

INCIDENCE AND CLINICAL IMPLICATIONS OF PTERYGOSPINOUS BAR BY OSSIFICATION OF PTERYGOSPINOUS LIGAMENT IN DRY ADULT HUMAN SKULL IN SOUTH TELANGANA REGION: AN OSTEOLOGICAL STUDY

Sampada P Kadadi¹, Drakshayini B Kokati², Jayaprakash B R³

Received : 02/02/2023
Received in revised form : 04/03/2023
Accepted : 19/03/2023

Keywords:
Pterygospinous ligaments, Mandibular nerve, Spine of Sphenoid.

Corresponding Author:
Dr. Jayaprakash B R,
Email: jayaprakash1805@gmail.com

DOI: 10.47009/jamp.2023.5.2.286

Source of Support: Nil,
Conflict of Interest: None declared

Int J Acad Med Pharm
2023; 5 (2); 1362-1364



¹Associate Professor, Department of Anatomy, Vijayanagar Institute of Medical College, Ballari, Karnataka, India

²Associate Professor, Department of Anatomy, Kaher's Jgmm Medical College, Gabbur Cross, Hubli and Kle Academy of Higher Education Belagavi, Karnataka, India

³Associate Professor, Department of Anatomy, Government Medical College, Nalgonda, Telangana, India.

Abstract

Background: The Pterygospinous ligament extends backwards and laterally from the Pterygospinous process at the posterior border of lateral Pterygoid plate to spine of Sphenoid. Complete ossification of Pterygospinous ligament forms bony bridge called as Pterygospinous bar resulting in formation of complete Pterygospinous foramen (Civinini's foramen) resulting in compression of the lingual nerve between the bony bridge and medial pterygoid muscle causing lingual numbness, pain during talking and Chorda tympani nerve may also be compressed resulting in abnormal taste sensation in anterior 2/3rd of the tongue and may also interfere in mandibular nerve block. The present study aims at incidence of ossified pterygospinous ligament in dry adult human skull in South Telangana population and discusses its clinical implications. **Materials and Methods:** The present study includes 50 dry adult human Skull of unknown age and sex obtained during routine undergraduate teaching in the department of anatomy in our institution. Base of the skull was observed for presence of ossified pterygospinous ligament; complete or incomplete and unilateral or bilateral. **Result & Conclusion:** Ossified pterygospinous ligament was complete and unilateral in two skulls 4%. This variation is important for dental surgeons, maxillofacial surgeons, radiologists, anesthetists and anatomists.

INTRODUCTION

The pterygospinous ligament usually attached from lateral pterygoid plate to spine of sphenoid bone. It may sometimes ossified, forming a foramen, which can be traversed by mandibular nerve branches to supply temporalis, masseter and lateral pterygoid muscle.^[1] In 1837, Civinini described the pterygospinous ligament and found that this ligament ossified in 2% to 3% of his specimen.^[2] The pterygospinous ligament and ossified foramen formed is named after Civinini.^[3] The complete ossification of pterygospinous ligament is known as the pterygospinous bar.^[4] Partial or complete ossification of pterygospinous ligament seems to be a major cause of trigeminal neuralgia,^[5] causing lingual numbness and pain associated with speech impairment.^[6] Knowledge of ossified pterygospinous ligament (Civinini ligament), pterygospinous foramen (Civinini's foramen) and

pterygospinous bar are important for anatomists, radiologists, anthropologists, neurosurgeons, maxillofacial surgeons, dental surgeons and anaesthetists especially while treating Trigeminal neuralgia and also while performing surgical operations on the pterygoid region.^[7]

Aims and Objectives

The present study aims at incidence of ossified pterygospinous ligament in dry adult human skull in South Telangana population and discusses its clinical implications.

MATERIALS AND METHODS

The present study includes 50 dry adult human Skull of unknown age and sex obtained during routine undergraduate teaching in the department of anatomy in our institution. Only intact Skulls were included for the study. Skull with other variations, broken and damaged ones were excluded. Base of

the skull was observed for presence of ossified pterygospinous ligament; complete or incomplete and unilateral or bilateral.

RESULTS & DISCUSSION

Out of 50 dry adult human Skull, ossified pterygospinous ligament was complete and unilateral in two skulls 4%.



Figure 1: a & b- Showing the base of the dried adult human skull with right and left complete ossified pterygospinous ligament with Civinini's foramen of different skulls respectively.



Figure 2: Showing the base of the 50 dried adult human skulls.

The ossified Pterygospinous ligament has been considered as a phylogenetical remnant in humans.^[8] The pterygospinous ligament ossification is very rare.^[9,10] Therapeutic approach to access foramen ovale may be difficult due to pterygospinous bar.^[11] The pterygospinous ligament ossification located close to foramen ovale and of anatomical, clinical and surgical importance because trigeminal neuralgia occurs by compression of neurovascular structures in region of foramen ovale.^[12] The presence of pterygospinous bar means that there would be less accessible space to gain entry into the para and retro pharyngeal space.^[8] Due to large pterygoid plate, the lingual nerve and the inferior alveolar branch of mandibular nerve in infratemporal fossa may take a long curved course and during contraction of pterygoid muscles these nerves are subjected to compression.^[13] The lingual nerve unusual course with entrapment was found between the ossified pterygospinous ligament and medial pterygoid plate.^[14] The taste sensation in anterior 2/3rd of the tongue impaired due to compression of Chordatympani nerve by pterygospinous bar involvement.^[15] For mandibular anaesthesia, lateral pterygoid plate forms an important landmark and anomalies in lateral pterygoid plate confuses the anaesthetists and also cause difficulty during thermocoagulation of trigeminal ganglion.^[16] Presence of an ossified

pterygospinous ligament can be an obstacle in a radiographically guided trigeminal ganglion blockage. Various researchers found that the pterygospinous ligament ossification either complete or incomplete and some found the incidence unilateral and some bilateral.^[4,5,9,13,17-22] Pinar et al study shows pterygospinous ligament ossified completely in 12 cases (3.32%) and incompletely in 35 cases (9.69%) out of 361 dry skull bones.^[22] Kapur et al emphasized that the presence of such an ossified Pterygospinous ligament may prevent anaesthesia of mandibular nerve at the lateral subzygomatic approach.^[23] The present Skull shows complete ossification of pterygospinous ligament on right side (unilateral) resulting in a well formed pterygospinous foramen. In most of the studies the incomplete variety was more common than complete one and unilateral variety was more common than the bilateral variety.

CONCLUSION

The Complete ossified pterygospinous ligament can produce various symptoms of neurovascular compression. Also leads to difficulty while performing surgical operation while accessing into para and retropharyngeal space due to increase in width of lateral pterygoid plate. The knowledge of anatomical variation of the pterygospinous ligament- ossification is clinically important to radiologists, neurosurgeons, maxillofacial, dental surgeons, and anaesthetists as anomalous bony obstructions could interfere positioning the needle during transfacial needle approaches to foramen ovale.

REFERENCES

1. Standring S. Grays Anatomy. The Anatomical basis of clinical practice. 40th edition Edinburgh; Elsevier Churchill Livingstone, 2005: p.540.
2. Civinini F: The pterygospinous ligament as described by Filippo Civinini Pistoiese in 1837 [in Italian]. Arch sc med-fis Toscana 1, 1837; 381–387.
3. Shane Tubbs R et al. Ossification of ligaments near the foramen ovale; An Anatomic study with potential clinical significance regarding transcutaneous approaches to the skull base. Neurosurgery; 2009; 65(1): 60- 64.
4. Antonopoulou M, Piagou M, Anagnostopoulou S: An anatomical study of the pterygospinous and pterygoalar bars and foramina.Their clinical relevance. J Craniomaxillofac Surg 2008; 36: 104–108.
5. Nayak SR, Saralaya V, Prabhu LV, Pai MM, Vadgaonkar R, D'Costa S: Pterygospinous bar and foramina in Indian skulls: Incidence and phylogenetic significance. Surg Radiol Anat 29, 2007: 5–7.
6. Peuker ET, Fischer G, Filler TJ: Entrapment of the lingual nerve due to an ossified pterygospinous ligament. Clin Anat 2001; 14: 282–284.
7. Srijit Das and Shipra Paul. Ossified Pterygospinous ligament and its clinical implications. Bratisl Lek Listy, 2007; 108 (3): 141 -143.
8. Ludinghausen M., Kageyama I., Miura M., and Aikhatib M., Morphological peculiarities of the deep infratemporal fossa in advanced age, Surgical and Radiologic Anatomy 2006; 28 (3): 284–292.

9. 9. Shinde V. S., Mallikarjun M., and Patil R., A study on an ossified pterygospinous ligament, *Journal of Clinical and Diagnostic Research* 2011; 5 (5): 978–979.
10. 10. Shweta Solan and Gokul Krishna Reddy Nune. Anomalous ossified pterygospinous ligament in eastern Zone- a case study. *IOSR-JDMS* 2014; 13 (4): 60-62.
11. 11. Suazo G, Zavando, M. D, Smith, R.L. Anatomical Study of the Pterygospinous and Pterygoalar Bony Bridges and Foramens in Dried Crania and its Clinical Relevance. *Int. J. Morphol.*, 2010; 28(2):405-408. 19
12. 12. Faig-Leite H, Faig-Leite FS, Fernandes RG. Anatomia do ligamento pterigoalar e do forame crotafítico bucinatório [resumo]. *Int J Morphol*, 2007; 25:15.
13. 13. Krmpotić-Nemanić J., Vinter I., Hat J., and Jalsovec D., Mandibular neuralgia due to anatomical variations, *European Archives of Oto-Rhino Laryngology*, 1999; 256 (4): 205–208.
14. 14. Soubhagya R Nayak, Rajalakshmi Rai. An unusual course and entrapment of the lingual nerve in the infratemporal fossa. *Comp. Anat*, 2008; 109[11]; 525-527.
15. 15. S. Das and S. Paul, Ossified pterygospinous ligament and its clinical implications, *Bratislavské Lekárske Listy* 2007; 108 (3): 141–143.
16. 16. Lang J., Skull base and related structures. Schattauer, Stuttgart, 1995: p.300 -311.
17. 17. Peker T., Karaköse M., Anil A., Turgut H. B., and Gulekon N., The incidence of basal sphenoid bony bridges in dried crania and cadavers: their anthropological and clinical relevance, *European Journal of Morphology*, 2002; 40 (3): 171–180.
18. 18. Yadav Anjoo et al. Pterygospinous bar and foramen in the adult Human skulls of North India; Its incidence and clinical relevance. *Anatomy research International*. Article id. 286794, 2014.
19. 19. Verma R. K., Rani A., Chopra J., Pankaj A. K., and Kumar N., Civinini Bar: incidence in North Indians and its clinical relevance, *NJCA* 2013; 2 (3): 128–133.
20. 20. Agarwal B., Gupta M., and Kumar H., Ossified ligaments of the skull, *Journal of the Anatomical Society of India*, 2012; 61 (1): 37–40.
21. 21. Wood J. F., The non-metrical morphological characters of the skulls as criteria for racial diagnosis, *Journal of Anatomy* 1931; 65: 179–195.
22. 22. Atamaz-Pinar Y., Arsu G., Aktan-Ekiz Z. A., and Bilge O. Pterygospinous and pterygoalar bridges, *Sendrom*, 2004; 16 (7): 66–69.
23. 23. Kapur E., Dilberović F., Redzepagić S., and Berhamović E., Variation in the lateral plate of the pterygoid process and the lateral subzygomatic approach to the mandibular nerve, *Medicinski arhiv*, 2000; 54 (3): 133–137.