SCIENTIFIC ARTICLE

Thoracic Outlet Syndrome in the Pediatric Population: Case Series

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We present 4 patients, 4 months to 10 years of age, with thoracic outlet syndrome. All were referred to the brachial plexus clinic. Three patients were diagnosed with vascular thoracic outlet syndrome after clinical evaluation and diagnostic imaging. Three had a cervical rib and 1 had an anomalous first rib. All patients were treated surgically through a supraclavicular approach and had resolution of the symptoms. No postoperative complications were noted. *(J Hand Surg Am. 2014;39(3):484–487. Copyright © 2014 by the American Society for Surgery of the Hand. All rights reserved.)*

Key words Brachial plexus, pediatric, supraclavicular, thoracic outlet syndrome.

Additional material is available online.

THORACIC OUTLET SYNDROME (TOS) is caused by compression of the neurovascular structures as they exit the thoracic outlet and results in a constellation of symptoms including pain, parasthesias, fatigue, pallor, cyanosis, numbness, weakness, limb coldness, heaviness, and motor deficits in the neck, upper extremities, or both.[1] Thoracic outlet syndrome is more common in women and typically occurs between the ages of 21 and 50 years. We present 4 children with TOS, including 1 patient who was 4 months of age.

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All authors listed in this report have followed the principles outlined in the 1975 Declaration of Helsinki. The Cincinnati Children's Hospital Medical Center Institutional Review Board has approved the research and deemed it to be nonhuman subjects research.

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CASE REPORTS

Patient 1

A 10-year-old girl presented with numbness and tingling along the lateral aspect of the right arm and weakness with right elbow flexion and shoulder abduction. She had previously had a cervical lymph node biopsy, after which the symptoms worsened; pathology revealed the specimen to have cartilage and bone. On physical examination, she had right-sided sensory abnormalities and decreased tendon reflexes. The Roos, Adson, and Wright tests elicited her symptoms. Magnetic resonance imaging and magnetic resonance angiography demonstrated bilateral cervical ribs without vascular compression. Because of these findings, we thought that the previous biopsy was actually of the cervical rib, and that her symptoms had worsened as a result of the sharp edge of the rib irritating the brachial plexus: in other words, neurogenic TOS. She underwent right supraclavicular brachial plexus exploration with cervical rib resection. The right arm numbness, tingling, and weakness with elbow flexion and shoulder abduction resolved. At a recent follow-up 37 months postoperatively, she had no problems, and all provocative maneuvers were negative.

Patient 2

A 4-month-old boy presented with episodes of right arm cyanosis since birth. These occurred when he was

lying prone or on the right arm. On physical examination, there was decreased sensation to pinch testing along the medial aspect of the right arm and lateral shoulder. No palpable masses, bruits, motor, or sensory deficits were noted. Hyperabduction of the arm with the head turned to the left resulted in cyanosis of the right hand without loss of pulses. A chest radiograph revealed a right cervical rib, and an ultrasound examination revealed patency of the subclavian artery and vein. Magnetic resonance imaging and magnetic resonance angiography demonstrated bilateral cervical ribs and compression of the subclavian vein when he was placed in right lateral decubitus and with hyperabduction of the right arm (Fig. 1). The patient was diagnosed with venous TOS and underwent surgical exploration through a supraclavicular approach with right cervical rib resection and anterior scalenotomy. The patient had complete resolution of symptoms including return of sensation with pinch testing and the absence of cyanosis with provocative maneuvers. When the parents were contacted by telephone 13 months later, they expressed satisfaction and had noted no further cyanosis regardless of shoulder position.

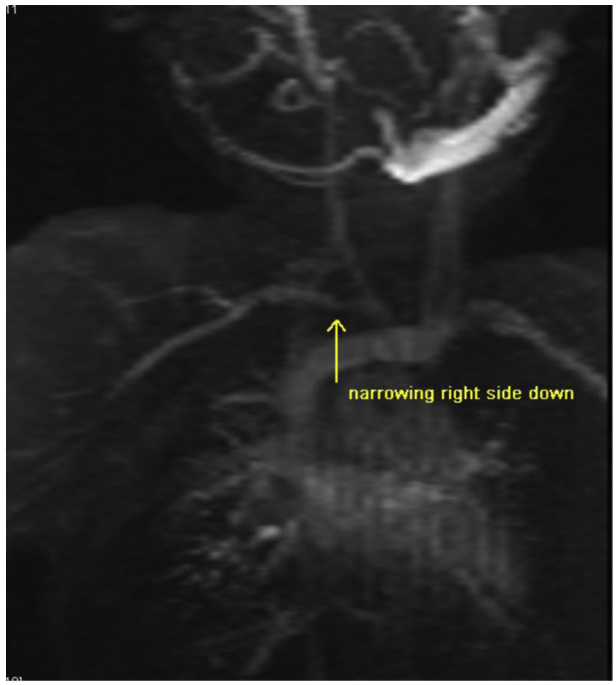

FIGURE 1: Magnetic resonance angiograph showing narrowing of the right subclavian vein with the patient placed in a right side–down position.

Patient 3

A 10-year-old girl presented to the pediatric surgery clinic with a subcutaneous right neck mass that had been present for 3 years. A chest radiograph revealed fused first and second ribs. A computed tomography angiogram revealed an anomalous first rib that fused laterally with the second rib and compression of the subclavian artery that worsened with shoulder abduction. She was referred to the brachial plexus clinic where the patient noted numbness and tingling in the right arm and pain with shoulder abduction, which also caused loss of the pulse distally. The patient was diagnosed with arterial TOS and underwent supraclavicular exploration with right first rib resection. The symptoms resolved and shoulder abduction no longer affected the pulse. Telephone follow-up 3 years after surgery indicated that the patient remained asymptomatic.

Patient 4

A 9-year-old girl presented with 2 months of numbness, tingling, and aching in the right arm, particularly with shoulder abduction, and progressive right hand weakness and pain when placing her hands above her head. She had similar symptoms on the left, but to a lesser degree. On physical examination, she noted pain with hyperabduction of both hands, right greater than left. She lost wrist pulses with 90° right shoulder abduction. The costoclavicular compression test led to immediate loss of pulses. The sensory and motor examinations were normal, although there was mild wasting of the right thenar musculature. A chest radiograph revealed a right cervical rib and magnetic resonance imaging and magnetic resonance angiography showed major compression of the right subclavian artery with the arm abducted. The patient was diagnosed with arterial TOS and underwent supraclavicular exploration with cervical rib resection and scalenectomy. Intraoperatively, a fibrous band was found to be compressing the subclavian artery, and was therefore resected. Three months postoperatively, she had complete resolution of symptoms except for some residual right hand weakness. She had a median nerve Tinel sign distal to the antecubital fossa. Provocative maneuvers no longer caused loss of pulses. She no longer had left-sided symptoms. She was prescribed physical therapy; at follow-up 11 months postoperatively, all provocative maneuvers were negative and she no longer reported right arm numbness, tingling, weakness, or pain.

DISCUSSION

Thoracic outlet syndrome is difficult to diagnose and treat owing to nonspecific symptoms and potential overlap with other pathologic processes. The neurovascular structures within the thoracic outlet can be