e-ISSN: 0976-822X, p-ISSN:2961-6042

Available online on http://www.ijcpr.com/

International Journal of Current Pharmaceutical Review and Research 2026; 18(2); 1223-1225

Original Research Article

Cervical Rib: A Retrospective Radiological Study on Morphological Features, Incidental Findings, and Clinical Correlation

Mazia Fathima Mahek[1], Mariya[2], V. Janaki[3]

[1]Senior Resident, MD Anatomy, GMC, Kodangal, Telangana, India
[2]Associate Professor, Dept. Anatomy, GMC Maheshwaram, Telangana, India
[3]Professor, Dept. Anatomy, Osmania Medical College, Hyderabad, Telangana, India

Received: 01-11-2025 / Revised: 15-12-2025 / Accepted: 21-01-2026
Corresponding author: Dr. Mazia Fathima Mahek
Conflict of interest: Nil

Abstract

Background: Cervical ribs are rare congenital anomalies that may be asymptomatic or associated with neurovascular complications due to compression of the thoracic outlet. This study evaluates the incidence, morphological types, and clinical relevance of cervical ribs identified incidentally in chest radiographs.

Materials and Methods: A retrospective observational study was conducted using 1000 chest radiographs collected from the Department of Radiology, Osmania Medical College, and Hyderabad. Radiographs from both sexes aged 12–80 years were reviewed for the presence and morphology of cervical ribs. Cases with rib fractures, incorrect positioning, or associated anomalies were excluded.

Results: Cervical ribs were detected in 15 (1.5%) radiographs. The incidence was higher in females (2.5%) compared to males (0.92%). Bilateral cervical ribs were observed exclusively in females. Most cervical ribs were unilateral and located on the right side. Several patients presented with upper limb neurological symptoms suggestive of thoracic outlet syndrome (TOS), while others were asymptomatic.

Conclusion: Cervical ribs, though often incidental, may be clinically significant when symptomatic, particularly in the presence of neurovascular compression. Recognition of cervical ribs in routine imaging is crucial for appropriate management of patients with thoracic outlet symptoms.

Keywords: Cervical rib, Thoracic outlet syndrome, Chest radiograph, Neurovascular compression, Anatomical variation.

DOI: 10.25258/ijcpr.18.2.202

Introduction

A cervical rib is a rare congenital anomaly resulting from the ossification of costal elements of the seventh cervical vertebra (C7), forming a supernumerary rib above the first thoracic rib [1,2]. These ribs may occur unilaterally or bilaterally and are more frequently detected on the left side [3].

However, variations in side prevalence have been observed across populations. Cervical ribs are categorized into four types based on their morphology [4]. The types range from complete ribs articulating with the first rib (Type 1) to short bony projections beyond the transverse process (Type 4). They usually lack physiological function and are often asymptomatic.

The embryological origin of cervical ribs is closely associated with genetic mutations, particularly in Hox genes and GDF11, which are responsible for axial skeletal patterning [5,6]. Normally, aberrant costal elements regress during fetal development, but persistence leads to the formation of a cervical rib [7]. Due to their location, cervical ribs may contribute to thoracic outlet syndrome (TOS) by compressing the brachial plexus or subclavian vessels within the scalene triangle [8,9].

Materials and Methods: A retrospective observational study was conducted at the Department of Radiology, Osmania Medical College, and Hyderabad. A total of 1000 consecutive chest radiographs, obtained for various clinical indications, were analyzed.

Inclusion Criteria:

- Chest radiographs of patients aged 12–80 years
- Radiographs of both sexes

Exclusion Criteria:

- Poorly positioned radiographs
- Fractured ribs or other congenital rib anomalies

Cervical ribs were identified based on their articulation with the C7 transverse process. Ribs were considered:

- **Complete** if they articulated with the first rib or manubrium anteriorly
- **Incomplete** if the anterior end was free or attached by fibrous bands [4,10]

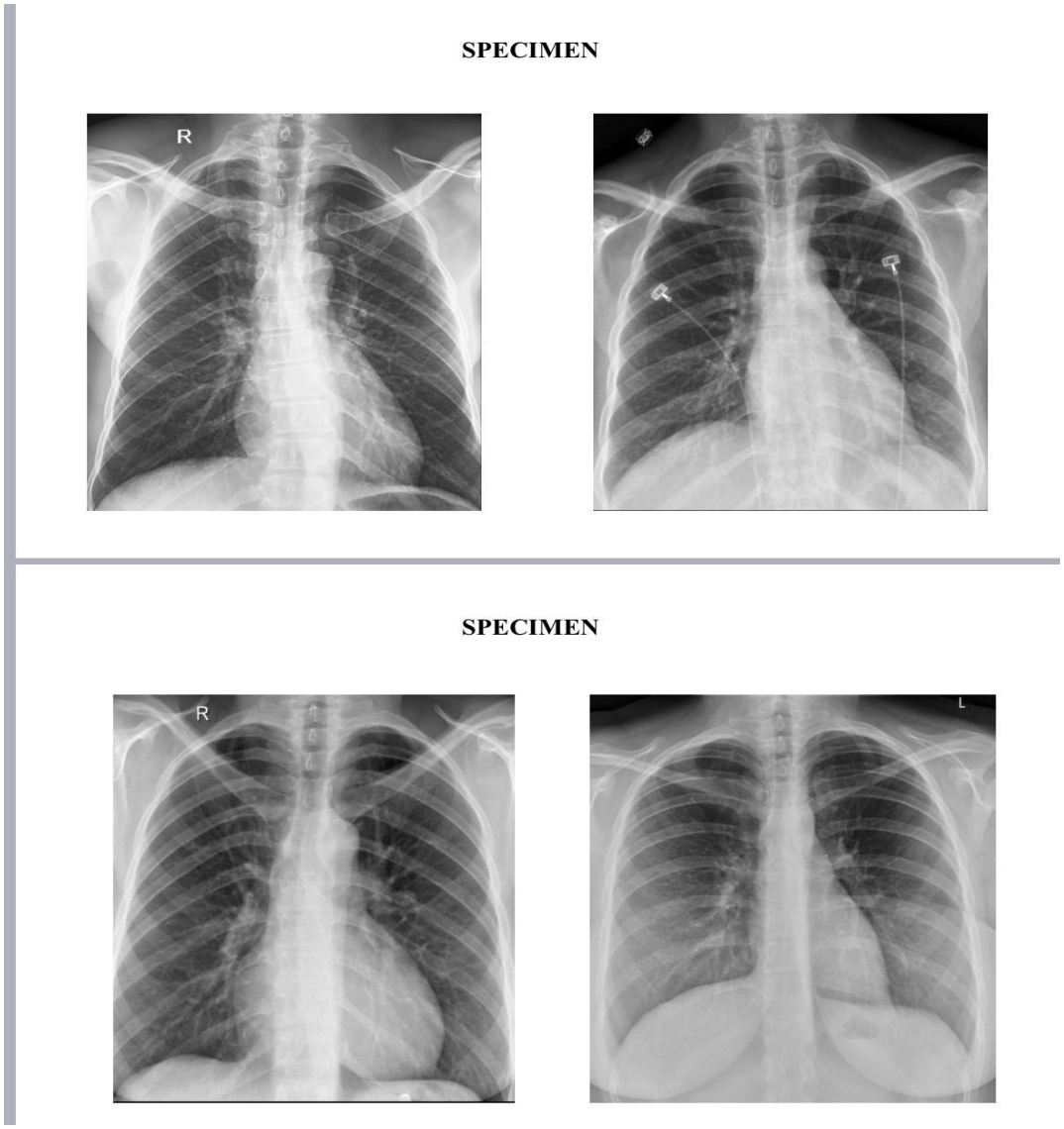

Figure 1:

Results: Of the 1000 chest radiographs analyzed:

- 15 (1.5%) showed the presence of cervical ribs.
- Among 650 male subjects, 6 (0.92%) had unilateral cervical ribs.
- Among 350 female subjects, 9 (2.5%) had cervical ribs:
  - 3 had bilateral ribs
  - 6 had unilateral ribs, all on the right side

While several cases were asymptomatic and discovered incidentally, others presented with neurological complaints such as hand pain, numbness, and tingling, suggestive of TOS [8,11].

Table 1:

Sex (Incidence of Cervical Rib n, %)	Absent n (%)	Right Side	Left Side	Bilateral / Unilateral	Total
Male (60.92%)	644 (99.08%)	6	Nil	Unilateral	650
Female (9.25%)	341 (97.5%)	6	3	Bilateral (3), Unilateral (6)	350
Total (15)	985	—	—	—	1000
Incidence of cervical ribs with respect to gender and laterality					

Discussion

The incidence of cervical ribs in our study (1.5%) is comparable to rates reported globally, which range from 0.2% to 3% [1,2,12]. A higher incidence was observed in females, consistent with findings from Nigerian and European populations [3,12,13].

Contrary to traditional understanding, which often reports left-sided dominance, all unilateral ribs in this study occurred on the right side, similar to patterns seen in some African population's ji [3].

Symptomatic cervical ribs may compress the subclavian artery, subclavian vein, or brachial plexus, resulting in symptoms ranging from upper limb paresthesia to vascular insufficiency, including subclavian artery thrombosis and venous thrombosis [8,14,15]. Severe cases may present with cerebral thromboembolism due to embolic propagation from a compressed artery [14].

Imaging, particularly chest radiography and 3D CT, plays a vital role in diagnosis and surgical planning [16]. Conservative treatment using physical therapy is initially recommended for mild neurogenic symptoms. However, surgical resection becomes necessary in refractory or vascular cases [17,18].

Embryologically, cervical ribs reflect disrupted segmentation of the cervical vertebrae and are associated with other anomalies, including vertebral fusion, spinal canal narrowing, and fetal aneuploidy [5,19,20].

Conclusion

This study confirms that cervical ribs, though often asymptomatic, may have significant clinical implications, especially in the setting of thoracic outlet syndrome. The observation of higher incidence in females and right-sided unilateral dominance warrants further exploration in future large-scale, multi-center studies.

Clinicians must recognize this anatomical variation in patients with unexplained upper limb symptoms or vascular signs.

Timely radiological diagnosis followed by appropriate medical or surgical management can prevent serious neurovascular complications.

References

1. Lukasz S, Cecot T. The epidemiological, morphological, and clinical aspect of the cervical ribs in humans. Biomed Res Int. 2016; 2016:803461.
2. Ebite LE, Igbigbi PS, Chisi JE. Prevalence of true cervical rib in adult Malawian population. J Anat Sci. 2007;1(1):07–09.
3. Abimbola EO, Willido AA. Prevalence of cervical ribs in a Nigerian population. J Med Dent Sci. 2014; 13:05–07.
4. Warwick R, Williams PL. Gray's Anatomy. BJS. 1973;98(3):218.
5. Furtado LV, Thaker HM, Erickson LK, et al. Cervical ribs are more prevalent in stillborn foetuses than in live-born infants and are strongly associated with fetal aneuploidy. Pediatr Dev Pathol. 2011;14(6):431–437.
6. Galis F, Van Dooren TJM, Feuth JD. Extreme selection in humans against homeotic transformations of cervical vertebrae. Evolution. 2006;60(12):2643–2654.
7. Merks JH, Smets AM, Van Rijn RR. Prevalence of rib anomalies in normal Caucasian children and childhood cancer patients. Eur J Med Genet. 2005; 48:113–129.
8. Sanders RJ, Hammond SL. Management of cervical ribs and anomalous first ribs causing neurogenic thoracic outlet syndrome. J Vasc Surg. 2002;36(1):51–56.
9. Redenbach DM, Nelems B. A comparative study of structures comprising the thoracic outlet in 250 human cadavers and 72 surgical cases. Eur J Cardiothorac Surg. 1998;13(4):353–360.
10. Dashti G, Ghasemi N. Evaluation of neurovascular complications of cervical ribs. Anat Sci. 2015;12(3):111–114.
11. Nwadinigwe CU, Iyidobi EC, Ekwunife RT, Onwuekwe CV. Thoracic outlet syndrome from bilateral cervical ribs: A clinical case report. J Orthop Case Rep. 2018;8(2):78–80.
12. Brewin J, Hill M, Ellis H. The prevalence of cervical ribs in a London population. Clin Anat. 2009;22(3):331–336.
13. Erken E, Ozer HTE, Gulek B, Durgun B. The association between cervical rib and sacralization. Spine. 2002;27(15):1659–64.
14. Haroun HSW. Cervical rib and thoracic outlet syndrome. MOJ Anat Physiol. 2016;2(5):138–143.
15. Chandak S, Kumar A. Usefulness of 3D CT in diagnosis of cervical rib presenting as supraclavicular swelling. J Clin Diagn Res. 2014;8(5):RD01–02.
16. Galis F, et al. Evolution. 2006;60(12):2643