

## CONTINUING MEDICAL EDUCATION ΣΥΝΕΧΙΖΟΜΕΝΗ ΙΑΤΡΙΚΗ ΕΚΠΑΙΔΕΥΣΗ

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### Vascular Diseases Quiz – Case 24

A 39-year-old female was referred to our vascular division from the orthopedic department complaining for a persistent upper limb pain during the last three months. The patient started to complain of a tingling sensation and numbness on her right hand, especially while her shoulder was in an abducted position. Later she was dropping things from her right hand, while pain was more apparent after intense upper limb workload. After three months of medical treatment, including heavy doses of non-steroidal anti-inflammatory drugs (NSAIDs), and physical therapy without improvement of her symptoms, she visited our institution.

Physical examination showed no limitation of motion of the shoulder, elbow or hand. Neither deformities nor neuromuscular deficits were observed. In an abducted position the radial pulse disappeared and the patient experienced pain and tingling in the right hand. Signs and symptoms were relieved when the shoulder was brought back to neutral.

Antero-posterior and lateral radiographs of the upper extremities showed an additional cervical rib (fig. 1). Duplex color ultrasonography demonstrated a reduction in right subclavian artery blood flow when the shoulder was in 90 degrees of abduction compared to when the shoulder was in neutral position. Three-dimensional computed tomography (CT) angiography in dynamic phases showed right subclavian artery stenosis followed by a significant post-stenotic dilatation (fig. 2).



Figure 1



Figure 2

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**Quiz # 1:** What is the most probable diagnosis?

**Quiz # 2:** What is the optimal treatment for this patient's condition?

## Comment

Thoracic outlet syndrome (TOS) refers to a collection of disorders caused by extrinsic compression or entrapment of upper extremity neurovascular structures as they pass through the anatomic region commonly indicated as the thoracic outlet. There are three forms of TOS, based upon whether the brachial plexus roots (neurogenic TOS), the subclavian vein (venous TOS) or the artery (arterial TOS) is predominantly affected. Despite the fact that arterial TOS (TOS-A) is the least frequent (5% of all TOS cases), it is the most severe since damage to the arterial wall by repetitive local trauma may lead to a stenosis and or post-stenotic aneurysmatic dilation and eventually produce distal embolization and limb-threatening secondary ischemia. The most common etiology of TOS-A is the presence of abnormal bone structures most commonly cervical ribs, which are apparent in nearly two thirds of TOS-A cases.

Development of symptoms is most often due to severe stenosis or distal embolization of thrombus from a subclavian artery aneurysm. Patients with arterial TOS may present with a sudden onset of hand pain and weakness, numbness and tingling in the hand or fingers, cold and pale fingers, chronic arm fatigue with use or even non-healing wounds or ulcerations in the fingers.

The diagnosis is suspected by clinical findings and confirmed by imaging studies. The presence of Adson's sign (disappearance of radial pulse when raising the arm, with contralateral cervical rotation, hyperextension, and deep inhalation) is reported in 10–20% of the asymptomatic population. Computed tomography angiography and magnetic resonance angiography, especially with recently revised techniques and protocols, may help diagnose aneurysms or stenosis of the subclavian artery and identify the site and cause of arterial damage. Digital subtraction angiography has been considered the "gold standard" for the diagnosis of this entity, although the invasive nature of the procedure should be acknowledged. All of

the imaging studies should be performed with dynamic views, that is, with the affected arm placed above the head to assess for active compression of the subclavian artery in this position.

Treatment is warranted in asymptomatic TOS patients with a proven arterial lesion and in all symptomatic patients. Therapeutic strategy includes decompressing the TOS and repairing the arterial lesion. Decompressing involves resecting the first and or cervical rib and division of the anterior scalene muscle and the fibrous bands. Revascularization if needed usually concerns the accomplishment of a by-pass or an interposition graft, using the common carotid artery or the ipsilateral subclavian artery as the inflow vessel.

In our case after the surgical resection of the first rib, the patient was free of symptoms, had a full range of motion of the right shoulder with no evidence of arterial insufficiency one year after.

## References

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