

## A technical guide to supraclavicular thoracic outlet decompression

Mohamad A. Hussain, MD, PhD,<sup>a,b</sup> Mosaad AlHamzah, MBBS, MPH,<sup>c</sup> and Mohammed Al-Omran, MD, MSc,<sup>b,c,d,e</sup> *Boston, Mass; Toronto, Ontario, Canada; and Riyadh, Saudi Arabia*

Thoracic outlet syndrome (TOS) is an underdiagnosed and undertreated condition that occurs owing to neurogenic, arterial, and/or venous compression in the thoracic outlet.<sup>1</sup> There are two main surgical approaches to TOS decompression: transaxillary and supraclavicular. The supraclavicular approach has several potential advantages, including that it allows for complete anterior and middle scalenectomy, resection of cervical and first ribs, brachial plexus neurolysis, and vascular reconstruction.<sup>1-4</sup> The objective of this video guide was to demonstrate a comprehensive approach to supraclavicular TOS decompression.

A young woman presented with right-sided arterial and neurogenic TOS at a high-volume tertiary care TOS center. Signs and symptoms of arterial compression included arm fatigue with use, pallor, and absent radial pulse with provocative maneuvers. Neurogenic symptoms included hand and arm pain, paresthesia, and weakness. Duplex ultrasound examination showed a normal flow in the subclavian artery at rest, but occlusion with provocative maneuvers. A computed tomography scan confirmed presence of a right-sided cervical rib.

A right-sided supraclavicular incision was made starting from the clavicular head of the sternocleidomastoid muscle and extending laterally to the medial border of the trapezius muscle (Video 1). The operation was subsequently divided into six main steps. (1) Creation of subplatysmal flaps (00:34); (2) mobilization of the scalene fat pad (01:07); (3) anterior scalenectomy (01:44); (4) brachial plexus neurolysis (03:05); (5) middle scalenectomy (03:37); and (6) resection of the cervical (04:27) and first ribs (04:54). In addition, details about patient positioning, electrocautery set-up, surgical instruments, postoperative care, and potential complications are provided in the video.

Key steps of the procedure are also illustrated in Fig 1, including (A) isolation of the anterior scalene muscle; (B) result after anterior scalenectomy; (C) isolation of the middle scalene muscle for middle scalenectomy; and (D) resected first rib. Fig 2 shows the result with demonstration of the long thoracic nerve, brachial plexus, subclavian artery, and phrenic nerve.

We believe this video will inform vascular surgeons about the complexities of supraclavicular TOS decompression, help them to optimize their surgical approach, and/or encourage them to refer TOS patients to appropriate centers of excellence.

The patient agreed to the recording and publication of this video.

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From the Division of Vascular and Endovascular Surgery, Brigham and Women's Hospital, Harvard Medical School, Boston<sup>a</sup>; the Li Ka Shing Knowledge Institute, St. Michael's Hospital, Toronto<sup>b</sup>; and the Department of Surgery, King Saud University, Riyadh<sup>c</sup>; the Department of Surgery, University of Toronto,<sup>d</sup> and the Division of Vascular Surgery, St. Michael's Hospital,<sup>e</sup> Toronto.

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Correspondence: Mohammed Al-Omran, MD, MSc, Professor and Head, Division of Vascular Surgery, St. Michael's Hospital, 30 Bond St, Suite 6-046 Donnelly South Wing, Toronto, ON M5B1W8, Canada (e-mail: [mohammed.al-omran@unityhealth.to](mailto:mohammed.al-omran@unityhealth.to)).

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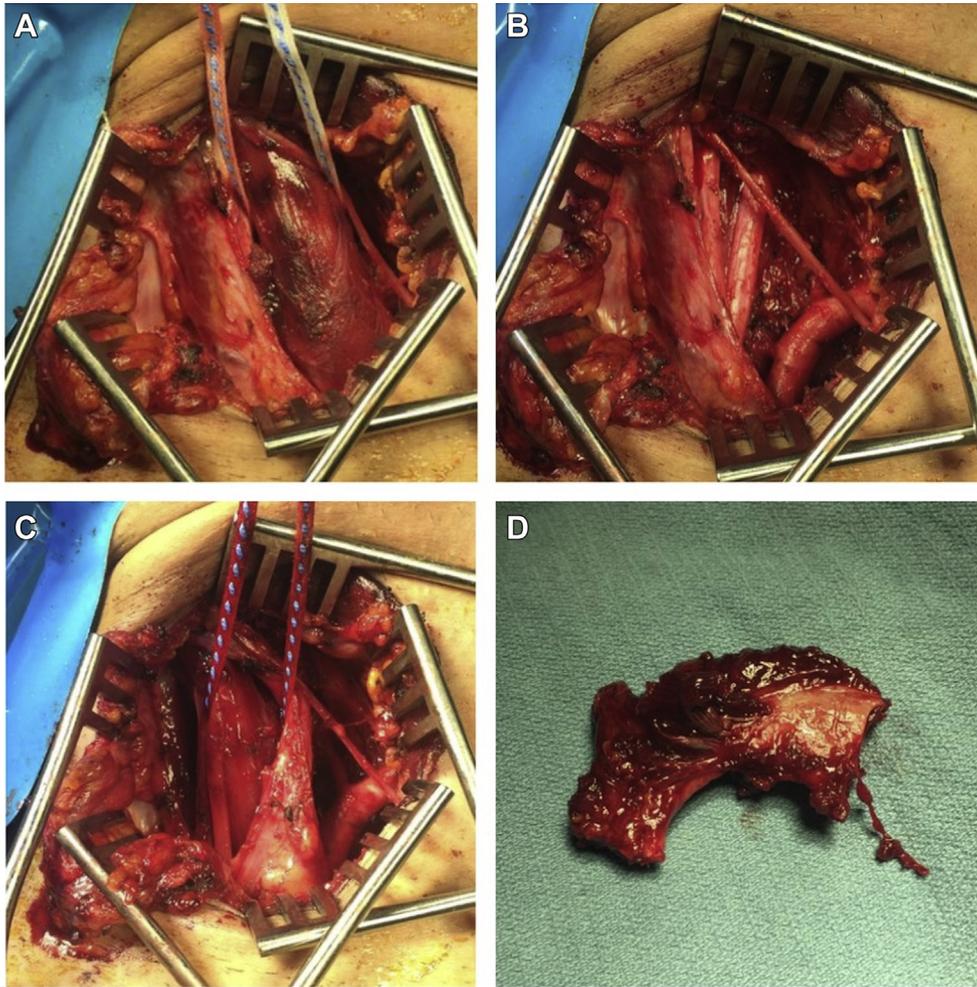
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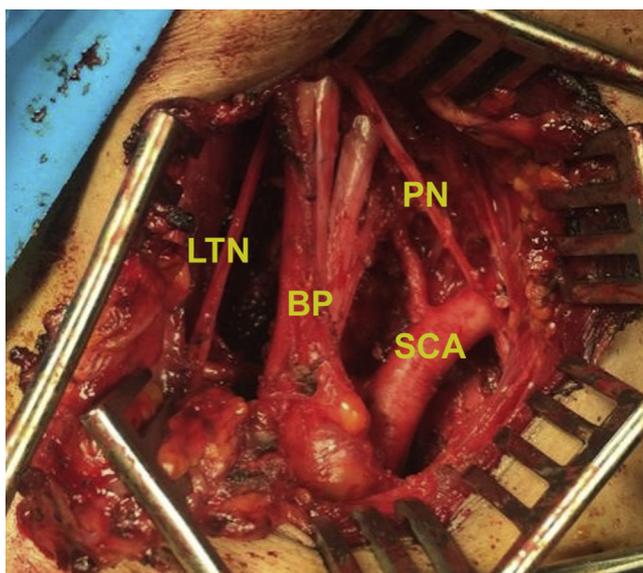
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**Fig 1.** Key steps in supraclavicular thoracic outlet decompression. **A,** Isolation of the anterior scalene muscle. **B,** Result after anterior scalenectomy. **C,** Isolation of the middle scalene muscle for middle scalenectomy. **D,** Resected first rib.



**Fig 2.** Final result with demonstration of the long thoracic nerve (LTN), brachial plexus (BP), subclavian artery (SCA), and phrenic nerve (PN).