Abstract

The cervical rib is surgically important than being just anatomical curiosity alone. The distal parts of costal processes in seventh cervical vertebra occasionally develop as cervical rib. A 32 years old female patient who attended the vascular surgical department presented with features of cervical rib on the left side. Imaging procedures confirmed bilateral cervical rib for which the patient underwent surgery. The cervical rib can cause thoracic outlet syndrome with features of acute arterial occlusion in upper limb. This case is reported to stress the important complications due to the cervical rib.

Key words: Thoracic outlet, Thoracic outlet syndrome, bilateral.

Introduction

Cervical rib is a congenital bony abnormality in which an extra rib is present superior to first rib and is attached to C7 vertebra. As a result of this extra rib, displacement of great vessels that cross the thoracic outlet and proceed into the neck can occur causing thoracic outlet syndrome. According to literature, the cervical ribs are found in less than 1% of normal population and have been reported in 5-9% of patients with thoracic outlet obstruction\(^1\),\(^2\). Cervical ribs may be complete or incomplete in association with fibrous bands. Complete cervical ribs are fused with a tubercle located on the upper aspect of 1st thoracic rib. This fusion point is usually adjacent to the site of the insertion of scalenus anterior muscle\(^3\),\(^4\).

Thoracic outlet is an opening bordered by 1st Rib laterally, Body of T1 Thoracic vertebra posteriorly, claviculomanubrial complex anteriorly\(^5\). Thoracic outlet syndrome is due to compression of neuro vascular structures at root of neck producing irritation of brachial plexus elements, most commonly against subclavian vessels in their passage from cervical area towards axilla.

Constitutional factors like cervical rib, fibrous bands can cause thoracic outlet syndrome producing pain, numbness, tingling or weakness in the arm and hand due to pressure against nerves or blood vessels. In this case report, the effect of vascular compression as a result of cervical rib and its treatment are discussed.

Embryology

The distal parts of costal processes in seventh cervical vertebra which do not develop normally occasionally develop into cervical rib. The costal element of the seventh cervical vertebra may be a mere epiphysis on its transverse process but more often has a head, neck and tubercle with or without a shaft extends into the posterior triangle of neck where it may end freely or join the first rib or first costal cartilage or even the sternum and may be partly fibrous or osseous\(^6\).

Case report

A 32 year old female patient who attended the vascular surgical department had complaints of pain and coldness of left upper limb for about 2 months duration, with swelling in left supraclavicular region of 15 days duration. Plain Radiographical picture was taken which showed bilateral cervical rib (Fig.1). Doppler study was done which showed absence of brachial artery, radial and ulnar artery pulsations on left side. Right side it was normal. Contrast angiography was taken which showed bilateral cervical rib (Fig.1). Doppler study was done which showed absence of brachial artery, radial and ulnar artery pulsations on left side. Right side it was normal. Contrast angiography was done which showed bilateral cervical rib, and left subclavian artery stenosis with post stenotic aneurysm [dilatation] (Fig.2) for which left sided trans brachial embolectomy was done. Cervical rib was removed on left side (Fig. 3). Post operatively pulsations returned in left side upper limb arteries. Patient was advised to have periodic follow up and instruction was given to report...
immediately when she had any complaints on right side. Fig. 4a shows the radiological appearance of bilateral cervical rib preoperatively. Fig 4b shows the postoperative radiological appearance of cervical rib on right side only, as the cervical rib was removed on left side.

Discussion

The Earliest case of vascular complication of a cervical rib explored at operation was published by Coote in 1861. Russell stated that anatomically, cervical ribs may be divided into four broad groups; Those with enlarged transverse processes; bilateral ribs either floating or articulating; unilateral ribs, either floating or articulating; rudimentary rib tips either single or bilateral. McGowan stated that the longer the rib the greater the possibility of costoclavicular compression. Ribs four cm or more are liable to be symptomatic. The more laterally placed the tip of the rib the more liable is to produce symptoms. Ribs which extend six cm or more lateral to the center of the spine were found to be symptomatic. Murphy stated that dilatation of the artery was due to obstruction of the lumen as it passed between scalenus anterior muscle and cervical rib. In 1916, Halstead reported 716 cases of cervical ribs recorded in the literature. He was interested in aneurysms or dilatation associated with cervical ribs, and is found in 27 such
instances. Arteries compressed by the cervical rib or scalenus muscle have shown dramatic restoration to its original size after its removal. There have been only a few cases of complete obliteration of subclavian artery. One such case was reported by Oljenick and Lindskog and Howes. Leriche believed in the nervous origin of vascular phenomena, and recognized the aneurysmal dilatation of subclavian artery. He suggested that the sympathetic fibres in the wall of the subclavian artery were irritated by chronic fibrosis around the artery overlying the cervical rib, this led to the vascular changes transmitted by fibres in the perivascular plexus to the arm. Thromboembolism may originate from the damaged vessel wall or aneurysm.

Cerebral embolus is a rare but recognized manifestation of the thoracic outlet syndrome and has been associated with occlusion of subclavian artery with retrograde flow. Todd expressed that a nervous origin of vascular changes in the hands is due to paralysis of sympathetic fibres passing in brachial plexus. Molina stated that in clinically diagnosed neurogenic arterial thoracic outlet syndrome, 51% of cases are due to arterial compression at thoracic outlet. The only reliable non-invasive test to assess for subclavian artery compression is duplex Doppler ultrasonogram. When it shows anatomical abnormalities of the vessel, “arteriogram” is indicated. If there is any suspicion of arterial disease namely aneurysm formation or intrinsic deformity of vessel wall contrast angiogram is usually preferred. It is not uncommon for woman to present with symptoms of thoracic outlet obstruction as they approach middle age. Thoracic outlet syndrome is the most common cause of acute arterial occlusion in upper limb of adults younger than forty years, common in occupation that involve prolonged positioning of neck such as cashiers, secretaries, surgeons and truck drivers. Cervical ribs occurred twice as often in women (66.7%) than men (33%) as in prior studies. Unusual case of iatrogenic hemorrhage during tracheostomy with right subclavian artery had been displaced by a cervical rib had been reported. Bilateral cervical rib was present in 47.2% of cases.

The initial treatment of “arterial thoracic outlet syndrome” is focused on revascularization in order to remedy acute ischaemia. This step is typically performed via brachial artery “thromboembolectomy.” Demonstration of a “fixed arterial lesion” either occlusive or aneurysmal in nature is an indication for surgical reconstruction. As these lesions are secondary to extrinsic compression surgical resection of the causative factor is indicated. The above case was reported to stress the important complications due to a cervical rib.

References
Cervical rib - Lokanayaki