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 evacinated 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 evacinated 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 tentorium cerebelli in the literature. The present study aims to estimate the incidence of ossified 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>
<thead>
<tr>
<th>Tentorium cerebelli in skulls</th>
<th>Unilateral</th>
<th>Bilateral</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Right side</td>
<td>Left side</td>
</tr>
<tr>
<td>Normal</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Partial ossification</td>
<td>1 (0.8%)</td>
<td>1 (0.8%)</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Tentorium cerebelli in specimen</th>
<th>Right side</th>
<th>Left side</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Normal</td>
<td>13 (32.5%)</td>
<td>25 (62.5%)</td>
<td>38 (95%)</td>
</tr>
<tr>
<td>Partial ossification</td>
<td>1 (2.5%)</td>
<td>1 (2.5%)</td>
<td>2 (5%)</td>
</tr>
</tbody>
</table>

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]

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 ...
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.

ACKNOWLEDGEMENTS

The authors sincerely wish to thank the management, administrators and the Professor and Head of the department of Anatomy of Vinayaka Missions Kirupananda Variyar Medical College, Salem for their whole hearted support and permissions to utilize their resources and conduct this study. The authors acknowledge the great help received from the scholars whose articles cited and included in references of this manuscript. The authors are also grateful to authors/editors/publishers of all those articles, journals and books from where the literature for this article has been reviewed and discussed. Authors are grateful to IJHSR editorial board members and IJHSR team of reviewers who have helped to bring quality to this manuscript.

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How to cite this article: Perumal A, Gayathri M. Anatomical study on ossification of tentorium cerebelli over the trigeminal notch. Int J Health Sci Res. 2014;4(6):52-55.