

ORIGINAL ARTICLE

**THORACIC OUTLET SYNDROME: MANAGEMENT AND
OUTCOME**

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ABSTRACT

Objective:

To evaluate the results of cervical rib excision or scalenotomy to relieve the symptoms of thoracic outlet syndrome without excision of the first rib through supraclavicular surgical approach.

Design:

Retrospective observational descriptive study.

Place and duration:

Department of Thoracic Surgery Postgraduate Medical Institute, Govt: Lady Reading Hospital Peshawar from July 2003 to June 2007.

Material and Methods:

Detail scrutiny of the clinical record of patients who underwent cervical rib excision or scalenotomy through supraclavicular approach was carried out. The results of the procedure were analyzed in terms of clinical improvement in the symptoms of TOS. Negativity of the clinical tests were noted which were positive pre operatively. The usefulness of the supraclavicular approach for the excision of cervical rib or scalenotomy without excision of the first rib was also noted.

Results:

A total of 30 patients underwent the procedure during the last 4 years. 19(63.3%) patients underwent cervical rib excision and 11(36.6%) patients had scalenotomy. The minimum follow up was 6 month. At 3 months follow up, 21(70%) of patients had complete resolution of the symptoms with return to normal routine work. 5(16.6%) patients had moderate improvement in their symptoms with more decrease in pain and need for medication. One patient had little improvement. At 6 months follow up no recurrence of symptoms had occurred. 3 patients lost to follow up including one with bilateral disease. 3(10%) post operative complications occurred. One had haematoma in the wound which responded to local drainage while 2 patients had minor wound infections which were treated conservatively. There was no mortality.

Conclusion:

Cervical rib excision or scalenotomy is sufficient to relieve the symptoms of TOS without excision of the first rib. Supraclavicular incision is an easy and appropriate approach to excision of cervical rib or scalenotomy.

Key words:

Thoracic outlet syndrome, Cervical rib, scalenotomy, supra clavicular approach

Introduction:

Thoracic outlet syndrome (TOS) is a clinical condition which results from compression of the lower roots of brachial plexus and/or the subclavian vessels. Its true incidence is not known, but has been suggested as occurring in less than 1% of population¹. The neurological symptoms are more common than the vascular symptoms. They occur in about 90% of cases^{2, 3, 4}. The vascular symptoms usually consist of hand ischemia, transient ischemic attacks, and hand edema during arm hyper abduction and arm claudication⁵. The neurological symptoms includes pain and paraesthesia which occurs in 95 % of cases while the remaining 10% have motor weakness or atrophy of the hypothenar and interosseous muscles on the ulnar side of the hand⁶. There may also be tenderness in the supraclavicular fossa in some of the cases⁷. The diagnosis of TOS is usually clinical and is supported by radiography to reveal cervical rib or anomalous first rib. The vascular sequelae are supported by angiography, venography or vascular ultrasonography⁸. The surgical decompression of TOS is achieved by resection of the cervical rib, if present, resection of the first rib or by scalenotomy through supraclavicular approach^{3, 9}, or through transaxillary approach¹⁰. Supraclavicular approach provides an easy access to the cervical rib excision, scalenotomy or excision of any bony prominence causing TOS and for microsurgical neurovascular decompression without first rib resection^{11, 12, 13}. This study reviewed the outcome of cervical rib excision or scalenotomy without the excision of first rib and the supraclavicular approach to relieve the symptoms of TOS over a period of 4 years.

Material and Methods:

This is a retrospective analysis carried out in the department of thoracic surgery Postgraduate Medical Institute, Lady Reading Hospital Peshawar. Patients were operated for the symptoms of TOS between July 2003 and June 2007. Clinical details of 30 patients who underwent surgery through supraclavicular approach for the excision of cervical rib or scalenotomy were studied. The variables included were age, sex, side involved, duration of symptoms, predominant and associated symptoms, procedure performed and their outcome at follow up were all recorded in the data base.

Symptoms were classified as neurological, vascular or combination of these. The diagnosis of TOS was based upon the clinical symptoms including tender supraclavicular fossa along with radiological findings. The clinical tests included Adson test, arm claudication test and costoclavicular test. Clinical symptoms with any one of the test as positive were taken as diagnostic of TOS and included in the study. Patients with negative diagnostic test and those with peripheral nerve injuries were excluded from the study.

The operative procedure consisted of supraclavicular approach in all patients and excision of cervical rib, if present or scalenotomy if no rib was found or scalenous anterior found having fibrous band.

Results:

Out of total 30 patients, 22(73.3%) were females and 8(26.7%) males. Age ranged from 22 years to 49 years with mean age of 33.2 years. 16(53.3) patients had right side involved while 11(36.7%) patients had left side involvement while 3(10%) had bilateral involvement. Duration of symptoms ranged from 2 years to 15 years with mean duration of symptoms of 4.2 years (table no 1). 22(73.3%) patients had predominantly neurological symptoms, 3(10%) had purely vascular while 5(16.7%) patients had combination of these (table no 2). 19(63.3%) patients had cervical rib excision while in 11(36.7%) patients scalenotomy was performed. Those patients with bilateral disease, the contra lateral side was operated 3 months and 5 months later from the first operation in 2 patients while one patient lost to follow up.

3 post operative complications occurred including one haematoma which was drained and 2 minor wound infections which responded to conservative management. 3 patients lost to follow up including one with bilateral cervical ribs in whom the most symptomatic side was operated. Minimum follow up of the remaining patients was 6 months. At review, 3 months after surgery 21(70%) patients had complete symptomatic improvement with return to normal routine work. 5(16.7%) patients had moderate improvement with marked decrease in pain and the need for medication. This group also included 1 patient with vascular and 2 with combined symptoms. One (3.3%) patient had little improvement in his symptoms (table no 3). This was the patient with predominantly vascular symptoms. At 6 months after surgery no recurrence of symptoms had occurred in our series.

Discussion:

Thoracic outlet syndrome (TOS) is a symptom complex caused by compression of the neurovascular structures at the thoracic inlet. It usually affects young people mostly females⁴. In our study most of the patients were young females, constituting about two third of our study patients. They had predominantly neurological symptoms as this is the most common symptoms encountered^{2,3,4}.

A small group of patients have predominantly vascular symptoms or the combination of the two^{4,5}. In our series, they constituted 10% and 16.7% of the patients respectively. There is no single satisfactory diagnostic tool for TOS and like wise does not have a gold standard surgical approach¹². Different approaches have been applied by different author achieving variable results^{3,9,10,11,12,13}. In our series, all the patients had scalenotomy or cervical rib excision without excision of the first rib through supraclavicular incision. It is an easy approach providing sufficient excess to the structures of the brachial plexus, subclavian vessels, scalene muscles, the first rib & cervical rib¹¹ giving comparable & satisfactory results^{3,9,10}.

The presence of cervical rib as the cause of symptoms of TOS is variable. A UK based study has mentioned that it was present in 25-100% of cases^{14,15}. A US series has reported 20% incidence^{3,16}. In our series it was present in 63.3% of patients. The high incidence of cervical rib in our series was probably due to the fact that they were referred to us only when radiological abnormality was found. This also reflect the prolong duration of symptoms before they were referred to surgery in our study as well as by others^{15,17}.

Surgery gives complete resolution of symptoms and return to normal routine activities in 68-100% of cases^{5,7,14,18}. In our series 70% of the patients were able to achieve their goal and return to normal routine work within 6 months of follow-up. 16.7% patients had moderate improvement in their symptoms with marked decrease in pain and the need for medication. Only one patient had little symptomatic improvement. Post operative complication like minor wound infection or major complication like pneumothorax or major vascular injury can occur⁸. In our series, no major complications occurred. 2 wound infections were managed conservatively and one haematoma formation was drained successfully.

We did not receive any recurrent case of TOS in our study as it is reported in a series with prolong follow-up⁴. This may be due to small number of patients and short duration of follow-up.

We found excision of the cervical rib or scalenotomy without the excision of the first rib as sufficient to alleviate the symptoms of TOS. The supraclavicular incision was an easy & better approach to access these structures & give cosmetically acceptable scar.

Conclusion:

Supraclavicular approach is safe and easy approach to excision of cervical rib or scalenotomy. Excision of cervical rib or scalenotomy alone is sufficient to relieve symptoms of TOS without the excision of first rib.

References:

1. Sanders RJ, Hammond SL. Management of cervical ribs and anomalous first ribs causing neurogenic thoracic outlet syndrome. *J vasc surg* 2002 Jul; 36(1):51-6.
2. Cina C, whiteacre L, Edwards R, Maggisano R. Treatment of thoracic outlet syndrome with combined scalenotomy and transaxillary first rib resection. *Cardiovasc surg* 1994; 2(4):514-8
3. Hampel GK, Shutze WP, Ander JF, Bukhari HI. 770 consecutive supraclavicular first rib resections for thoracic outlet syndrome. *Ann vasc surg* 1996; 10(5): 456-63
4. Podlaha J. Thoracic outlet syndrome – 24 years of experience. *Bratisl Lek Listy*. 2007; 108(10-11):429-32.
5. Davidovic LB, Kostic DM, Jakovljevic NS, Kuzmanovic IL, Simic TM. Vascular thoracic outlet syndrome. *World J surg* 2003; 27(5): 545-50
6. Herald C, Urschel Jr, Amit N patel. Thoracic outlet syndrome and dorsal sympathectomy. In: Frank W. Sellke, Pero J dell Nido, Scott J Swenson (Eds). *Sabiston and Spencer surgery of the chest* 2005. Elsevier Saunders
7. Jamieson WG, Chinnick B. Thoracic outlet syndrome: facts and fancy? A review of 409 consecutive patients who underwent operation. *Can J surg* 1996 Aug; 39(4): 321-6
8. David PE, Edward M, Ahmad NR, Philip B. Transaxillary first rib excision for thoracic outlet syndrome. *J R Coll Surg Edin* 1999 dec; 44: 362-5
9. Fantini GA. Reserving supraclavicular first rib resection for vascular complications of thoracic outlet syndrome. *Am J surg* 1996; 172(2): 200-4
10. Carty NJ, Carpenter R, Webster JH. Continuing experience with transaxillary excision of the first rib for thoracic outlet syndrome. *Br J Surg* 1992; 79(8): 761-2
11. Degeorges R, Reynaud C, Becquemin JP. Thoracic outlet syndrome surgery: long term functional results. *Ann Vasc Surg* 2004 sep; 18(5):558-65
12. Weigel G, Schmidt M, Gradl B, Girsch W. TOS – surgery via a single supraclavicular incision. *Acta Neurochir Suppl*. 2007; 100:141-3.
13. Rochkind S, Shemesh M, Patish H, Graif M, Segev Y, Salame K, Shifrin E, Alon M. Thoracic outlet syndrome: a multidisciplinary problem with a perspective for management without rib resection. *Acta Neurochir Suppl*. 2007; 100:145-7.
14. Davies AH, Walton J, Stuart E, Morris PJ. Surgical treatment of thoracic outlet compression syndrome. *Br J Surg* 1991; 78(10): 1193-5
15. Baker DM, Lamerton AJ. Outcome of surgical management of thoracic outlet compression syndrome in a district general hospital. *Ann R Coll Surg Engl* 1993; 75(3): 172-4
16. Stallworth JM, Horne JB. Diagnosis and management of Thoracic outlet syndrome. *Arch Surg* 1984; 119(10): 1149-5
17. Brown SCW, Charlesworth D. Results of excision of a cervical rib in patients with the thoracic outlet syndrome. *Br J Surg* 1988; 75(5): 431-3
18. Toso C, Robert J, Borney T Pugin F, Spiliopoulos A. Thoracic outlet syndrome: influence of personal history and surgical technique on long term results. *Eur J Cardiothorac Surg* 1999 Jul; 16(1): 44-7

Table no 1

Demographic Features n = 30

<u>Feature</u>	<u>No of pts (%)</u>
Females	22(73.3)
Males	8(19.5)
Mean Age	31.5 years
Right side	16(53.3)
Left side	11(36.6)
Bilateral	3(10)
Mean duration of symptoms	4.2 years

Table no 2

Symptomatology

<u>Sypmtoms</u>	<u>No of pts (%)</u>
Neurological	22(73.3)
Vascular	3(10)
Combination	5(16.6)

Table no 3

Results of surgery

<u>Feature</u>	<u>No of pts (%)</u>
Improvement	21(70)
Moderate Improvement	5(16.6)
Little Improvement	1(3.3)
Lost to follow up	3(10)