SCIENTIFIC LETTER

# RIGHT THORACIC OUTLET SYNDROME DUE TO CERVICAL RIB AND SUBCLAVIAN ARTERY ANEURYSM REPAIR


## ABSTRACT

The term Thoracic Outlet Syndrome (TOS) was coined to describe a group of patients with compression of the subclavian vessels, artery or vein and the brachial plexus in the area of the thoracic outlet. TOS is responsible for 5 to 10% of painful symptoms in the upper limb.

A case of a 70-year-old female patient is described, who is admitted due to pain in the right upper limb of about 2 months of evolution, associated with paresthesia, coldness and weakness. Angiography shows aneurysm of the right subclavian artery and cervical rib present and fused to the first thoracic rib. In the surgical intervention, a supernumerary cervical rib resection and aneurysm repair with a PTFE prosthesis were performed.



***Keywords:*** *Cervical rib, aneurysm, subclavian artery*



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## INTRODUCTION

The Thoracic Operculum Syndrome (TOS) is responsible for 5 to 10% of painful symptoms in the upper limb. TOS affects 8% of the general population with a frequency of 3-80 cases per 1000 individuals and unknown incidence, involving patients with compression of the subclavian vessels (arteries or veins) and the brachial plexus in the thoracic outlet space[1,4].

This syndrome is more common in women than in men (a 3-4:1 ratio) and occurs more frequently in young adults in the 25 to 40 age range.

Neurogenic symptoms are the most usual, accounting for about 90-95% of all cases, followed by venous in 5-10% and arterial symptoms in approximately <1%.

The cervical rib is the most common cause, with an incidence of 0.2 to 1% of the population, 50 to 80% being bilateral and only 10 to 20% producing symptoms with a 2:1 ratio in women versus men.

There are 3 major etiological groups: bone anomalies, soft tissue anomalies and postural anomalies. Bony anomalies comprise cervical ribs, transverse mega process of C7, anomalies of the first rib, nonunion of the clavicle, hypertrophic callous of the clavicle or tumors; anomalies of soft tissues include cervical muscular hypertrophy (anterior scalene muscle, medium scalene, pectoralis minor and subclavian), fibrous bands (costocoracoid ligaments, costoclavicular membrane) or congenital muscular anomalies.

The TOS may have three different presentations. The first is neurogenic TOS (NTOS), which involves the neurological symptomatology of the syndrome, the second is the venous TOS (VTOS), which produces pure venous symptoms like thrombosis of the subclavian vein, and finally the arterial TOS (ATOS), an extremely rare form, that manifests itself with purely arterial symptomatology, secondary to arterial thrombosis or arterial aneurisms of the subclavian artery.

As for complementary studies: chest and cervical X-rays are used to rule out or confirm bone anomalies. Computarized axial tomography (CT) provides better anatomic information, particularly when bony etiology is suspected. Magnetic resonance (MRI) permits an adequate evaluation of soft tissues, most particularly of the brachial plexus. Arteriography has very limited value in these cases and must only be used when a patient presents symptoms and signs of ischemia and arterial insufficiency[1,2,5].

## CLINICAL CASE

We present the case of a female 70-year old patient admitted for pain in the upper right limb with an intensity score of 9/10, 2 months of evolution, associated with paresthesia, cold and weakness. The patient had no history of allergies or diseases and had been smoking 5 cigarettes a day for the last 20 years, was medicated with acenocumarol 1 mg/day and had been subjected to a thrombectomy of the upper right limb one month earlier.

An abnormal physical examination revealed: asymmetric thorax with right supraclavicular pulsatile mass measuring 3x4 cm. Positive Adson test. Positive Wright test. Axillary, humeral, radial and cubital pulse present and weak. Slow capillary filling and distal coldness of the right upper limb.

Angiotomography: aneurism of the right subclavian artery measuring 20 mm, with mural thrombus in the interior and cervical rib present fused to the first thoracic rib (Figure 1).

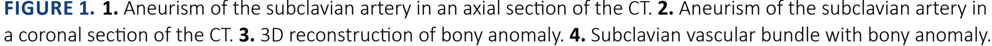


**FIGURE 1. 1.** Aneurism of the subclavian artery in an axial section of the CT. **2.** Aneurism of the subclavian artery in a coronal section of the CT. **3.** 3D reconstruction of bony anomaly. **4.** Subclavian vascular bundle with bony anomaly.

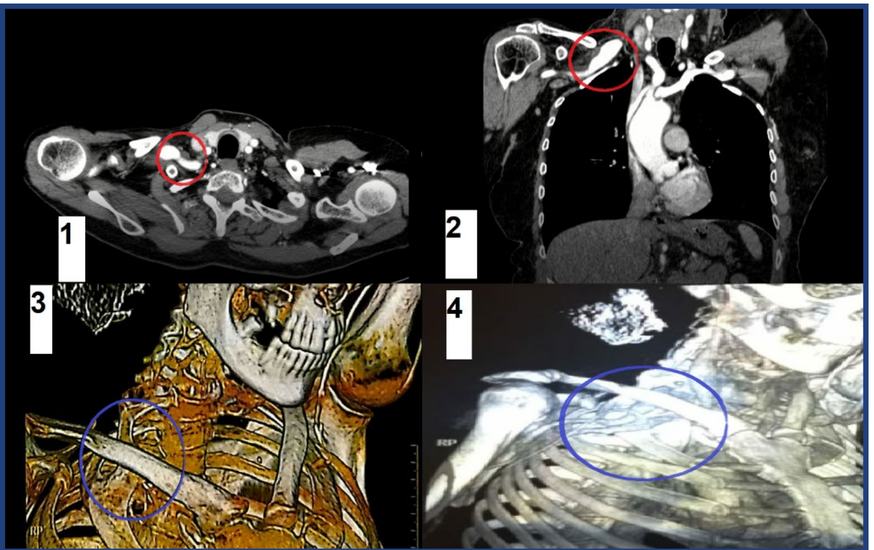
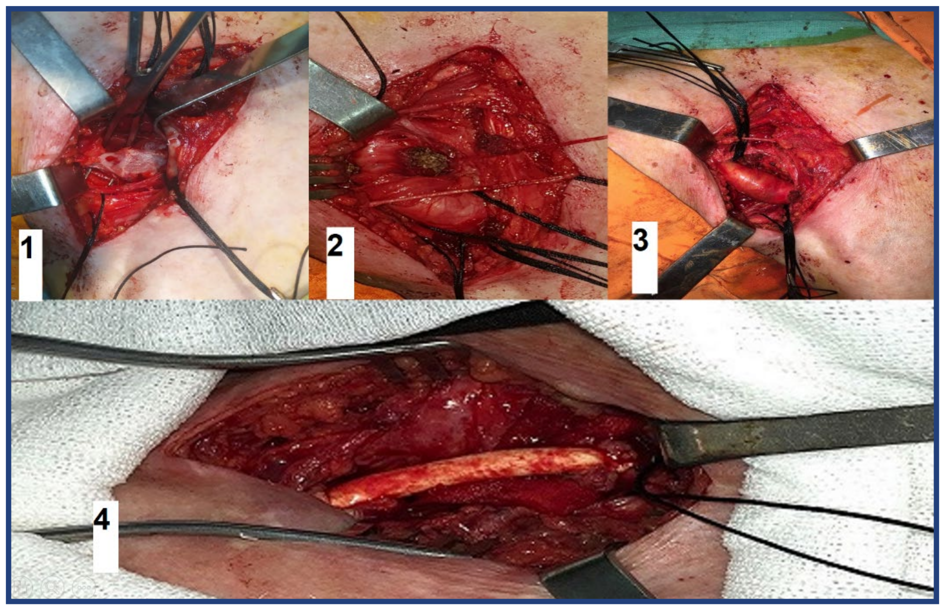


**FIGURE 2.** **1.** Cervical rib fused to the first rib. **2.** Scalene muscle section. **3.** Subclavian aneurism. **4.** Subclavian-axillary bypass with PTFE prosthesis.




Based on the patient´s prior signs and symptomatology, the surgical history and image studies, the condition was interpreted as TOS of vascular etiology. Surgical management was proposed for resolution of the condition prior optimization of the coagulation test and cardiovascular evaluation.

A supraclavicular approach was performed with repair of vascular and nervous structures, section of the scalene muscle, resection of the supernumerary cervical rib and repair of the posstenotic aneurism with PTFE prosthesis *(Figure 2)*.

On day 3 post-op the patient was discharged from hospital with preserved peripheral pulse, good mobility and nervous integrity of the upper limb with the required dose of antiaggregation medication. Follow-up continues in the outpatient thoracic and peripheral vascular surgery service.

## CONCLUSION

The treatment of TOS requires multidisciplinary management, focused on three main objectives: reduction of neurovascular compression, pain management, symptoms control and ultimately improving quality of life[3].

Several factors are taken into consideration to proceed with surgical treatment, including no response to conservative management for at least 3 months, motor-sensory involvement, vascular claudication, recognized anatomical anomaly and impairment of daily life activities.

Supraclavicular route is preferred as it permits to perform the resection of the first rib, apart from providing good access to vascular landmarks[6].

It should be noted that the symptomatology presented by this patient is the least frequently found.

**Conflicts of interest**
The authors have no disclosures to declare.

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