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Medicine

CLINICAL SIGNIFICANCE OF CERVICAL RIBS

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ABSTRACT Cervical rib refers to a supernumerary rib extending from seventh cervical vertebra to the first rib or sternum causing neurovascular compression. The objective of this study was to identify prevalence of cervical ribs and report the resulting clinical symptoms and outcome in patients attending a tertiary care center in Riyadh, KSA. Data were collected from database of Radiology Department and patients files (Cortex) at KFMC, between January 2012-September 2017 after approval of the study from the IRB of KFMC (IRB No-17-349). In our study, Cervical ribs were bilateral in 134(62%)cases and more frequent in females 154(71.3%) than in males62(28.7%). Nearly half of the cases 108(50%) were asymptomatic and detected by routine radiological investigations for other conditions. Among those who were symptomatic, neck pain 46(21.3%) and shoulder pain 32(14.8%) were the most common prevailing symptoms. Limb weakness and numbness was reported in 10(4.6%) of cases each, whereas few cases had swelling 2(0.9%), vertigo 5(2.3%), and headache 3(1.4%). Statistically significant association with (p value=0.007*) was observed between age groups and symptoms. Another interesting finding noted was that 24(11.1%) of cases out of 216 had associated anomalies.

KEYWORDS :

Introduction

A Cervical rib is defined as a rib that takes its origin from seventh cervical vertebra and varies in length from being as small as < 1cm or extend beyond the thoracic outlet to fuse with the first rib.[1]

Cervical ribs have been classified by Gruber as early as 1869 into four groups. 1. Cervical ribs that extend beyond the transverse process. 2. Cervical ribs that extend beyond the transverse process with a free tip almost touching the first rib. 3. Cervical ribs that extend beyond the transverse process with fibrous bands or cartilage attached to the first rib and 4. Cervical ribs that are completely fused with the first rib.[2]

Arteriothromboembolic events or aneurysm of subclavian vessels are the most common conditions that have been reported due to cervical rib compression of subclavian vessels.[3]

Recently Peet introduced the term TOS (Thoracic outlet syndrome) to describe the neurovascular compression in the interscalene triangle and classified them into three categories;arterial (subclavian artery<1%),venous (subclavian vein 4-6%),and neurogenic(brachial plexus (94-97%).[4]

Cerebral infarction or TIA due to cervical rib compression is unusual and only few cases have been reported earlier.[5]

A study regarding the presence of Cervical ribs in KSA has not been attempted earlier, and a comprehensive data is required pertaining to its incidence and pattern from this region. Apart from this, any structural defect or associated anomalies were recorded from the available data.

Objective

The purpose of this study is to identify prevalence of cervical ribs and report the resulting clinical symptoms and outcome in patients attending a tertiary care center in Riyadh, KSA.

Method

A retrospective review of a prospectively acquired database was performed. Data was collected from database of Radiology Department at KFMC, between January 2012-September 2017. Approval of the study was taken from the IRB of KFMC (IRB No-17-349). Demographic details of the patients, including the symptoms, diagnosis and clinical outcome were recorded and analyzed using SPSS version 22, Illinois, USA.

Results

In our study, Cervical ribs were bilateral in 134(62%)cases and more frequent in females 154(71.3%) than in males62(28.7%) as in table 1.

Nearly half of the cases 108(50%) were asymptomatic (table 2) and detected by routine radiological investigations for other conditions. Among those who were symptomatic, neck pain 46(21.3%) and shoulder pain 32(14.8%) were the most common prevailing symptoms. Limb weakness and numbness was reported in 10 (4.6%) of cases each, whereas few cases had swelling 2(0.9%), vertigo 5(2.3%),and headache3(1.4%).Symptomatology of patients by different age groups is displayed in table 3. Statistically significant association with (p value=0.007*) was observed between age groups and symptoms.

The other interesting finding was that 24(11.1%)of cases had associated anomalies as depicted in table 4.

Table1: Demographic data of patients with cervical ribs (n= 216)

Age group	No(%)
≤ 25	46(21.3%)
26-50	90(41.7%)
> 50	80(37%)
Sex	
Females	154(71.3%)
Males	62(28.7%)
Nationality	
Saudi	186(86.1%)
Non Saudi	30(13.9%)
Imaging Modality	173(80.1%)
X-ray	35(16.2%)
CT scan	3(1.4%)
X-ray, CT	2(0.9%)
MRI	3(1.4%)
XFD	

Table 2: Characteristics and symptomatology of cervical ribs (n=216)

Side	No(%)
Right side	45(20.8%)
Left side	37(17.1%)
Bilateral	134(62%)
Symptoms	108(50%)
Asymptomatic	10(4.6%)
Limb weakness Numbness	10(4.6%)
Neck pain	46(21.3%)
Shoulder pain	32(14.8%)
Swelling	2(0.9%)
Vertigo	5(2.3%)
Headache	3(1.4%)

Table 3: Symptomatology of patients by different age groups

Age	Symptoms							
	Asymptomatic	Limb weakness	Numbness	Neck pain	Shoulder pain	Swelling	Vertigo	Headache
≤ 25	33(15.3%)	2(.9%)	0	3(1.4%)	4(1.9%)	1(0.5%)	1(0.5%)	2(0.9%)
26-50	44(20.4%)	5(2.3%)	6(2.8%)	18(8.3%)	16(7.4%)	0	0	1(0.5%)
>50	31(14.4%)	3(1.4%)	4(1.9%)	25(11.6%)	12(5.6%)	1(0.5%)	4(1.9%)	0(0%)

P value=0.007* (Statistically significant association between age groups and symptoms)

Table 4: Association of cervical ribs with other Anomalies (n=216)

Cervical ribs Associated with	No of cases(%)
Anomalies	24(11.1%)
Not associated with other anomalies	192(88.9%)
Type of anomaly associated with cervical rib	
1. Scoliosis	6(2.7%)
2. Achondroplasia	1(0.5%)
3. Holoprosencephaly	1(0.5%)
4. Klippelfeilsyndrome	1(0.5%)
5. Cerebral palsy	2(0.9%)
6. Torticolis	1(0.5%)
7. Wilms tumor	1(0.5%)
8. VonHippel Lindau syndrome	1(0.5%)
9. Downs syndrome	1(0.5%)
10. Hunters syndrome	1(0.5%)
11. VACTREL association	3(1.5%)
12. Congenital fusion of cervical spine 1	1(0.5%)
13. 11 pairs of ribs	1(0.5%)
14. Missing left 12th rib	2(1.0%)
15. Aberrant right subclavian artery	1(0.5%)

Discussion

The incidence of Cervical ribs is estimated to be 2% in the general population6.They are mostly asymptomatic in 90% of cases, and found twice more frequently in females (68%) than in males (32%)7,8. In our study, Cervical ribs were bilateral in 134(62%)cases and more frequent in females 154(71.3%).

Ericson et al in 2015 reported a case of 39-year-old female with a brief history of unilateral headache, facial tingling and slurred speech along with 2-month history of left upper extremity weakness of left hand that was diagnosed with bilateral cervical ribs on chest radiograph, and was subsequently treated by cervical rib excision[9]. In our study, among those who were symptomatic, neck pain 46(21.3%) and shoulder pain 32(14.8%) were the most common prevailing symptoms. Limb weakness and numbness was reported in 10(4.6%) of cases each, nearly half of the cases 108(50%) were asymptomatic and detected by routine radiological investigations for other conditions.

Jusofovic et al in 2012 reported a case of 49 year old male with a right cervical rib compression leading to subclavian arterial thrombosis followed by both cerebellar and cerebral infarctions secondary to retrograde thromboembolism from the carotid artery and recommended that surgical treatment instead of conservative treatment should always be considered to prevent further embolic events and serious consequences[5].In our study, only very few cases had swelling 2(0.9%),vertigo 5(2.3%),and headache3(1.4%).

Cervical ribs have been identified to be chief cause of arterial compression at the thoracic outlet followed by anomalies of the first rib [9,10]. In the present cases, association of bilateral cervical rib with aberrant right subclavian artery was noted in one case with no symptomatology though.

Another interesting finding in our study was that 24(11.1%)of cases also had associated anomalies such as Scoliosis, Achondroplasia, Holoprosencephaly, Klippel fiel syndrome, Torticolis, Wilms tumour, Cerebral palsy, Von Hippel Lindau disease, Downs syndrome,Hunters syndrome,and VACTREL association.

Sharma et al in 2014 examined 5000 patients and reported that 61(1.22%) had cervical rib. although they couldn't establish any association between presence of cervical rib and other thoracic bony anomalies, except parallel finding of elongated transverse process of 7th cervical vertebra in 2 cases with right sided cervical rib and thoracic scoliosis.[11]

Tubbs et al in 2006 reported an adult male skeleton with fusion of his C6 and C7 vertebral bodies (Type II KFA) in addition to a remnant of the intervertebral disc space and bilateral rudimentary cervical ribs emanating from the C7 vertebrae. Excessive joint degeneration was noted between the vertebral bodies of C5 and C6.[12]In our study there was fusion of cervical spine C1 and bilateral cervical rib in a female patient aged 19 years since birth.

Jessica Bott et al in 2009 conducted a study on a series of human fetuses and revealed that approximately 40% of the fetuses had cervical ribs, even though external congenital abnormalities such as craniofacial and limb defects were absent and therefore they recommended that future studies determining the size and frequency of cervical ribs in healthy fetuses are needed to allow evaluating their potential as an indicator of medical risks. They also reported that 23.6% of the fetuses with cervical ribs also had absent or rudimentary 12th ribs, pointing to a posterior homeotic shift of the seventh cervical vertebrae and all thoracic vertebrae.[13]

Two cases in our series aged 10 years and 15 years were devoid of 12th rib. Similar results, namely 26.4% posterior homeotic shifts, were found in deceased fetuses and infants with a variety of minor and major congenital abnormalities.[14]

Majority of the cases in our study were treated conservatively for pain management and were recommended physiotherapy, whereas some of the cases underwent C4-C6 fixation /cervical rib resection, and radiculopathy.

Conclusion

The presence of bony abnormalities in the thoracic outlet, most commonly the cervical ribs, and abnormalities of the first thoracic ribs, are often responsible for vascular and neurological complications such as paresthesias or pain anywhere in the upper extremities, neck and/or shoulder pain, or noncoronary chest pain. Early diagnosis can therefore prevent vascular and neurological complications.

Conflict of interest

The authors declare that there is no conflict of interest.

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REFERENCES

1. Chang KZ, Likes KBA, Davis K, Demos J,CRNP, Freischalg JA. The significance of cervical ribs in thoracic outlet syndrome. Journal of vascular surgery.2013.Pg 771-775.
2. Gruber W. Ueber die Halsrippen des Menschen,mit vcrgleichend-anatomischen Bemerkungen Mem Acad Sci 1869:2:7-27.
3. Sanders RJ, Hammond SL, Rao NM. Thoracic outlet syndrome: A review. Neurologist 2008;14(6):365-73.
4. Peet RM, Hendricksen JD, Anderson TP, Martin GM. Thoracic outlet syndrom : Evaluation of a therapeutic exercise program. Proc Staff meet Mayo clinic 1956.31(9)281-7.
5. Jusufovic M,Sandset CE, Popperud TH, Solberg S, Ringstad G, Kerty E. An unusual case of the syndrome of cervical rib with subclavian artery thrombosis and cerebellar and cerebral infarctions. BMC Neurology 2012.12:48.
6. Viertel VG, Intraplromkul J,Patel NV, Zheng W et al. Cervical ribs: A common variant overlooked in CT imaging. AJNR Am J Neuroradiol.2012. 33:2191-2194.
7. Davidovic LB,Kostic DM,Jakovijevic NS,Kuzmanovic IL,Simic TM.Vascular thoracic outlet syndrome.World J Surg.2003.27(5:545-50.
8. SandersJ,Haug C.Thoracic outlet syndrome.A common sequelae of neck injuries.Philadelphia.IB Lippincott.1991:40-1.75:1,29-85.
9. Erickson BR, Go MR, Vaccaro PS. Cervical rib causing occlusion of the Subclavian arteryand thoracic outlet syndrome. Journal of Vascular Medicine and Surgery.2015.3:202.
10. Criado E, Berguer R, Greenfield L.The spectrum of arterial compression at the thoracic

outlet.J Vasc Surg.2010.52:406-411.
11. DK sharma,Vishnudutt,Vandana Sharma,Mrithunjay Rathore.Prevalence of cervical rib and its association with gender,body side,handedness and other thoracic bony anomalies in a population of Central India.Indian Journal of Basic and Applied Medical Research.March 2014.vol.3Issue.2.593-597.
12. Tubbs RS,Salter EG,Oakes WJ.Klippel Feil Anomaly with associated rudimentary cervical ribs in a human skeleton:case report and review of literature.Folia Morphol(Warsz).2006 Feb;65(1):92-4.
13. Jessica Bots, Liliane C D Wijnaendts, Sofie Delen, Stefan Van Dongen, Kristiina Heikinheimo, and Frietson Galis. Analysis of cervical ribs in a series of human fetuses.J Anat. 2011 Sep; 219(3): 403–409.
14. Galis F, Van Dooren TJ, Feuth JD, Metz JA, Witkam A, Ruinard S, Steigenga MJ, Wijnaendts LC. Extreme selection in humans against homeotic transformations of cervical vertebrae.Evolution. 2006 Dec;60(12):2643-54.