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Case Report

Synostosis of C7 and T1 with Bilateral Incomplete Foramen Transversarium in T1

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ABSTRACT

The fusion of cervical vertebrae is seen in Klippel-Feil syndrome. We found a fused bone in which the C7 and T1 vertebrae are fused. Incomplete or forming foramen transversarium [FT] is seen on the transverse process of T1. Costal facets are seen on the body and transverse process of T1 along with an incomplete or forming foramen transversarium. The incomplete foramen were seen bilaterally and of similar size. Knowledge of this rare variation will guide the radiologists for diagnosis and spine surgeons to decide the course of the surgery.

KEY WORDS: Klippel-Feil Syndrome, Incomplete foramen transversarium, Synostosis, Cervical vertebral fusion syndrome, Vertebral artery.

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INTRODUCTION

The thoracic spine consists of seven cervical vertebrae with an intervertebral disc in between them. 1st, 2nd and 7th vertebrae are atypical while 3rd to 6th vertebrae are typical cervical vertebrae. 1st and 2nd cervical vertebrae are called atlas and axis respectively. 7th cervical vertebra C7 is also called vertebra prominens due to prominent horizontal placed spine. A foramen transersarium [FT] is seen on transverse process. Vertebral vein is the only structure passing through 7th foramen transversarium, while vertebral artery and vein pass through first six foramen transversarium [1].

Klippel –Feil Syndrome (KPS) is a congenital anomaly in which abnormal fusion of any two cervical vertebrae is seen [2,3].

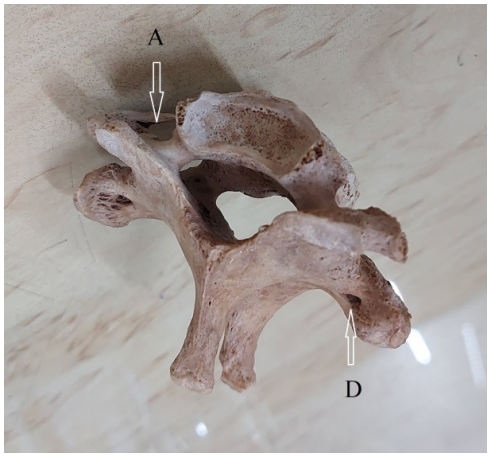
This condition is also called cervical vertebral fusion syndrome [4].

Maurice Klippel and Andrew Feil also gave a classification of three stages of KPS involving the cervical vertebrae. Fiel A also gives a classification of KPS including the thoracic and lumbar vertebrae. Clinical triad of short neck, low hairline and limited neck movements is seen in KPS [5,6].

CASE REPORT

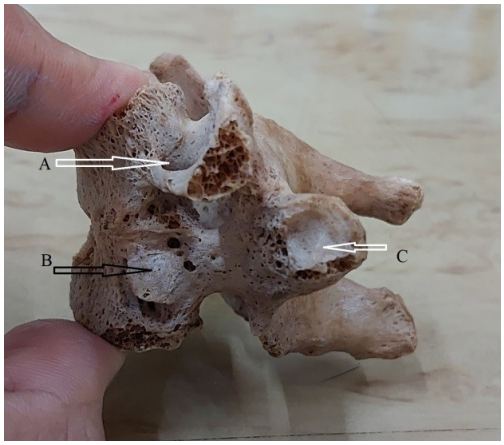
During routine 1st MBBS osteology classes, we found an osteology specimen showing synostosis of 7th cervical vertebra and 1st thoracic vertebra. [Fig. 1,2,3] We saw fusion of bodies of both vertebrae with intervertebral disc completely absorbed inside the body. The transverse processes of both vertebrae are also fused. Costal facets are seen on body and transverse process of 1st thoracic vertebra. Foramen transversarium is seen on transverse process of 7th cervical vertebra. Small pits denoting incomplete or forming foramen

tranversarium are seen on transverse process of 1st thoracic vertebra. [Fig 1 & 3] Spine of 7th cervical vertebra is rounded while the spine of 1st thoracic is pointed. Spines of both vertebrae are directed backwards and horizontally placed. [Fig. 2] All observations were noted and photographed.



A – Foramen transversarium of C7
D – Incomplete or forming foramen transversarium of T1

Fig. 1: Fusion of C7 and T1 – Superior view



A – Foramen transversarium of C7
B – Costal facet on body of T1
C – Costal facet on transverse process of T1

Fig. 2: Fusion of C7 AND T1 – Lateral view

A – Foramen transversarium of C7
C – Costal facet on transverse process of T1
D – Incomplete or forming foramen transversarium of T1

Fig. 3: Fusion of C7 and T1

DISCUSSION

During development, division of para axial mesoderm into sclerotome and dermatome is seen. At the time of organogenesis, the process of segmentation and differentiation of vertebrae takes place. Any vascular insufficiency during 3rd to 8th week of intra uterine life gives rise to non-segmentation of primitive sclerotome thus forming abnormally fused vertebrae [4].

Ryu RC et al [7] report a case of congenital fusion between C7 and T1 vertebrae which is similar to our case. While Manju et al [4] describes a rare case of fusion of C7, T1 and T2 vertebrae to form a single bone. They mention fusion of the three bodies and spines. Foramen transversarium [FT] was seen for C7. Gupta et al [8] found FT in left transverse process of T1 vertebra. The foramen was near the root of transverse process.

Incomplete foramen transversorum [FT] is formed due to incomplete formation of the foramen on transverse process. Sheikh A et al [9] report 2.27 % incomplete single FT in C7 on left side. They found incomplete double FT on right side in 7.32 % in typical cervical and 11.36% in C7. While on left side they found double incomplete FT in 8.54% typical cervical and 2.27% in C7 cervical vertebrae. Murlimanju B V et al [10] reported accessory FT in 1.6% cases. C6 and C7 showed more incidence of accessory foramen than other cervical vertebrae. They state that absence of foramen points towards absence of vertebral artery.

Incomplete FT in atlas is also reported by Wysocki et al [11]. They report double FT in 15.87% on right and 11.11% on left in male C7 bones. In female bones they found 17.64% on right and 10.81% on left. A rare case of triple FT was seen on left in one (1.58%) male C7 bone. Absent FT was seen in one male C7 on right side. Presence of FT in T1 vertebra was seen in a single right side bone.

Sabnis A [1] reported cases of incomplete and double FT. Author states that accessory branches of vertebral artery can be the reason for duplication of FT. Thickness of the foramen is proportional to calibre of the artery. Vein and nerve may occupy the

accessory foramen. Knowledge of such variations will be helpful for Surgeons and radiologists

CONCLUSION

Fusion of C7 and T1 vertebrae which is Klippel –Feil Syndrome (KPS) is noted. Incomplete or forming FT on transverse process of T1 is also seen. Prior knowledge such variation will guide the radiologists for diagnosis and spine surgeons in planning the course of operative procedures.

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Author Contributions

Patel Dinesh K – Concept development, Material and methods, references,

Shiinde Amol A – Introduction, Discussion, Manuscript preparation.

Conflicts of Interests: None

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