The Professional Medical Journal
www.theprofesional.com

DOI: 10.29309/TPMJ/18.4386

ORIGINAL PROF-4386

THORACIC OUTLET SYNDROME;
MANAGEMENT AND DIAGNOSIS OF PATIENTS–TRUE PICTURE

Khadija Iqbal[1], Aisha Asim[2], Ibad-ur-Rehman[3], Samra Asif[4]

1. M.B.B.S, FCPS (Anatomy)
   Professor
   Anatomy
   Al Nafees Medical College
   Isra University.
2. FCPS Diagnostic Radiology
   Assistant Professor
   Department of Radiology
   Al Nafees Medical College
   Isra University.
3. Second Year M.B.B.S Student
   Shifa College of Medicine
   Islamabad.
4. 4th Year B.D.S Student
   Margalla Institute of Health Sciences
   UHS Lahore.

Correspondence Address:
Dr. Khadija Iqbal
P1024 Asghar Mall Road, Rawalpindi.
Khadijaiqbal1972@gmail.com

Article received on:
05/10/2017
Accepted for publication:
30/12/2017
Received after proof reading:
28/02/2018

ABSTRACT... Introduction: Thoracic outlet syndrome represents a variety of symptoms ranging from neurogenic to vascular. The thoracic outlet syndrome considered as a disputed disorder and management and diagnosis need special attention. **Objective:** The present study was done with the objective was to observe association of thoracic outlet syndrome with cervical rib and the treatment and diagnosis options given to the patients once they present in the OPD. **Study Design:** Observational. **Sampling:** Convenience. **Duration:** January 2015-2017 January. **Materials and methods:** In this study the cervical rib was present in 3 males out of 58 cases. In females 8 had cervical rib out of 150 cases. **Results:** Out of eleven patients only six were advised surgical excision to relieve symptoms of thoracic outlet syndrome. Analgesics were also prescribed to all patients. The second category who did not have cervical rib nerve conduction studies were advised to only 12 males and 10 females. In our study patients presenting with numbness or and any vascular complaint only 11 cases had cervical rib. The treatment advised for relieving symptoms was surgical in only six patients and analgesics in all cases. The treatment for patients without cervical rib was analgesics and nerve conduction was advised only in 22 patients. **Conclusion:** The diagnosis and management of TOS is a combination of neurophysiological testing and clinical examination outcomes. The use of advanced techniques can lead to better patient management in our hospitals.

Key words: Thoracic outlet syndrome, cervical rib, anaegesics, numbness, nerve conduction

Article Citation: Iqbal K, Asim A, Ibad-ur-Rehman, Asif S. Thoracic outlet syndrome; management and diagnosis of patients–true picture. Professional Med J 2018;25(3):350-354. **DOI:**10.29309/TPMJ/18.4386

INTRODUCTION

Thoracic outlet syndrome represents a variety of symptoms ranging from neurogenic to vascular.[1] Compression of neurovascular structures in interscalene triangle is the most known cause but it is a disputed definition and venous causes are also included now.[2] Diagnosing and managing TOS can be challenging because the symptoms vary greatly amongst patients with the disorder.[3] Many studies show a dispute in diagnosis of the syndrome as whether the predominant type is neurogenic or vascular. Also the referral of the patients to the neurosurgeon, general surgeons or medical specialist is still controversial.[4,5]

In Pakistan this syndrome is increasing. Mostly women present with complaints and the syndrome is also common in females in western population.[6] Most women present with numbness in upper limb or with pain n hand muscles.[7] Some may present with neck pain. These sympto[12] ms become worse on doing physical activities.[8] Some may complain of pain radiating in the submandibular region and heaviness in the shoulder region.[9] The commonest cause associated with thoracic outlet syndrome in our country is cervical rib. Cervical rib is a common congenital condition.[10] A cervical rib usually takes origin from the anterior tubercle of the transverse process of the seventh cervical vertebra. It may have a free anterior end, may be connected to the first rib by a fibrous band, or may articulate with the first rib. There are several presentations of the cervical rib.[11] It can be a floating rib, connected to first rib through a fibrous tissue or it may form a joint with first rib.It is most commonly on the right side but can be present on the left side. Sometimes it occurs bilaterally. It remains unnoticed in some individuals butit can

cause pressure on the lower trunk of the brachial plexus in some patients, producing numbness down the medial side of the forearm and hand13. In extreme cases wasting of the small muscles of the hand is reported. It can also compress subclavian artery and interfere with the circulation of arm and forearm.[14]

The neurovascular bundle may be compressed at costoclavicular space, interscalene triangle, and insertion of the pectoralis minor into the coracoid process.[15] The involvement of nerves is reported more frequently as compared to vascular and vinous involvement.[16] The rare presentations which might be fatal are cerebral infarcts and myocardial infarctions due to the occlusion of subclavian artery. Transient ischemic attacks also occur and serve to diagnose the cervical rib for the first time.[17]

A chest X-ray and X-ray of neck can help to diagnose thoracic outlet syndrome. A thorough neurological examination and history is required to diagnose the thoracic outlet syndrome. Other tests including an MRI scan or CT scan.[4] Special tests called nerve conduction studies may sometimes be suggested.[7] In our country the surgical options used to relieve the symptoms associated with TOS are minimal The thoracic outlet syndrome considered as a disputed disorder and management and diagnosis need special attention. The present study was done with the objective was to observe association of thoracic outlet syndrome with cervical rib and the treatment and diagnosis options given to the patients once they present in the OPD.

MATERIALS AND METHOD

This observational study was done in private radiology clinics of Rawalpindi and Islamabad. Patients who were referred by the doctors with complaint of numbness upper limb coming to their clinics for X-RAY chest were included in the study. The patients with severe thoracic trauma were excluded from the study. These X-Rays were consulted with a radiologist to detect cervical rib. The duration of study was from January 2015-2017 January. The patients of any gender and age groups from 12 to fort years were included in the study. Sampling was convenience sampling. The sample size was 208 patients. The contact numbers of patients were taken. They were contacted when they again visited their doctors and interviewed about the treatment prescribed to them.

RESULTS

The study comprised 208 patients. 150 were female and 58 were male patients. The overall mean age was 20.9± 5.1 years. In this study the cervical rib was present in 3 males out of 58 cases (Fgure-1). In females 8 had cervical rib out of 150cases (Fgure-2). Out of eleven patients only six were advised surgical excision to relieve symptoms of thoracic outlet syndrome. Analgesics were also prescribed to all patients. The second category who did not have cervical rib nerve conduction studies were advised to only 12 males and 10 females (Table-I).

Gender	Cervical rib	Complaints	Treatment advised to those who had cervical rib		Treatment advised to those who did not have cervical rib	
		numbness down the medial side of the forearm and hand	Surgical excision of first rib N=11	analgesics	Analgesics/anxiolytics N=198	nerve conduction studies
Male (58)	3	50	3	3	50	12
Female(150)	8	150	3	8	150	10

Table-I. Cervical rib and associated symptoms

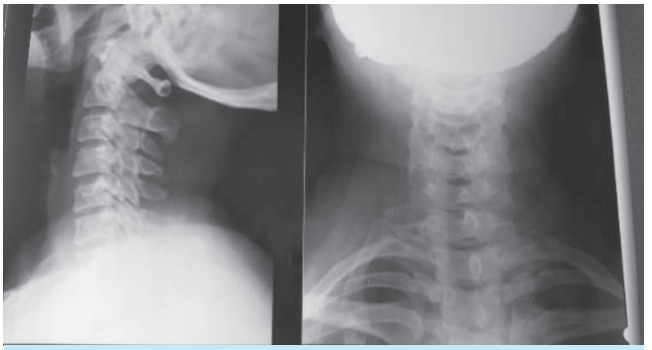

Figure-1. Right cervical rib

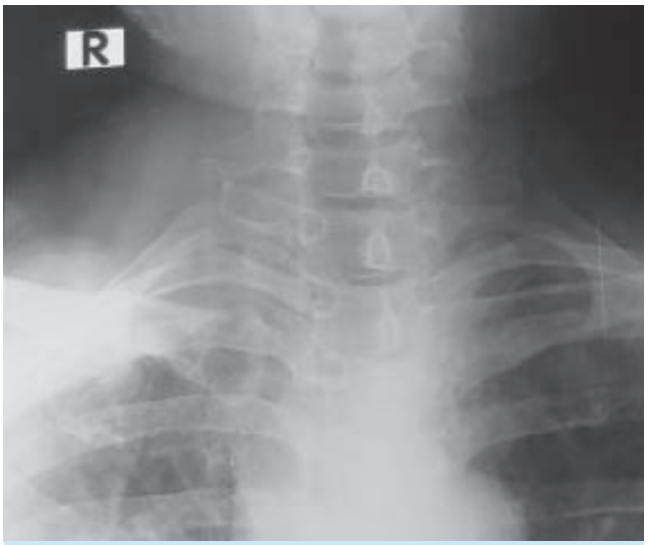

Figure-2. Bilateral rudimentary cervical rib

DISCUSSION

Thoracic outlet syndrome may not present with all its components in one patient. These symptoms require a careful and detailed medical history and physical examination are the most important diagnostic tools for proper identification of TOS. Electromyography, nerve conduction studies, and imaging of the cervical spine and the chest also can provide helpful information regarding diagnosis.[18] Some might have vascular complaints and sometimes the neurogenic components may predominate.[19] The literature shows the cause of these symptoms to be cervical rib, cervical disc protrusion, disc prolapse, Fracture of the clavicle can cause compression by bone fragments, excessive callus, inflammatory disease including rheumatoid arthritis, fibromyalgia and disorders of posture such as kyphosis and scoliosis.[20,21,22] The literature also shows that the commonest cause might be cervical rib. So it is customary to advisechest X-RAY to every patient with pain and numbness to rule out the cause. The management of thoracic outlet syndrome is overlooked in our country. Mostly the symptoms are labelled as psychological or emotional andanalgesics or anxiolytics are prescribed. In our study patients presenting with numbness or and any vascular complaint only 11 cases had cervical rib (Table-I). The treatment advised for relieving symptoms was surgical in only six patients and anaelgesics in all cases. The treatment for patients without cervical rib was analgesics and nerve conduction was advised only in 22 patients.

Diagnosis and management options are limited in Pakistan. The extensive surgical procedures, failure rate and cost of operation might be a cause. But mostly the doctor's do not perform thorough clinical examination to rule out other causes. The conservative management like analgesics prescription is practiced all over the country. In our study the analgesics were prescribed to almost every patient. Prescribing analgesics in cases where no abnormality is detected on X-RAY is justified but in cases diagnosed with cervical rib the best option should have been surgical. Management of TOS with cervical rib is surgical in most parts of the world. While diagnosing cervical rib other associated anomalies have also been discovered. Bifid rib is seen in 1% of the population, more commonly in females, and occurs more frequently on the right side than on the left.[22] Hypo plastic (short) and defective (interruption) ribs are one of the least common structural congenital abnormalities of the ribs.[23] Sternal variations and anomalies like suprasternal bone, suprasternal tubercle, complete manubriosternal fusion, complete steno xiphoidal fusion and double-ended xiphoid process have been also reported in literature.[24,25] Surgical corrections have also been reported in previous literature. In one study it was seen that in only six patients were advised surgical treatment. Literature reports that in west during the last five years, more than fifty operations were performed for abnormal ribs that produced symptoms of TOS.[26] Neurogenic TOS was relieved in most of thecases through surgical interventions. Indications for surgery were disabling pain

and paraesthesia and failure to respond to conservative treatment.[27] Different approaches have also beendiscovered. These include middles calenectomy, transaxillary first rib resection, and combined supraclavicular scalenectomy and first rib resection.[28] Complete resection of the first rib and the most careful removal of all fibro-muscular structures affecting the artery, vein and brachial plexus are of importance to the result of the operation.[29,30]

In our study nerve conduction studies were also advised in only 22 of the cases (Table-I). Role of nerve conduction studies is important not only to 22 of the cases. Many studies show that the nerve conduction studies are of help to diagnose other nerve associated problem like carpal tunnel syndrome and ulnar nerve entrapment.[31] Diabetic neuropathies can also be ruled out through the nerve conduction studies.[32] Using surgical approach the symptoms are relieved ad feedback of patients is good.[29] In our country Doppler ultrasound and angiography which are best for diagnosing arterial TOS do not have a place in diagnosis.[4]

CONCLUSION

The diagnosis and management of TOS is a combination of neurophysiological testing and clinical examination outcomes. The use of advanced techniques can lead to better patient management in our hospitals.

REFERENCES

1. KoknelTalu G. **Thoracic outlet syndrome.** Agri. 2005; 17:5–9.
2. Campbell WW, Landau ME. **Controversial entrapment neuropathies.** Neurosurg Clin N Am.2008; 19:597–608, using neurogenic thoracic outlet syndrome. J Vasc Surg 2002; 36: 51-6.
3. Samarasam I, Sadhu D, Agarwal S, Nayak S. **Surgical management of thoracic outlet syndrome: a 10-year experience.** ANZ J Surg. 2004; 74:450–4.
4. Sanders RJ, Hammond SL, Rao NM. **Diagnosis of thoracic outlet syndrome.** J Vasc Surg. 2007; 46:601–4.
5. Pollack EW. **Surgical anatomy of the thoracic outlet syndrome.** Surg Gynecol Obstet. 1980; 150:97–103.
6. Khan A, Rattihalli RR, Hussain N. **Bilateral thoracic outlet syndrome: An uncommon presentation of a rare condition in children.** Ann Indian Acad Neurol. 2012 Oct 15(4):323-5. doi: 10.4103/0972-2327.104349.
7. Hooper TL, Denton J, Mc Galliard MK, et al; **Thoracic outlet syndrome: a controversial clinical condition. Part 1: anatomy, and clinical examination/diagnosis.** J Man ManipTher. 2010 Jun 18(2):74-83.
8. Demondion X, Herbinet P, van Sint Jan S, Boutry N, Chantelot C, Cotten A. **Imaging assessment of thoracic outlet syndrome.** Radiographics. 2006; 26:1735–50.
9. Sheth RN, Belzberg AJ. **Diagnosis and treatment of thoracic outlet syndrome.** Neurosurg Clin N Am. 2001 Apr; 12(2):295-30.
10. Sanders RJ, Hammond SL. **Management of cervical ribs and anomalous first ribs.**
11. Sanders RJ, Hammond SL. **Management of cervical ribs and anomalous first ribs causing neurogenic thoracic outlet syndrome.** JVasc Surg. 2002 Jul; 36(1):51.
12. Chang KZ, Likes K, Davis K, Demos J, Freischlag JA. **The significance of cervical ribs in thoracic outlet syndrome.** JVasc Surg. 2013; 57(3):771.
13. Wise R. **Seventh cervical rib associated with subclavian artery occlusion and multiple infarcts: case report.** J Neurosci Nurs. 2008; 40(3):169-72.
14. Morbidelli A, Miani S, Bortolani E. **Complete cervical rib. Possible neurovascular implications of the upper limb].** Minerva Chir. 1989: 15; 44(7):1167-72.
15. Merks JHM, Smets AM, Van Rijn RR, Kobes JCHN, Maas M, Hennekam RC. **Prevalence of rib anomalies in normal Caucasian children and childhood cancer patients.** Eur J Med Gen 2005; 48:113-29.
16. Plaza Aulestia N, Rodríguez Montero S, Velloso Feijoo ML. **Double cervical rib: A case report.** Reumatol Clin. 2017 Jul 31. pii: S1699-258X(17)30175-4.
17. Viertel VG, Intrapiromkul J, Maluf F, Patel NV, Zheng W, Alluwaimi F, et al. **Cervical ribs: a common variant overlooked in CT imaging.** AJNR Am J Neuroradiol 2012; 33:2191-2194.
18. Nord KM, Kapoor P, Fisher J. **False positive rate of thoracic outlet syndrome diagnostic maneuvers.** Electromyogr Clin Neurophysiol. 2008 Mar 48(2):67-74.
19. Roos DB. **Historical perspectives and anatomic considerations. Thoracic outlet syndrome.** Semin

Thorac Cardiovasc Surg. 1996 Apr; 8(2):183-9.

20. Sizer PS Jr1, Phelps V, Brismee JM. **Differential diagnosis of local cervical syndrome versus cervical brachial syndrome.** Pain Pract. 2001 Jan; 1(1):21-35.

21. Klaassen Z, Sorenson E, Tubbs RS. **Thoracic outlet syndrome: a neurological and vascular disorder.** Clin Anat. 2014 Jul; 27(5):724-32.

22. Song WC, Kim SH, Park DK, Koh KS. **Bifid rib: anatomical considerations in three cases.** Yonsei Med J 2009; 50: 300-3.

23. Verna E, Piercecchi-Marti MD, Chaumoitre K, Bartoli C, Leonetti G, Adalian P **Discrete traits of the sternum and ribs: a useful contribution to identification in forensic anthropology and medicine.** J Forensic Sci. 2013 May; 58(3):571-7.

24. El-Busaid H, Kaisha W, Hassanali J, Hassan S, Ogeng'o J, Mandela P. **Sternal foramina and variant xiphoid morphology in a Kenyan population.** FoliaMorphol (Warsz). 2012 Feb; 71(1):19-2.

25. Yekeler E, Tunaci M, Tunaci A, Dursun M, AcunasG. **Frequency of sternal variations and anomalies evaluated by MDCT.** AJR Am J Roentgenol. 2006 Apr; 186(4):956-60.

26. GockelM. **Operative treatment of thoracic outlet syndrome in Finland.** Ann ChirGynaecol. 1996; 85(1):59-61.

27. Degeorges R, Reynaud C, Becquemin JP. **Thoracic outlet syndrome surgery: long-term functional results.** Ann Vasc Surg. 2004 Sep; 18(5):558-65.

28. Sanders RJ, Hammond SL. **Supraclavicular total scalenectomy with or without first rib resection: technic and results.** Handchir Mikrochir Plast Chir. 2006 Feb; 38(1):29-3.

29. Sanders RJ, Hammond SL. **Supraclavicular first rib resection and total scalenectomy: technique and results.** HandClin. 2004 Feb; 20(1):61-70.

30. Atasoy E **Combined surgical treatment of thoracic outlet syndrome: transaxillary first rib resection and transcervicalscalenectomy. Hand Clin.** 2004 Feb; 20(1):71-82.

31. Belmin J, Valensi P. **Diabetic neuropathy in elderly patients. What can be done?** Drugs Aging. 1996 Jun; 8(6):416-2.

32. Rota E, Morelli N. **Entrapment neuropathies in diabetes mellitus.** World J Diabetes. 2016 Sep 15; 7(17):342-53.

AUTHORSHIP AND CONTRIBUTION DECLARATION

Sr. #	Author-s Full Name	Contribution to the paper	Author=s Signature
1	Khadija Iqbal	Introduction, Materials and methods.	
2	Aisha Asim	X-ray Diagnosis, Discussion.	
3	Ibad-ur-Rehman	Data collection	
4	Samra Asif	Data collection	