A Cadaveric Demonstration of the Transaxillary Approach to First Rib Resection for the Treatment of Thoracic Outlet Syndrome

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Thoracic outlet syndrome (TOS) can be classified as neurogenic or vascular. Neurogenic TOS is the most common form, affecting 3 per 100,000 persons, and results from compression of the brachial plexus by components of the thoracic outlet.1 Patients present with pain, weakness, temperature instability, and color changes in the affected extremity.1 Vascular TOS encompasses venous and arterial forms, affecting ~0.1 to 2 and 0.03 to 0.9 per 100,000 persons, respectively.2 Venous TOS results from compression of the subclavian vein as it travels between the clavicle and first rib.2 The clinical presentation is characterized by venous congestion with edema, the development of collateral vessels, and thrombosis.2 Approximately 60% of upper extremity deep vein thromboses are due to venous TOS.2 Arterial TOS results from compression of the subclavian artery between the scalene muscles and the first rib or an atypical cervical rib.2 Arterial TOS presents with symptoms of acute ischemia, including pallor, pain, and weakness. In cases of arterial TOS, perfusion must be restored urgently to prevent critical limb ischemia.2

Surgical intervention is used to relieve neurogenic or vascular compression associated with TOS via first rib resection (transaxillary, supraclavicular, or infraclavicular) or claviculectomy.2 The transaxillary and supraclavicular approaches to first rib resection are performed most often, with procedure selection dependent on patient anatomy.3 Several studies have shown no significant differences in outcomes between the transaxillary and supraclavicular approaches.4,5

Transaxillary rib resection accesses the first rib from the axilla, where it is positioned between the pectoralis major and latissimus dorsi muscles.2,3 However, the surgical window is narrow and deep, limiting visibility and creating a unique challenge when teaching the technique to residents and vascular trainees. This video was developed to circumvent this challenge by demonstrating the steps of transaxillary rib resection on a Thiel-embalmed cadaver, which allowed for a larger incision to better show the associated anatomy (Supplementary Video, online only). The cadaver was provided by a medical school gift body program and consent was given through donor participation in the program. This demonstration provides an excellent technical overview of a transaxillary first rib resection, spanning from skin incision (at 0:49 minute) to rib removal and trimming of the bony remnants (5:29 minutes).

REFERENCES