

# Thoracic outlet syndrome

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**T**he thoracic outlet is bordered on two sides by the anterior and middle scalene muscles of the neck, which help move the head.<sup>1</sup> In most patients, the bottom of the outlet is formed by the first rib; however, some people have a naturally occurring extra bone at the top of the thorax, known as a cervical rib.<sup>1</sup>

The structures that pass through the thoracic outlet include the brachial plexus, which provides muscle control and sensation to the arm as well as blood supply to the shoulder and arm. The pain and discomfort of thoracic outlet syndrome (TOS) result when these structures are squeezed as they pass through the outlet.<sup>2</sup>

Common causes of TOS include the presence of a cervical rib or an extra band of tissue connecting the top rib and spine. Other causes include swelling after an injury, upper lung tumors, bone remodeling after a clavicle fracture, or poor posture, especially in patients with large amounts of breast tissue.<sup>3</sup> TOS tends to be more common in women than in men.

**Three types of TOS** Generally, TOS is unilateral.<sup>4</sup> Typical presentations include

- **Neurogenic TOS**, in which the lower portion of the brachial plexus is compressed.<sup>1</sup> Patients tend to report hand weakness and numbness in their ring and pinkie fingers.<sup>4</sup>
- **Arterial TOS**, resulting from compression of the subclavian artery.<sup>1</sup> The patient may report that one arm is more sensitive to cold temperatures than the other. The blood pressure in that arm may be lower than on the unaffected side.<sup>1,2</sup>
- **Disputed TOS** is a mixture of the first two. Cure rates are unfortunately worse with this third type.<sup>1</sup>

**Confirming the diagnosis** Several physical maneuvers (Adson's maneuver, Allen's test) may be performed in an attempt to recreate the discomfort.<sup>5</sup> These tests are sometimes positive for TOS in healthy patients, but they are very reliable when more than one of them successfully recreates the symptoms.<sup>6</sup>

A chest radiograph is helpful in determining whether an extra rib or a tumor is causing the compression. Many soft-tissue abnormalities, however, may not be visible on the film.<sup>3</sup> A nerve conduction study can help pinpoint the origin of the pain.<sup>7</sup> If initial tests are not diagnostic, MRI, CT, ultrasonography, or arteriography may be needed.<sup>3,8</sup>

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**Begin with conservative treatment** Interventions focus on controlling symptoms and preventing further damage to aggravated tissue. Treatments include physical therapy, surgical correction, or a combination of the two.

Most patients are treated conservatively at first,<sup>2</sup> with physical therapy and anti-inflammatory medications. In some studies, however, as few as 20% of patients achieved adequate relief with conservative management alone.<sup>9</sup>

Physical therapy may include a combination of stretching, strengthening, massage, ultrasound, electrical stimulation, and postural training.

**Surgery** Success rates after surgery range from 45% to more than 80%.<sup>8,9</sup> Patients may obtain relief from pain but may or may not regain full strength of the affected muscles.<sup>10</sup>

The most common surgical approach is transaxillary,<sup>8</sup> requiring a small incision under the arm. A cervical rib, if present, is detached and removed. If there is an extra band of tissue, it is divided in order to eliminate that possible irritant.<sup>8</sup>

Risks of transaxillary surgery include nerve damage to the shoulder, bleeding with the need for transfusion, and poor relief or worsening of symptoms.<sup>8</sup>

**The risk of doing nothing** If TOS remains untreated, progressive nerve and blood vessel damage could result in permanent loss of feeling throughout the arm, paralysis, or formation of blood clots. □

*For information that can be photocopied and handed to patients, please turn the page.*

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