

Transaxillary Approach for Thoracic Outlet Syndrome Case Report

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ABSTRACT

The brachial plexus and subclavian arteries are compressed when the thoracic outlet is expelled, resulting in the clinical disease known as Thoracic Outlet Syndrome (TOS). These disorders have various etiological causes, including cervical rib, and can damage the nervous system or blood vessels. The cervical rib, which develops from the seventh cervical vertebra and is thought to be abnormal, extra, or congenitally overdeveloped, is the main factor contributing to thoracic outlet syndrome (TOS). The transaxillary method developed by Roos, which is conservative and offers great exposure to the neurovascular structures with good aesthetic outcomes, is one of several surgical procedures employed for treating TOS. We present a case of a 43-year-old man with a cervical rib who complained of progressive pain and paresthesias in his left upper limb and presented to us in Ghurki Trust and Teaching Hospital Lahore . We removed the cervical rib and stented the Subclavian to the Brachial artery using a transaxillary approach.

Keywords: Cervical Ribs, Transaxillary approach, Thoracic outlet syndrome

INTRODUCTION

The primary neurovascular bundles that run from the thoracocervical area to the axilla are compressed in a condition known as thoracic outlet syndrome (TOS), which is an immobilization syndrome. The most frequent cause of TOS is a cervical rib or an abnormal first rib, which leads to neurogenic, venous, or arterial symptoms such as numbness, paresthesias, paralysis, and vasomotor abnormalities in the upper limb.

A cervical rib is an extra, abnormal rib that often develops at the seventh cervical vertebra (1). However, there is also a possibility that the 5th and 6th cervical vertebrae will form (2). The cervical vertebrae's elongation defines a cervical rib. It seems to be a partly or fully grown bone that extends anteriorly to the first thoracic rib they merge with (3). In 1869, Gruber was the first to characterize the cervical rib (4). He divided them into four categories: The first thoracic rib is not connected to the rib in type I, which extends past the transverse process of C7. Type I ribs extend up to the transverse process of C7. It extends beyond the transverse process in type III and is partially joined to the first rib by cartilage or fibrous bands; in type IV, it is entirely fused to the first rib by a bony pseudo-articulation. The majority of people with this illness are females (5). About 1% to 2% of the population has it (6). The term "thoracic outlet syndrome" (TOS) refers to a variety of clinical illnesses and syndromes caused by compression of the brachial plexus (neurogenic TOS), subclavian vein (venous TOS), and subclavian artery, the neurovascular systems that supply the upper extremities (arterial TOS).

The history, physical examination, and radiological testing diagnose TOS. Various provocative tests, such as those developed by Adson, Roos, and Wright, can replicate the symptoms. CT angiography can be diagnostic to determine the degree of vascular impairment, even though doppler ultrasonography assists in the early workup. The first course of treatment is conservative, and surgical intervention is only used in cases of acute vascular insufficiency, neurological dysfunction, or discomfort resistant to non-surgical treatments.

CASE REPORT

We describe a 43-year-old man who had left brachial and radial artery thrombolectomies in the past at Sheikh Zaid Hospital and who presented with complaints of worsening left upper limb discomfort and paresthesias during the preceding 12 months. The discomfort was slow in onset, subtle in severity, and was accompanied by claudication in the left hand and numbness.

Upon inspection, the left forearm's volar aspect revealed scarring from a prior surgical procedure (Figure 1). His left hand's palmar surface was chilly and pallid, and there were no radial or brachial pulses. Regarding neurological function, the left-hand grip

was typical relative to the right, with a power of 5/5 throughout all left forearm and hand muscle groups.

A neck X-ray revealed bilateral cervical ribs (Figure 2). The left brachial artery's proximal section was not opaque on a CT scan, and there was an abrupt cutoff of about 5-6 cm before the artery's bifurcation in the cubital fossa (Figure 3). The diseased portion was overall 9.2cm (Figure 4). The first and cervical ribs were fused, most likely causing subclavian artery compression (Figure 5). The forearm's distal flow, however, was via collaterals.

After that, the patient was informed of our plan to use the Transaxillary method to stent from the subclavian to the brachial artery with a Dacron bypass graft, and he gave his consent. Following surgery, the left hand's pallor lessened, it warmed up, and the capillary refill time was less than 3 seconds. The patient is fully symptom-free at six months' follow-up.(Figure 6)



Figure 1



Figure 2



Figure 3



Figure 4



Figure 5



Figure 6



Figure 7

Surgical Technique: The transaxillary technique was used to perform surgery on the research subject. An incision is made between the latissimus dorsi and pectoralis major muscles after the patient is positioned in a 45-degree posterolateral posture with their arm raised. The first rib was reached with an upward dissection after the incision had reached the third rib, which is located subcutaneously in the axillary fossa. The second rib's intercostal muscle and the anterior and medius scalenus muscles were lifted from the rib. The first rib was removed following the excision of the Scale muscles, fibrous ligaments, and Costa clavicular ligament, maintaining the T1 root outside the surgical region. The first rib was removed around the costal cartilage anteriorly and posteriorly transverse. The cervical rib underwent the same procedure. To look for any rips in the pleura. A radiographic examination of the cervical spine was performed during surgery to assess the first-rib stump. Some pictures to have good idea of approach attached.

DISCUSSION

Compression of neurovascular tissues at the superior aperture of the thorax is a clinical condition known as thoracic outlet syndrome (TOS) (7). The region known as the thoracic outlet extends from the fifth cervical nerve root cephalad level to the upper medial mediastinum, laterally from the outside border of the first rib (8). The stellate ganglion, subclavian artery and vein, thoracic duct, scalene lymph nodes, and the apex of the lung are just a few of the body parts located in this anatomic space. Other body parts include the middle and anterior scalene muscles, long thoracic and phrenic nerves, five primary nerves, and three trunks that make up the brachial plexus, suprascapular, and dorsal. Numerous surgical techniques have been employed to treat TOS. However, it was discovered in the 20th century that the first rib plays a significant role in the neurovascular compression in TOS. Ross started the procedure to remove the first rib using the transaxillary technique. These days, it is thought that this operational strategy is a commonly employed technique.

An additional rib that develops above the first rib is called a cervical rib. Hox gene mutations are to blame for the emergence of cervical ribs (9). Galen and Vesalius provided a detailed description of the cervical rib for the first time (10). Although cervical ribs are often located on the left side of the body, the right side is utilized more frequently; hence the symptom first appeared there (10, 11). The left side likewise showed signs of development earlier in our case study. The symptoms affect women more commonly than men do. Todd notes in his study that increased chest mobility in women is one determinant for developing cervical ribs (10). It is also said that abnormalities are more common in women (12). When patients are encouraged to get a chest or neck X-ray for another reason, it is typically asymptomatic and only becomes apparent. Both vascular and neurogenic symptoms are present in symptomatic individuals (10). In addition to the discomfort that radiates into the hand and paresthesias, neurogenic symptoms can include weakness and deterioration of

the muscles on the afflicted side (limb and hand). Coldness, swelling, and bluish discoloration of the limb are all vascular signs. An uncommon complication known as cerebral embolus is brought on by the compression of the subclavian artery, which causes backward flow. These signs and symptoms may also be present in cervical stenosis and spondylosis, which may need unneeded surgery on the cervical spine. Excision of the cervical rib is seen in excruciating pain, muscular weakness, and vascular symptoms (10).

CONCLUSION

A transaxillary technique to cervical rib excision is safe and allows for a thorough evaluation of the thoracic inlet, particularly the cervical rib, with little danger to the nearby neurovascular systems. The patient can carry out everyday tasks independently with better long-term results and fewer problems.

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