Venous pseudoaneurysms are rare and have been reported only sporadically in the literature. There is little knowledge about the etiology and pathogenesis of venous pseudoaneurysms. Surgical therapy is usually reserved for venous aneurysms of the abdomen and lower extremity because of a high risk of complications, such as venous thromboembolism. Aneurysms of the head and neck, on the other hand, are usually acquired and can be associated with infection or trauma.

Subclavian and upper extremity venous pseudoaneurysms are rare and poorly understood. We present the case of a 45-year-old woman with a right subclavian vein pseudoaneurysm that formed after blunt trauma to the upper chest and shoulder. The patient was managed successfully with surgical excision through a supravacular approach. The case report is followed by a discussion on the etiology, clinical presentation, and management of venous pseudoaneurysms.

CASE PRESENTATION

A healthy 45-year-old woman presented to an outpatient clinic with a 4-month history of a progressively enlarging painless mass in the right supravascular area. She reported a past history of a fall on her right side 2 years before her presentation. On examination, the mass was round, soft, mobile, nonpulsatile, and positioned just superior to the right clavicle; it measured approximately 5 × 5 cm. The mass increased in size with Valsalva maneuver. Neurologic and musculoskeletal examination findings were otherwise normal.

Her radiologic investigations included a duplex ultrasound examination, which was suggestive of venous origin of the structure. Computed tomography (CT) with administration of contrast material confirmed a 5 × 5-cm saccular venous pseudoaneurysm in proximity to the right subclavian vein that enhanced with contrast material in the venous phase only at the right internal jugular vein origin (Fig 1). The delineation from the right brachiocephalic vein inferomedially was not clear. Given that the mass was progressively increasing in size on history, surgical treatment was recommended to the patient. Endovascular therapy was considered, but the location of the venous pseudoaneurysm at the right internal jugular vein origin made it difficult to tackle from an endovascular approach.

The patient underwent an elective excision of the right subclavian vein pseudoaneurysm. A right-sided 5-cm supraclavicular incision was made to expose the pseudoaneurysm, which was located just lateral to the sternocleidomastoid muscle and medial to the scalenus anterior muscle, pushing the omohyoid muscle anteriorly. The saccular pseudoaneurysm was communicating with the subclavian vein through a small stalk. Two feeding vessels to the pseudoaneurysm, one extending from the internal jugular vein and another from the subclavian vein, were visualized and tied off. The pseudoaneurysm sac was freed off the vein and excised (Fig 2). A single stitch was used to repair the small defect in the subclavian vein. Histopathologic examination of this patient’s surgical specimen showed confined, fibrotic wall tissue attached with scattered fatty lobules, consistent with a venous pseudoaneurysm.

The patient had an uncomplicated postoperative course and was discharged home in good condition. A postoperative venous duplex ultrasound study revealed normal flow through the subclavian vein and no residual stenosis. She was seen in the clinic 6 months postoperatively and had no signs of recurrence or any other complications.

DISCUSSION

Venous aneurysms are rare and their etiology is poorly understood. According to Yao et al, they can be broadly categorized into three categories on the basis of etiology: congenital, acquired, and traumatic. Congenital venous aneurysms are often found in children in conjunction with cystic hygromas, as they are thought to share a common embryologic origin. Venous pseudoaneurysms, on the other hand, are usually acquired and can be associated with infection or trauma.

The etiology of the subclavian vein pseudoaneurysm in this case is unclear, but it may have been acquired secondary to blunt trauma, given the patient’s history of a
fall on her right side 2 years before presentation. A history of blunt trauma is often under-reported by patients and not specifically elicited by clinicians on history, although it is likely the etiology for a large proportion of pseudoaneurysms. Venous pseudoaneurysm of the lower extremity secondary to blunt trauma has previously been described, although it has not been reported for upper extremities. Penetrating trauma to the thoracic outlet by either a stab wound or iatrogenic injury may also lead to pseudoaneurysm formation of the subclavian vein with or without an arteriovenous fistula to the nearest artery, such as the common carotid artery or innominate artery.

The mechanism responsible for the development of pseudoaneurysms after blunt trauma is unclear but may be related to the acceleration-deceleration forces encountered in blunt traumatic injuries. Furthermore, given that the subclavian vessels are relatively tethered to the first rib at the subclavian groove, they may be at an increased risk for injury at this location.

A review of the literature revealed four reported cases of subclavian vein aneurysms. Two were asymptomatic and discovered incidentally, whereas one presented as a symptomatic supraclavicular mass without a prior history of trauma. Only one was a post-traumatic subclavian vein pseudoaneurysm that followed minor trauma to the shoulder, which was managed by surgical excision and patching of the defective vein.

Once a venous aneurysm is discovered, the initial diagnostic evaluation includes duplex ultrasonography, followed by CT with arterial and venous phases to delineate the exact anatomy. Furthermore, CT with contrast enhancement can help determine if there is arterial-venous communication in the form of an arteriovenous fistula. This is particularly important in considering an operative approach for management of this problem.

Potential complications of untreated venous pseudoaneurysms include venous obstruction, arteriovenous fistula (with or without limb ischemia), and compression of other structures in proximity to the pseudoaneurysm. Although rare, venous thromboembolism has also been reported as a complication of upper extremity venous aneurysms. Calligaro et al reported a 71% incidence of deep venous thrombosis or pulmonary embolism among 31 patients with aneurysms involving either the popliteal or femoral veins. Among 32 patients with intra-abdominal venous aneurysms, 41% experienced major complications, including 5 deaths from either rupture or a pulmonary embolus. Surgical excision of aneurysms involving the deep venous system in the lower extremities or abdomen is preferred to avoid such complications. Unlike with arterial aneurysms, there is no established evidence for increased risk of vessel rupture with venous aneurysms.

Endovascular stenting for subclavian vessels has a high failure rate due to the anatomic position as it is prone to flexion during shoulder movement, and the vessel may be compressed by multiple surrounding structures including the first rib and clavicle. Phipp et al reported three cases of subclavian stent failure due to a fractured stent.

Definite management includes surgical excision of the venous pseudoaneurysm, repair of the vein, and ligation of the arteriovenous fistula if one has developed. The patient in this report underwent successful pseudoaneurysm excision through a supraclavicular surgical approach. Although primary repair of the vein was performed because the venous defect was small, an interposition graft may be required if the venous defect is too large for primary repair. Therefore, preoperative preparation of the thigh was done in case a great saphenous vein conduit was required.
CONCLUSIONS

To our knowledge, this represents the second case of post-blunt traumatic subclavian venous pseudoaneurysm reported. The patient was successfully managed with surgical excision of the pseudoaneurysm through a supraclavicular approach. Given that the risk of major complications, such as venous thromboembolism, is low in patients with upper extremity venous aneurysms, surgical therapy is generally reserved for symptomatic patients or for cosmetic reasons.

REFERENCES

1. Calligaro KD, Ahmad S, Dandora R, Dougherty R, Dougherty MJ, Savarese RP, et al. Venous aneurysms: surgical indications and review of literature. Surgery 1995;117:1-6.
2. McCready RA, Bryant MA, Dveibis JL, Chess BA. Subclavian venous aneurysm: case report and review of the literature. J Vasc Surg 2007;45:1080-2.
3. Yao JS, van Bellen B, Flinn WR, Bergan JJ, editors. Aneurysms of the venous system. In: Bergan JJ, Yao JS, editors. Aneurysms: diagnosis and treatment, vol. 1. New York: Grune & Stratton; 1982. p. 515-30.
4. Joseph AE, Donaldson JS, Reynolds M. Neck and thorax venous aneurysm: association with cystic hygroma. Radiology 1989;170:109-12.
5. Karahan M, Ihsir S, Baltacioglu F, Caglar MM. False aneurysm of the common femoral vein in a footballer. Br J Sports Med 2005;39:e8.
6. Zafarghandi MR, Mooni M, Esfahani MH, Rasouli MR. A rare complication of internal jugular vein catheterization: innominate-subclavian junction pseudoaneurysm. Artif Organs 2009;33:296-7.
7. Walden FM. Subclavian aneurysm causing brachial plexus injury after removal of a subclavian catheter. Br J Anaesth 1997;79:807-9.
8. Hopsu E, Tarvainen J, Vento SI, Pitkärinta A. Acquired jugular vein aneurysm. Int J Otolaryngol 2009;2009:535617.
9. Radmil O, Vasic D, Vranes M, Banzic I, Cvetic V, Davidovic L. Venous pseudoaneurysm as a late complication of hemodialysis. Am Surg 2012;78:270-2.
10. Wallace JR, Baril DT, Chaer RA. Upper extremity venous aneurysm as source of pulmonary emboli. Ann Vasc Surg 2013;27:240.
11. Schellhammer F, Webker G, Tunowski B. Asymptomatic aneurysm of the subclavian vein. Acta Radiol 2005;46:366-7.
12. Regueiro Mira F, Galbis Carvajal JM, Canto Armengod A. Thoracic venous aneurysms. Clinical observation. J Cardiovasc Surg 2002;43:527-9.
13. Casbas L, Chauffour X, Cau J, Bossary JP, Midy D, Baste JC, et al. Post-traumatic thoracic outlet syndromes. Ann Vasc Surg 2008;19:25-8.
14. Phipp LH, Scott DJ, Kessel D, Robertson I. Subclavian stents and stent-grafts: cause for concern? J Endovasc Surg 1999;6:233-6.

Submitted Mar 13, 2015; accepted Jul 13, 2015.