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Original Research Article

CERVICAL RIBS: A STUDY ON RADIOGRAPHS IN A TERTIARY CARE HOSPITAL OF ASSAM

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ABSTRACT

Introduction: Cervical rib is the extra rib arises from the seventh cervical vertebra. The prevalence of cervical rib depends on the population. Cervical ribs are usually asymptomatic but may cause compression of subclavian artery and brachial plexus. Aim is to study the prevalence of cervical rib with associated gender, age group and laterality (body sides).

Materials and Methods: 8000 plain chest radiographs were studied from the month of January to March, 2017, in which 63 chest radiographs were found with cervical ribs. The particulars of the patients were recorded and data were tabulated and analysed.

Results: prevalence of the cervical rib was found to be 0.79% and female outnumbered male.

Discussion: cervical rib is a less studied topic in this part of North-East India and thus, this study was conducted on chest radiographs of the patients of a tertiary hospital of this part of India.

KEY WORDS: Cervical Rib, Radiographs, Assam, Prevalence.

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INTRODUCTION

A cervical rib is a supernumerary, extra or additional rib [1] which arises from the costal element of the seventh cervical vertebra, may be a mere epiphysis on its transverse process but more often it has a head, neck and tubercle [2]. Radiograph images indicate that the prevalence of cervical ribs is below 1% in the general population; however, studies have found its occurrence to vary significantly from 0.58% to

6.2% depending on the population [3,4].

Most of the authors found that cervical ribs are frequent in women but about laterality of the cervical ribs different authors had different views. Cervical ribs are asymptomatic in most people [5].

A cervical rib may cause compression of the subclavian artery and the lower roots of the brachial plexus, in which case affected individuals will complain of pain, paraesthesia and even pallor of the affected upper limb, a condition known as thoracic outlet syndrome [6].

The bony portion of each rib is derived from sclerotome cells that remain in the paraxial mesoderm and that grow out from the costal processes of thoracic vertebrae. Costal cartilages are formed by sclerotome cells that migrate across the lateral somitic frontier into the adjacent lateral plate mesoderm [7]. Hox genes are responsible for patterning of the axial skeleton, and mutations within them probably are implicated in the development of cervical ribs.

There are two types of cervical ribs: those which are complete and articulate with the first rib and those which are incomplete and end freely in the soft tissues of the neck [8].

The study was conducted to observe the prevalence of cervical ribs in this part of North-East India with associated gender, age group, laterality (body sides) and also to correlate with other studies.

MATERIALS AND METHODS

This is a retrospective study on 8000 plain chest radiographs of the patients who underwent this investigation in the Radiology Department. X-rays were collected from the month of January to March, 2017. All chest X-rays were carefully examined for cervical ribs. X-rays in which ribs were not visible or obstructed by any pathology and also X-rays of the patients outside the state of Assam were excluded from the study. Patients with cervical rib were recorded for particulars like age, sex etc. Descriptive statistics such as ANOVA, unpaired t test were used with statistical setting at $p < 0.05$. Study was approved by the ethical committee of the institute.

RESULTS

After careful observations of the 8000 chest radiographs, 63 (0.79%) radiographs with cervical ribs were found. Among 63, male were 31.75% (20 out of 63) and female were 68.25% (43 out of 63) with male-female ratio of 1:2.15. Thus, number of female patients with cervical rib was approximately twice the number of male patients with same anomaly.

Table 1: Showing number and percentage of patients with laterality (body sides) of the cervical ribs.

Laterality (body sides) of Cervical Rib	Number of patients with cervical rib	Percentage of patients with cervical rib
Left sided	9	14.29%
Right sided	10	15.87%
Bilateral	44	69.84%
Total	63	100%

Thus, table no.1 showed that cervical ribs commonly occur bilaterally (figure no.2). Second most common was right (figure no.1) followed left cervical rib (figure no.3). While studying the bilateral X-rays, it was found that 50% (22 out of 44) bilateral cervical rib X-rays having right side cervical ribs were longer in size than the left side and in about 30% (13 out of 44) bilateral cervical rib X-rays, both right and left cervical ribs were equal in size (figure no.2).

Table 2: Showing number and percentage of male, female patients of cervical ribs according to different age groups

Age groups	Male (A)	Percentage (out of 20)	Female (B)	Percentage (out of 43)
0-<15	0	0%	3	6.98%
15-<30	7	35%	15	34.88%
30-<45	6	30%	14	32.56%
45-<60	3	15%	8	18.60%
60-<75	3	15%	3	6.98%
75-<90	1	5%	0	0%
TOTAL	20	100%	43	100%
Mean	3.33	16.67	7.17	16.67
S.D	±2.733	±13.663	±6.242	±14.516
S.E.M	±1.116	±5.578	±2.548	±5.926

Table no.2 showed that about 65%-70% patients of cervical ribs were between age of 15 years to 45 years. On comparing columns A and B in the table no.2, p value was found to be 0.1983 which was considered not significant. Thus, the comparison between male and female cervical rib patients with different age groups was not statistically significant as p value >0.05.

Table 3: showing number and percentage of patients with laterality (body sides) of cervical ribs according to different age groups.

Age Groups	Cervical Rib		
	Right Sided (A)	Left Sided (B)	Bilateral (C)
0-<15	2	0	1
15-<30	4	5	13
30-<45	0	2	17
45-<60	3	1	8
60-<75	1	1	4
75-<90	0	0	1
TOTAL	10	9	44
Mean	1.67	1.5	7.33
S.D	±1.633	±1.871	±6.593
S.E.M	±0.667	±0.764	±2.692

Table no.3 showed that about 45.45% (20 out of 44) bilateral cervical rib patients were between 15 years to 45 years of age. On comparing columns A, B, C in table no.3, p value was found to be 0.0405 which was considered significant. Thus, the comparison between cervical rib patients according to laterality (body sides) and different age groups were found to be significant as p value <0.05.

It was also found that among 63 cervical rib patients, 71.43% (45) were hindu and 28.57% (18) were of muslim by religion.

Table 4: Showing laterality (body sides) of cervical ribs with sex of the patients.

Gender	Cervical Rib		
	Right Sided (A)	Left Sided (B)	Bilateral (C)
Male	1	3	16
Female	9	6	28
Total	10	9	44
Mean	6.67	6	29.33
S.D	±4.933	±3.000	±14.048
S.E.M	±2.848	±1.732	±8.110

Fig. 1: Showing right side cervical rib (blue arrow) with normal left transverse process of 7th cervical vertebra (red arrow). Both side 1st ribs were marked with violet arrow.

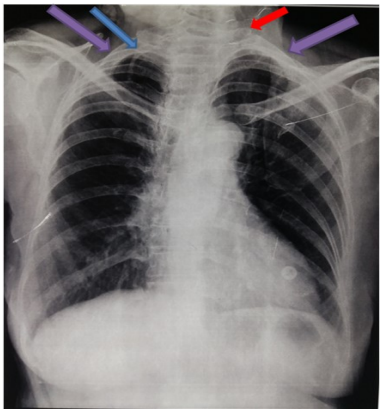


Fig. 2: Female patient with bilateral cervical rib (blue arrow) and both side 1st rib (violet arrow). Both side cervical ribs were equal in size.

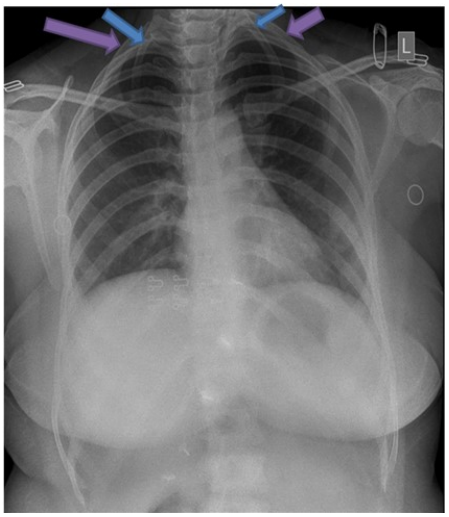
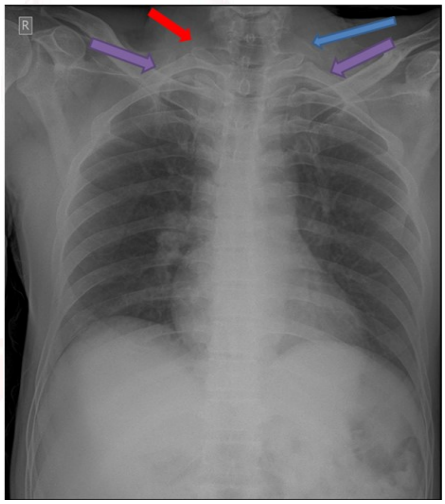


Fig. 3: Showing left side cervical rib (blue arrow) with normal right transverse process of 7th cervical vertebra (red arrow). Both side 1st ribs were marked with violet arrow.



DISCUSSION

Accessory ribs, usually rudimentary, result from the development of the costal processes of cervical or lumbar vertebrae. These processes usually form ribs only in the thoracic region. The most common type of accessory rib is a lumbar rib, but it usually causes no problems [9]. Though cervical rib is an anomaly from seventh cervical vertebra but according to some authors it may arise from fourth, fifth or sixth cervical vertebra [1,10].

The classification proposed by Sargent (1921) is as follows: **type 1**, prolongation and pointing of the seventh cervical transverse process; **type 2**, short articulating rib with fibrous prolongation; **type 3**, jointed rib long enough to carry the eighth cervical nerve; **type 4**, jointed rib fused

at its end with the first rib or articulating with it; and **type 5**, a complete seventh cervical rib with cartilaginous union to the first costal cartilage or to the manubrium [5].

Hox genes are responsible for patterning of the axial skeleton, and mutations within them probably are implicated in the development of cervical ribs [11]. It has been hypothesized that abnormality in the expression of Hox genes could influence oncogenesis. Germ cell tumors, astrocytoma, and acute lymphoblastic leukemia were diagnosed in children with higher rate of such cervical anomalies as cervical ribs [12].

The prevalence of cervical ribs depends on the population [1]. Comparison of previous studies showed that the highest prevalence was reported among the Asian population (24.9%) [13], followed by the Turkish population (6.1%) [4], the white British population (5.9%) [13], the Saudi Arabians (3.4%) [14], and then the Italians (2.5%) [15], whereas the lowest prevalence was seen in the Malawian population (0.58%) [3]. A previous report[13] highlighted that Asians are 5 times more likely to have cervical ribs when compared with the white British. In the present study, the prevalence of cervical rib was found to be 0.79% which is similar to Ezeofor SN et al. study [16] with prevalence of 0.7%. In four Indian studies, the prevalence of cervical ribs were 1.22% in Central India [17], 0.6% around Lucknow [18], 2.67% in Kashmiri [19] and 1.16% in Chennai population [20].

Many studies [3,4,13-15] reported frequent occurrence of cervical rib in females than males which is similar to the present study. Although the majority of surveys reported that cervical ribs predominate in women, in central Indian population [17] (Male: 0.68%; Female: 0.54%) and Chennai population [20] of India found cervical ribs to be more common in males. In other two Indian studies, female predominance was mentioned with female 0.73% than male subjects 0.49% in Lucknow [18] and women 1.55% than men 1.12% in Kashmiri population [19]. It is to be noticed that in the present study, the female patients with cervical rib (67.74%) was more than double the male patients (32.26%). Many study reports [3,4,13-15] demonstrated that unilateral cervical ribs were seen more on the right than on the left, but in the present study bilateral cervical rib (69.84%) was found to be very common than unilateral (table no.1). In one of the Indian study, bilateral cervical ribs were found more frequent in Lucknow population [18] and study in Enugu population by Ezeofor SN et al. [16] also found more bilateral cervical ribs. Sharma DK et al. [17] did not find any correlation with the result of gender and body side association of cervical rib which is contrary to the present study where significance was found between gender of the patients and laterality (Body sides) of cervical ribs(table no.4).

In the present study, 65%-70% patients of cervical ribs were between age of 15 years to 45 years (table no.2) and significance was found between laterality (body sides) of cervical ribs and the different age groups of cervical rib patients (table no.3). Ezeofor SN et al. [16] study in Enugu population revealed no age variation in cervical ribs occurrence.

The survey conducted by Dashti and Ghasemi indicates that neurological manifestations were more frequent than vascular [21]. The type of manifestation depends on the morphology of the cervical ribs. It is commonly known that incomplete ribs only affect the brachial plexus, whereas complete ribs also have an impact on the subclavian artery [1].

Conservative treatment is recommended as initial treatment, unless acute vascular or neurological manifestations are observed. However, if conventional treatment does not alleviate the symptoms, surgical treatment is required [22]. Nowadays, surgical procedures on the cervical rib can be performed using the supraclavicular or the transaxillary approach [23].

CONCLUSION

This study, which represents the population of Assam, reveals that the prevalence of cervical ribs is 0.76% with female predominance and common age of occurrence is 15 years to 45 years. About 70% is bilateral cervical rib and among them 50% having right cervical rib longer in size than left one.

Conflicts of Interests: None

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