraspinous fossa by way of the spinoglenoid notch, the suprascapular artery eventually joins an anastomotic connection with the dorsal scapular artery and the subscapular artery circumflex scapular branch [9].

Given the perilous course through which the suprascapular artery traverses before reaching its target structures, it is vulnerable to injury by surrounding elements in certain settings. Durham et al. [4] describe such a setting, where vessel compression from thoracic outlet obstruction secondary to a cervical rib compounded by repetitious, overhead use led to aneurysm formation of the suprascapular artery. Other reports have described similar suprascapular aneurysmal formations resulting from repetitive overhead arm motions in athletes, particularly in baseball pitchers [5, 10]. It is believed that when compared to other subclavian artery lesions, suprascapular artery aneurysms are likely unique to a sports-related cause [10].

This mechanism of recurring bony compression and wear on small vessels is consistent with the chronic, erosive glenohumeral osteoarthritis in our reported patient resulting in abnormal, repetitive bone-vessel contact as the cause of the aneurysm. Findings during exploration of the patient's left shoulder joint showed marked erosion and medialization of the

glenoid to the level of the coracoid process and significant degeneration of the humeral head. Erosion to this degree places the suprascapular artery in precarious proximity to the sclerotic humeral head, notably as it traverses the spinoglenoid notch. The abnormal contact in this setting would be elicited with even subtle humeral movements. Given the finding of this patient's large hemarthrosis, it is conceivable that erosive changes within the glenohumeral joint space created focal, inflammatory aneurysms of the scapular arteries with intermittent bleeding. While inflammation may add to vascular degeneration and aneurysm formation, it was ultimately the abnormal bony contact with the suprascapular vessel that led to aneurysmal vasculopathy in this case.

Conclusion

Aneurysms of the thyrocervical trunk and its branches are rare [1–3]. The most commonly involved branch is the inferior thyroid artery, with only 15 cases being reported since 1959 [2]. Even fewer suprascapular artery aneurysms have been reported, and various etiologies have been proposed, the most frequent of which seems to be repetitive overhead arm motion [5, 10]. In these cases, repetitive traumatic contact with surrounding structures led to aneurysmal formation in collateral vessels. After a comprehensive literature review, this may be the first case of a suprascapular aneurysm caused by repetitive, abnormal, bone-vessel contact secondary to extensive glenohumeral osteoarthritis.

Statement of Ethics

Informed consent was obtained from the patient for publication of this case and all related images.

Disclosure Statement

The authors have no conflicts of interest to declare.

Funding Sources

No specific funding was received for this study.

Author Contributions

Timothy K. Summers and Benjamin D. Sookhoo participated in the production of the manuscript literature to include grammatical corrections, accuracy check, and final production. Lorie Stumpo (musculoskeletal radiologist) and Stephen A. Parada (shoulder surgeon) were the attending physicians who performed the final review of the completed document.

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Fig. 1. Coronal (a) and axial (b) CT scan sections showing focal aneurysmal formation (arrows) within the suprascapular artery.

Fig. 2. Anteroposterior (a) and lateral scapula (b) plain film radiographs demonstrating humeral head degeneration.