



## **Conservative Management of Cervical Rib- A Case Report**

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### **Authors' contributions**

*This work was carried out in collaboration among all authors. All authors read and approved the final manuscript.*

### **Article Information**

DOI:10.9734/JPRI/2021/v33i48A33242

Editor(s):

(1) Dr. Asmaa Fathi Moustafa Hamouda, Jazan University, Saudi Arabia.

Reviewers:

(1) Cody Thompson, Alabama State University, USA.

(2) Leszek Sułkowski, General Specialist Hospital, Poland.

Complete Peer review History: <https://www.sdiarticle4.com/review-history/73184>

**Received 17 July 2021**

**Accepted 21 September 2021**

**Published 06 November 2021**

**Case Study**

### **ABSTRACT**

**Background:** An additional rib that develops from the seventh cervical vertebra is known as a cervical rib, a congenital anomaly placed above the typical first rib, affecting 0.2- 0.5 percent of the total population. It may be seen on either the left or right sides. The majority of patients have little or no complaints and are identified by chance during an X-ray or CT scan. Due to the extreme compression on the arteries, veins and nerves caused by the position of the rib, which varies in shape and size, they might develop thoracic outlet syndrome. A cervical rib is a prolonged ossification of the lateral costal segment of the Cervical 7<sup>th</sup> vertebra.

**Clinical Presentation:** A 18 years old female patient was diagnosed with cervical rib on X-ray due to persistent pain at right hand. Patient concern with reduced mobility of the right upper limb and unable to lift the hand. The patient went physiotherapy treatment which comprise of exercise and electro therapy for 10 weeks which resulted in improvements in pain and range of motion and functional activities

**Conclusion:** The case report suggest that a prompt structured physical rehab let to improving the functional goals progressively and significantly which is a measured aspect leading to a successful recovery.

*Keywords: Congenital; thoracic outlet syndrome; ossification; rehabilitation.*

## 1. INTRODUCTION

A cervical rib, sometimes termed as an accessory or a supernumerary rib, is a congenital abnormality that generally originates from the seventh vertebra and exceedingly rarely from the fifth or sixth vertebra. It generally comprises of a head, neck, and tubercle. A fibrous band around the insertion of the anterior scalene muscle attaches it to the first rib from behind. To be termed a rib, cervical ribs must articulate with the transverse process. The lateral costal part of the C7 vertebra tenaciously been ossified for a long time [1].

It may wind up in the soft tissues of the neck by accident, articulating with the first thoracic rib and sternum, or connecting to a fibrous band. The left side of the neck has more unilateral cervical ribs than the right side. Bilateral cervical ribs are more common than unilateral cervical ribs [1]. Cervical ribs can develop bilaterally in roughly 50% of individuals [2].

Cervical ribs are most commonly found in middle-aged people. It is a congenital anomaly that occurs above the normal first rib and affects between 0.2 and 0.5 percent of the population. Cervical ribs are twice as frequent in women as males (68 percent vs 32 percent), are bilateral in more than half of cases, and are asymptomatic in 90 percent of cases. The 10% of individuals with cervical rib who are symptomatic have neurogenic symptoms most of the time, although some have vascular symptoms as well. The pathophysiology of cervical ribs and aberrant first ribs is based on their physical connections, with the brachial plexus and subclavian artery and veins passing via the scalene triangle [3].

Trauma, overuse, and bad posture are all factors that predispose people to symptoms. The cervical rib generally compresses these tissues against the scalene muscles. Any pressure on a nerve causes neurogenic TOS, but pressure on vascular structures causes vascular TOS. Compared to vascular TOS, neurogenic TOS is significantly more common. The cervical rib itself or a fibrous band(s) might put pressure on the neck.

Thoracic outlet syndrome is caused by the tension on the nerves produced by the existence of the rib, which varies in size and shape. When the subclavian artery is squeezed, moving the

neck to the other side might cause the afflicted arm to lose its pulse (Adson maneuver). To fully examine thoracic outlet syndrome, a CT scan, nerve conduction tests, and an MRI may be required [4].

Physical therapy is used to treat nerve compression. When conservative therapy fails, the cervical rib and scalene muscles may need to be removed [3].

## 2. CASE PRESENTATION

### 2.1 Patient Information

An 18-year-old female patient with right hand dominance had pain from 14<sup>th</sup> oct 2020 after consultation to an orthopedic surgeon X-ray was done which revealed congenital extra cervical rib. Patient underwent physiotherapy sessions following the next day of diagnosis. The patient was having the chief complaint of pain in right hand which patient describe as chronic pain with 8/10 at movement and 7/10 on rest swelling was not present and patient complaint of limited mobility and unable to move the extremity

### 2.2 Clinical Findings

Physical examination was done. She was examined in supine and sitting. The extra rib was palpated and inspected. The chances for other deformity were also checked. Grade 2 tenderness was present. Local temperature was normal.

### 2.3 Investigation

It may be seen on either the left or right sides. The majority of patients have little or no complaints and are identified by chance during an X-ray or CT scan.

### 2.4 Assessment

A thorough clinical history and examination were recorded, which included a neurological and locomotor systemic evaluation, cervical neck x - ray, a chest x - ray, and nerve conduction tests to the median and ulnar nerves.

Pain assessment on NPRS pain was 7/10 on rest and 8/10 on slight movement. Swelling was absent. On observation, patient had forward

head, protracted shoulder, kyphotic thoracic spine.

Physiotherapy intervention- patient specific rehabilitation protocol was structured. Patient underwent physiotherapy treatment for 10 weeks, 6 days per week.

### 2.5 Management

The main goal of management was reducing the pain and to increase the mobility of the upper limb.

1. On day one of treatment we evaluated the patient for strength, range of motion, tightness and pain.
2. Before starting the treatment education regarding the operative procedure was explained to the patient.
3. Patient was explained the importance of exercise for his better rehabilitation and early return to ADLs.
4. And importance of physical therapy for avoiding surgery. Further management is given in table below.

### 3. DISCUSSION

Niels Pesser et, al. Conducted a short observational study to find out the feasibility of multidisciplinary care pathway for Neurogenic

Thoracic Outlet Syndrome (NTOS). The study included 476 patient. 290 patient has undergone surgery and 186 patient received physiotherapy after surgery. The outcomes used in the study were TOS disability scale (TDS), cervical brachial questionnaire (CBSQ) etc. In this study they concluded that the severe grade of TOS requires physical therapy while during initial stages or in moderate cases of TOS it can be managed by physical therapy [5].

Throughout many cases, we think that ablation of both of the cervical and first ribs is sufficient to relieve symptoms and avoid anything like a second surgery. Davies et al. [6] looked at removing just the cervical rib without the first rib. In a study of 58 individuals with TOS, 22 were reported to just have cervical ribs: five experienced arterial symptoms, six experienced neurogenic symptoms, and eight seemed to have a mix of neurogenic and arterial symptoms. In their group, 15 patients had cervical rib resection alone and were symptom-free.

Individuals who only had the cervical rib excised without the first rib eliminated, according to Toso et al. [7], started to experience problems following the procedure [8-10]. We've discovered that extracting both the cervical and first ribs in one surgery provides for plenty of room for the vein, artery, and brachial plexus [11,12].

**Table 1. Timeline**

Date of Onset	14 Oct 2020
Date of Admission	16 Oct 2020
Date of Physiotherapy Rehabilitation	17 Oct 2020
Date of Completion of treatment	15 Jan 2021

**Table 2. MMT**

		Pre-Rehab	Post-Rehab
Shoulder	Flexion	2/5	5/5
	Extension	2/5	5/5
	Abductors	3/5	5/5
	Adductors	3/5	5/5
	Internal Rotators	3/5	5/5
	External Rotators	3/5	5/5
Cervical	Flexors	3/5	5/5
	Extensors	3/5	5/5
	Side Flexors	2/5	4/5
	Lateral Rotators	2/5	4/5

**Table 3. Range of motion**

		<b>Pre- Rehab</b>	<b>Post- Rehab</b>
Shoulder	Flexion	0-130	0-180
	Extension	0-15	0-25
	Abductors	0-130	0-150
	Adductors	0-35	0-50
	Internal Rotators	0—40	0-75
	External Rotators	0-75	0-90
Cervical	Flexion	0-60	0-80
	Extension	0-40	0-70
	Side Flexion	0-30	0-45
	Lateral Rotation	0-65	0-90

**Table 4. Observations of different intervention with respect to dosage**

<b>Intervention</b>	<b>Dosage</b>	<b>Rationale</b>
Cervical and Shoulder Isometrics.	5 sec hold 10 repetition	To maintain muscle contractility and maintain strength
Chin tucks, Scapular Sets	5 sec hold 10 repetition	To prevent the further compression of the structure and correct faulty posture
Active ROM for cervical and shoulder joint	10 repetition as much as possible	To maintain mobility of the joint
Shoulder Joint mobilization	30 oscillation 2 sets	To reduce pain and correction faulty biomechanics.
Myofascial Release Technique	Press for 30 sec 2 times.	To reduce pain and improve ROM.
Breathing Exercise	10 repetition every hourly	To maintain lung compliance(due to faulty posture lung cannot expand completely.)
Strengthening for scapular, shoulder and cervical musculature	20 reps 3 times daily.	To strengthen and offloading the joint.
Stretching of pectorals, neck flexors	30sec 3 reps	To lengthen the tight structure and correct posture

#### 4. CONCLUSION

We conclude that a tailored made physical therapy program with proper ergonomic advices and medication has reduced the pain, increases the ROM and strength on the muscle and reduced the compression on the vasculature in the outlet region. Stretching and strengthening of the causative muscle have shown a significant improvement in the condition of the patient.

#### CONSENT

Written and Oral informed consent was obtained from the patient included in the study.

#### ETHICAL APPROVAL

As per international standard or university standard written ethical approval has been collected and preserved by the author(s).

#### COMPETING INTERESTS

Authors have declared that no competing interests exist.

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