The supraclavius muscle is a novel muscular anomaly observed in two cases of thoracic outlet syndrome

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Various anomalous muscles and fibrofascial structures have been described in relation to the anatomy of thoracic outlet syndrome. We describe two patients with a previously undescribed muscle anomaly, which originated laterally near the trapezius muscle, coursed across the supraclavicular space deep to the scalene fat pad, and attached obliquely to the superior undersurface of the medial clavicle, which we have termed the "supraclavius" muscle. The significance of the supraclavius muscle is unknown, but its occurrence in patients with thoracic outlet syndrome indicates that it can be associated with narrowing of the anatomic space adjacent to the neurovascular structures. (J Vasc Surg Cases 2015;1:84-6.)

Thoracic outlet syndrome (TOS) refers to a group of uncommon disorders arising from extrinsic compression of the neurovascular structures that serve the upper extremity as they pass through the spaces of the thoracic outlet. Various anomalous muscles and fibrofascial structures have been described in relation to the anatomy of TOS.[1-8] We describe here two patients in whom a previously undescribed anomalous muscle was observed. Because this muscle originated laterally from near the trapezius muscle to pass across the supraclavicular space, inserting obliquely along the superior undersurface of the medial clavicle, we have termed this anomaly the "supraclavius" muscle. Each of the patients described in this report provided consent to publish.

CASE REPORTS

Patient 1. A 19-year-old male baseball player presented with spontaneous right arm swelling and cyanosis. He underwent venography with successful thrombolysis, revealing a focal obstructive lesion in the subclavian vein at the level of the first rib, followed by right paraclavicular thoracic outlet decompression for venous TOS. During the operation, after initial mobilization of the scalene fat pad, a supraclavius muscle was discovered, with its medial attachment to the deep superior aspect of the clavicle, separate from and lateral to the clavicular head of the sternocleidomastoid muscle. The lateral extent of this muscle was joined to the trapezius muscle, yielding a distinct muscle ~7 cm long and 2 cm wide (Fig), which was easily excised before scalenectomy, first rib resection, and subclavian vein reconstruction.

Patient 2. A 60-year-old retired nurse presented with pain in the lower part of the right neck, with numbness and tingling radiating into the arm and hand, for >1 year. She had strong clinical evidence for brachial plexus compression at the supraclavicular scalene triangle and the subcoracoid pectoralis minor space.

She did not improve with physical therapy and underwent right supraclavicular thoracic outlet decompression and pectoralis minor tenotomy for neurogenic TOS. After initial mobilization of the scalene fat pad, an anomalous supraclavius muscle was encountered originating from near the trapezius muscle and passing to the superior undersurface of the medial clavicle. The muscle was adherent to and dissected from the anterior aspect of the brachial plexus before it was resected from the operative field. The operation was then completed as planned, with scalenectomy, brachial plexus neurolysis, and first rib resection, along with concomitant pectoralis minor tenotomy.

DISCUSSION

A large number of anatomic variations have been described within the scalene triangle and spaces of the thoracic outlet in patients with TOS and in the normal population.[1-8] These variations include bony anomalies, such as cervical ribs and hypoplastic first ribs, which each occur with a frequency of ~0.7% in the general population.[8] Muscular variants (eg, the scalene minimus muscle) and a spectrum of fibrofascial bands and ligaments occur with much greater frequency, from ~46% to 63% in the general population[4,5] to almost all patients undergoing surgery for TOS, where Roos[1] described seven different variations.

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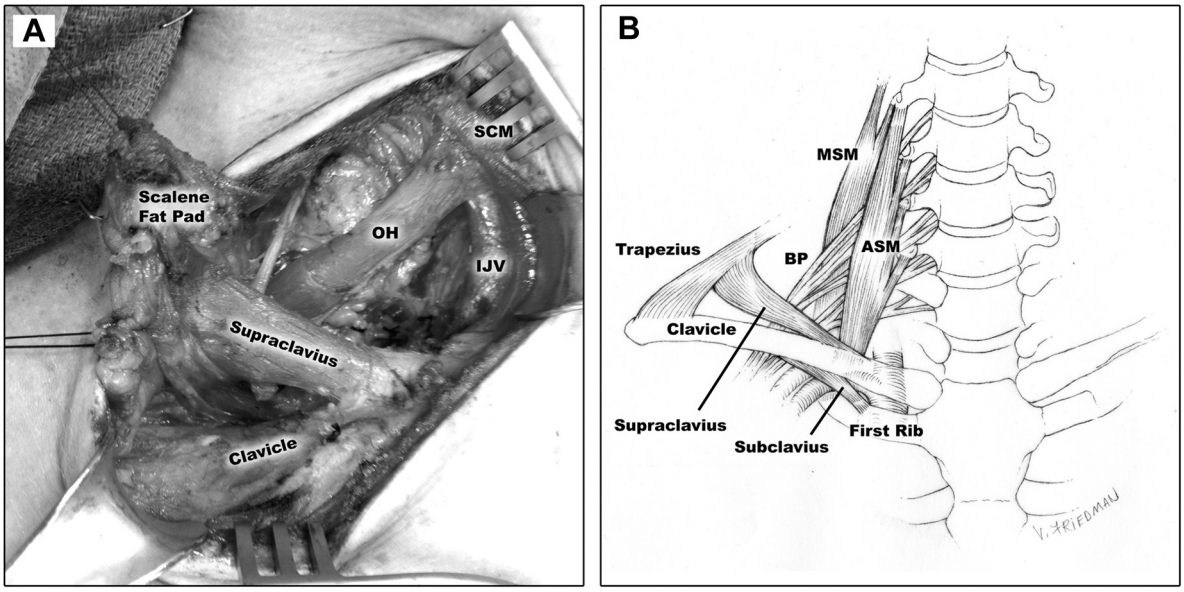

Fig. A, Operative photograph for venous thoracic outlet syndrome (TOS) in patient 1 demonstrates a prominent supraclavius muscle observed during the initial exposure of the right supraclavicular space. *IJV,* Internal jugular vein; *MSM,* middle scalene muscle; *OH,* omohyoid muscle; *SCM,* sternocleidomastoid muscle. **B,** Schematic illustration depicts the course of the supraclavius muscle, in relation to the scalene triangle, brachial plexus, and the subclavius muscle. *ASM,* Anterior scalene muscle; *BP,* brachial plexus.

The width of the scalene triangle has been observed to be narrow in >80% of patients with neurogenic TOS, indicating that any additional space occupied by anomalous structures may further narrow the thoracic outlet.[2] These anomalies may thereby predispose patients to the development of compressive neurovascular symptoms after trauma or mechanical stress, resulting in clinical manifestations of TOS. Knowledge of these anatomical variations is particularly important to surgeons conducting operations for TOS to ensure safe and adequate decompression of the thoracic outlet.

In this report, we describe a novel anomaly we have termed the "supraclavius" muscle because it attaches obliquely to the medial superior undersurface of the clavicle, lateral to the clavicular portion of the sternocleidomastoid muscle, and appears to be symmetric to the course and attachment of the subclavius muscle along the inferior aspect of the clavicle. The supraclavius muscle passes deep to the scalene fat pad and courses in front of the brachial plexus where the nerves emerge from the scalene triangle, so it may contribute to neural compression as observed in the second of the patients reported here. This anomaly has not been previously described and is undoubtedly exceptionally rare, as we have observed this muscle in only two patients in an experience now exceeding 2000 operations using supraclavicular decompression for TOS. When identified during supraclavicular operations for TOS, we recommend resection of the supraclavius muscle to eliminate any contribution this anomalous structure might make to neurovascular compression or later recurrence.

CONCLUSIONS

We describe here a rare anatomical variation observed during supraclavicular decompression for TOS, the supraclavius muscle. Although the overall clinical significance of the supraclavius muscle remains unknown, its occurrence in patients with TOS indicates that it can be associated with narrowing of the anatomic space adjacent to the neurovascular structures. Knowledge of the potential existence of the supraclavius muscle will be valuable for surgeons who perform operations for thoracic outlet decompression using supraclavicular exposure.

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