Case Report
Thoracic Outlet Syndrome Secondary to an Anomalous Subclavius Muscle

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This article reports an unusual presentation of thoracic outlet syndrome secondary to an anomalous subclavius muscle insertion that was diagnosed with magnetic resonance imaging (MRI) and successfully treated by surgical decompression.

CASE REPORT

A 34-year-old woman presented with a 1.5-year history of progressive left shoulder and anterior chest wall pain, at rest and at night, accompanied by paresthesia down the ulnar aspect of her left forearm and hand.

On physical examination, the patient had significant infraclavicular fullness and tenderness. Deep palpation of this region aggravated the pain and reproduced paresthesia. Adson's test1 reproduced her symptoms.

Radiographs of the chest, cervical spine, and shoulder were normal. Magnetic resonance imaging of the patient's left shoulder revealed a structure with the density of muscle adjacent to the inferior aspect of the brachial plexus (Figure 1). This structure represented an abnormally oriented subclavius muscle.

Because the patient's symptoms were debilitating and refractory to anti-inflammatory agents and physical therapy, she underwent surgical decompression of the thoracic outlet through a deltopectoral approach. The pectoralis minor was released and retracted medially, exposing the subclavius muscle, which was markedly thickened over the coracoid process to its base. The thickened insertion was excised. The brachial plexus was free of any evidence of compression. The pectoralis minor was repaired back to its insertion and the deltopectoral interval closed.

Postoperatively, the patient's pain diminished substantially, and Adson's test was normal. One year postoperatively, the patient was symptom-free with normal strength and range of motion. An MRI of the thoracic outlet showed ablation of the anomalous muscle tissue and no evidence of brachial plexus compression (Figure 2).

DISCUSSION

Thoracic outlet syndrome encompasses a group of syndromes resulting from compression of the neurovascular supply to the upper limb in the region extending from the supraclavicular fossa to the axilla. The boundaries of the thoracic outlet are defined by the first rib medially, the clavicle laterally, and the scalene muscles anteriorly. Both anomalous structures (eg, cervical ribs1 and adventitious fibrous bands2) and hypertrophied normal structures (eg, the anterior scalene muscle3) have been implicated in thoracic outlet syndrome.

The subclavius muscle is a small cylindrical muscle arising on the anterosuperior surface of the first rib at

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the junction with its cartilage. The muscle fibers course laterally and slightly superiorly to insert in a groove on the undersurface of the clavicle between attachments of the trapezoid ligament medially and conoid laterally.4

Because the subclavius muscle occupies the costoclavicular space that separates the medial clavicle from the subclavian vessels and the brachial plexus, its role in the pathogenesis of thoracic outlet syndrome has been suggested previously. In 1924, Lowenstein3 showed that in marked abduction and external rotation of the arm, the subclavius muscle and costocoracoid ligament compressed the subclavian vessels.

The insertion of an anomalous subclavius muscle into the capsule of a coracoclavicular joint was first identified by Lane6 in 1887 and more recently by Lewis7 and Abe.8 The latter noted the anomalous subclavius muscle attached to the medial side of a clavicular protrusion near the first rib, so that the costoclavicular space was narrowed.8

Hama et al.4 described brachial plexus compression caused by an abnormal attachment of the subclavius muscle. The subclavius muscle inserted onto a protrusion from the inferior clavicle that articulated with the base of the coracoid process. Similarly, Lusskin et al.9 described a case of subclavian vein compression and diffuse brachial plexopathy following clavicle fracture “influenced by a hypertrophied subclavius muscle.” Marked adhesions were noted between the hypertrophied subclavius muscle and tendon and the underlying subclavian vessels.

An abnormal subclavius tendon or insertion was found to be responsible for neurovascular compression in 39 (19.5%) of 200 consecutive patients10 who underwent transaxillary surgery for thoracic outlet syndrome. The elevated incidence of subclavius muscle pathology stems largely from the inclusion of a high number of patients with Paget-Schroetter syndrome, a rare variant of thoracic outlet syndrome characterized by spontaneous or effort-induced subclavian vein thrombosis.11

The subclavian vein normally lies between the subclavius muscle, costoclavicular ligament, and anterior scalene, in proximity to the first rib.10,11 Progressive hypertrophy of the subclavius muscle and enlargement of its tubercle may produce repetitive compressive trauma to the subclavian vein and lead to fibrosis, stricture, and thrombosis of the vessel.10 Because our patient’s arm was neither swollen nor dusky, a diagnosis of subclavian vein thrombosis was not considered.

Magnetic resonance imaging of the affected shoulder was used in our patient to identify the anomalous insertion of the subclavius muscle as the offending structure and provide evidence of thoracic outlet compression. Magnetic resonance imaging has been used previously to evaluate the thoracic outlet for possible structural pathology or evidence of brachial plexus compression.12,13 Structural variations in the thoracic outlet demonstrated by MRI have been shown to correlate well with those found on plain radiographs, and it has been suggested that MRI is the imaging modality that best provides preoperative information on the etiology of thoracic outlet syndrome.14

In contrast, others have not found MRI helpful in the diagnosis of thoracic outlet syndrome. Poole and Thomas13 found that MRI did not demonstrate any soft-tissue abnormalities in the thoracic outlet or compression of the brachial plexus.

Primary indications for surgical intervention are persistence of pain and failure of conservative treatment emphasizing rest, postural reeducation, and physical therapy. Other indications include significant neurologic deficit, subclavian vein thrombosis, or impending arterial thrombosis or rupture.15

The goal of surgical intervention is decompression of the brachial plexus by enlarging the thoracic outlet and releasing or excising the offending structure. The anatomic approach is dictated by the site and source of the neurovascular compression, as well as the preference of the surgeon. In the present case, the deltopectoral approach was used to enhance visualization of the subclavius muscle. After resection of the subclavius muscle, the brachial plexus was free of any compression, so that neither the first rib nor the anterior scalene muscle was resected. Excision of the subclavius insertion relieved the compression.

REFERENCES

6. Lane WA, Poland J, Dunn LA. Abnormalities observed in the dissecting room of Guy’s Hospital during the sessions 1885-86 and 1886-87. Guy’s Hospital Reports. 1887; 44:399-412.