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Original Research Article

Anatomical Study on Ossification of Tentorium Cerebelli over the Trigeminal Notch

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ABSTRACT

Background: The tentorium cerebelli is one of the folds of dura mater and the trigeminal nerve passes between the tentorium cerebelli and the trigeminal notch. The ossification of tentorium cerebelli over trigeminal notch is rare and it causes the compression of trigeminal nerve leading to trigeminal neuralgia. Considering lacunae in the studies on the ossification of tentorium cerebelli over the trigeminal notch in the Indian context, this study attempts to delineate the incidence of ossified tentorium cerebelli in Tamil Nadu population of India.

Materials and Methods: One hundred and sixteen (116) dry human skull and 40 sagittal section of wet skull specimens were examined. The presence of ossification of tentorium cerebelli was noted by macroscopic examination with naked eye. Results were tabulated and statistical analysis done.

Results: In the present study out of 116 dry skulls, 7 (6.03%) skull bones showed partial or incomplete ossification of tentorium cerebelli and in wet specimens, 2 (5%) sagittal sections showed partial or incomplete ossification of tentorium cerebelli out of 40 sections.

Conclusion: The knowledge of incidence of ossified tentorium cerebelli is essential for surgeons performing surgical decompression of the trigeminal nerve. This paper adds to the morphological data of the Tamil Nadu population, which would be of use to the neurosurgeons working in this area.

Key words: Skull, ossification of tentorium cerebelli, entrapment, decompression, incidence.

INTRODUCTION

Tentorium cerebelli is a tent shaped sheet of dura mater which covers the cerebellum and passes under the occipital lobes of the cerebral hemispheres. The convex outer limit of the tentorium is attached posteriorly to the lips of the transverse sulci of the occipital bone and the posterior-inferior angles of the parietal bones. Laterally, the tentorium is attached to the superior borders of the petrous temporal bones. Near the apex of the petrous temporal bone, the lower layer of the tentorium is evaginated anterolaterally under the superior petrosal sinus to form a recess between the endosteal and meningeal layers in the middle cranial fossa. This recess is the trigeminal cave and contains the roots and ganglion of the trigeminal nerve. The evaginated meningeal layer fuses in front with the anterior part of the trigeminal ganglion. At the apex of the petrous

temporal bone, the free border and attached border of the tentorium cross each other. The anterior ends of the free border are fixed to the anterior clinoid processes and the attached border to the posterior clinoid processes. [1] The porus trigeminus or opening of Meckel's cave is oval ring like passage present just lateral to apex of the petrous part of temporal bone which leads into trigeminal cave. The porus trigeminus bounded below by trigeminal notch and above by tentorium cerebelli through which trigeminal nerve passes from the posterior cranial fossa to trigeminal cave.

Some mammals, such as the cat, dog, dolphin, mink, and porpoise have bony tentoria as a normal feature. Therefore, development of a few areas of ossification in the human falx and tentorium not particularly surprising. [2] Amongst adult carnivores and cetaceans; the tentorium is also often partially or completely ossified, resembling bone formation in the endosteal duramater. [3]

The ossification of tentorium cerebelli has also been attributed to be one of the most important causes of trigeminal neuralgia. The knowledge of this clinical condition is essential for the neuro surgeons operating in this area. There is a paucity of information regarding the incidence of ossified of tentorium cerebelli in the literature. The present study aims to estimate the incidence of ossified of tentorium cerebelli over the trigeminal notch in Tamil Nadu population of India.

MATERIALS AND METHODS

Data for this study are comprised of one hundred and sixteen (116) dry human skulls and 40 sagittal sections of wet skull specimens were examined irrespective of sex and age belonging to Tamil Nadu population. The collection was obtained from the Department of Anatomy, VMKV medical college, Salem, India.

As criteria of inclusion, none of the skull presented fractures, malformations, damage due to conservation or pathologies that could influence the development of the studied region. The presences of ossification of tentorium cerebelli are noted by macroscopic examination with naked eye. Results were tabulated and statistical analysis done.

RESULTS

In the present study out of 116 dry skulls, 7 skull bones showed partial or incomplete ossification of tentorium cerebelli. Out of these 7 skull bones bilateral ossification were found in 5 skulls and unilateral of both right side and left side (Table-1). In wet specimens, in 2 sagittal sections, showed partial ossification of tentorium cerebelli out of 40 sections out of which one belonged to right side and one belonged to left side (Table-2).

Table 1: Ossification of tentorium cerebelli in dry skulls. (n=116)

Tentorium cerebelli in skulls	Unilateral		Bilateral
	Right side	Left side	
Normal	-	-	109(93.9%)
Partial ossification	1(0.8%)	1(0.8%)	5(4.3%)

Table 2: Ossification of tentorium cerebelli in specimen. (n=40)

Tentorium cerebelli in specimen	Right side	Left side	Total
Normal	*13*(32.5%)	*25*(62.5%)	*38*(95%)
Partial ossification	*1*(2.5%)	*1*(2.5%)	*2*(5%)

DISCUSSION

In discussing about ossification of tentorium cerebelli, many radiology textbooks use the term calcification and make no mention of ossification. The mineralization of tentorium, as visualized on radiographs is in fact ossification and not calcification. In study carried out of 18 consecutive autopsy cases, one case showed evidence of mineralization tentorium. In one case the free edge of the tentorium was also involved. The areas showing mineralized

were excised and submitted for histological study and the result showed each specimen was composed of osseous tissue complete with bone marrow elements. [2]

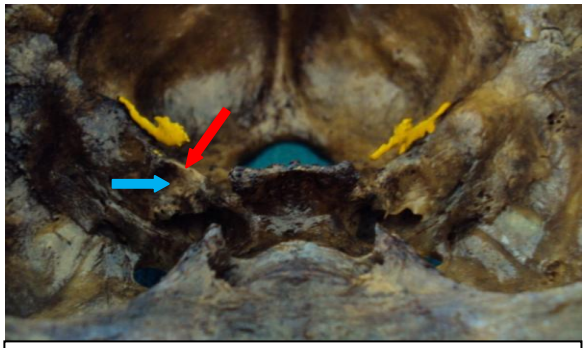

Figure: 1 – Yellow painted part represents ossified part of tentorium cerebelli, Red arrow: Trigeminal notch, Blue arrow: Trigeminal impression

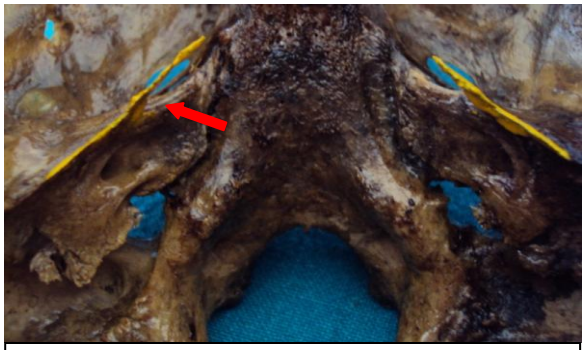

Figure: 2 – Yellow painted part represents ossified part of tentorium cerebelli, Red arrow: Trigeminal notch.

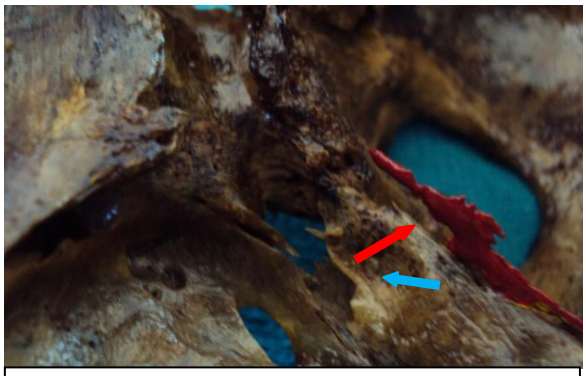

Figure: 3 – Red painted part represents ossified part of tentorium cerebelli, Red arrow: Trigeminal notch, Blue arrow: Trigeminal impression.

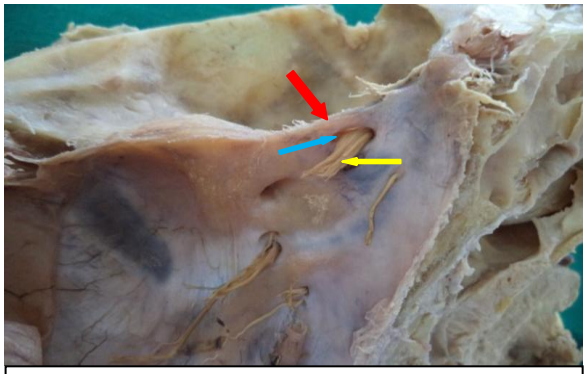

Figure: 4 – Red arrow represents ossified part of tentorium cerebelli, White arrow: Trigeminal nerve, Blue arrow: Porus trigeminus.

Intracranial calcifications causes are many. The most common sites are also many which include the tentorium also. Calcifications of the tentorium cerebelli occur in about 10% of elderly population. Dural and tentorial calcifications are usually seen in a laminar pattern and can occur anywhere within the cranium. [4]

The ossification of tentorium is due to increased serum parathormone levels due to inadequately treated hyperphosphatemia in elderly chronic renal failure patient leads to secondary hyperparathyroidism and extra osseous calcification of soft tissues. Ingested calcium is deposited in extra osseous sites, possibly because it cannot be deposited in bones. [5]

As consequence of ossification of tentorium cerebelli over trigeminal notch, it leads to compression of the trigeminal nerve root or ganglion resulting in Trigeminal neuralgia or tic douloureux. It is unique among neuropathic pain syndromes because it is treatable by a surgical technique. The other cause for trigeminal neuralgia occurred because of scar tissue that compressed the nerve root or ganglion in the middle cranial fossa [6] and with Chiari II malformation. [7]

A dural spur was formed as a sequel to ossification of the duramater (tentorium

cerebelli). During acceleration and deceleration accidents, it can cause severe damage to the brain, leading to sudden death. [8] Compression of brain stem due to excessive ossification of tentorium cerebelli can cause acquired aqueductal stenosis leads to chronic obstructive hydrocephalus. [9]

CONCLUSION

The present study adds knowledge of incidence of ossified tentorium cerebelli over the trigeminal notch is essential for surgeons performing surgical decompression of the entrapped trigeminal nerve in trigeminal neuralgia. The authors recommend cross-sectional studies with large sample size taking into account additional parameters like the age and gender of the bones in future.

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REFERENCES

1. Susan Standring. Gray's Anatomy. The Anatomical Basis of Clinical Practice. Churchill Livingstone. 2008; 39: 733-734.
2. S. Batnitzky, J.M. Powers, M.M. Schechter. Falx "calcification" - Does this Exist ?. Neuroradiology.1974; 7: 255-260.
3. Nathan Jeffery. Differential regional brain growth and rotation of the prenatal human tentorium cerebelli. J. Anat. 2002; 200: 135–144.
4. Yılmaz Kıroglu, Cem Callı, Nevzat Karabulut, Cagatay Oncel. Intracranial calcifications on CT. Diagn Interv Radiol. 2010; 16:263–269.
5. Sushil Razdan, KK Pandita, Vanilla Chopra, Sanjay Koul. New-onset headache in an elderly man with uremia that improved only after correction of hyperphosphatemia ("uremic headache") : a case report. Journal of Medical Case Reports.2011; 5:77.
6. Jeffrey Alan Brown. Percutaneous Balloon Compression for Trigeminal Neuralgia. Clinical Neurosurgery.2009; 56: 73-78.
7. R. Shane Tubbs, Martin M. Mortazavi, Joseph Miller, Mohammadali M. Shoja, Marios Loukas, Aaron A. Cohen-Gadol. Ossification of the Human Tentorium Cerebelli. Biomedicicine. 2012;3:34-38.
8. M. Sharma, B. Singh, A. Abhaya, H. Kumar. Occipitalization of atlas with other associated anomalies of skull. Eur J Anat.2008; 12 (3), 159-167.
9. Mehmet Turgut, Yusuf Z. Aral, Yelda Ozsunar. Autosomal recessive osteopetrosis as an unusual cause of hydrocephalus, extensive calcification of tentorium cerebelli, and calvarial hyperostosis – Case report. J Neurosurg Pediatrics.2000; 5:419-421.

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