

Original Article

INCIDENCE AND MORPHOMETRY OF BONY PROJECTIONS ON THE CEREBRAL ASPECT OF THE PETROMASTOID PART OF TEMPORAL BONE IN ADULT HUMAN SKULLS

Akhtari Afroze¹, S. M. Akram Hossain² & Lutfur Rahman³

ABSTRACT:

Objective: To find out the incidence, side, position and morphometry of bony projections on the cerebral aspect of the petromastoid part of the temporal bone of dry adult human Bangladeshi skulls.

Design: It is an observational study. The incidence, side and position of the bony projections on the cerebral aspect of petromastoid part of temporal bone was ascertained by observation. The size of the bony projection was measured by millimeter scale.

Setting: Department of Anatomy, Rajshahi Medical College, Rajshahi, Bangladesh.

Results: Out of total 100 petromastoid part of temporal bone (50 human skulls) bony projection was present in 44 (44%) close to the upper part of the groove for the sigmoid sulcus. The bony projection was unilateral and bilateral in 12 (27.3%) and 32 (72.7%) cases respectively and the incidence was equal (50%) on both right and left side. The projections were small, medium and large size in 26 (59.1%), 15 (34.1%) and 3 (6.8%) cases respectively. Position of the superior petrosal sulcus was superior and inferior to the bony Projection in 34 (77.3%) and 6 (13.6%) cases. In 4 (9.1%) the sulcus was inconspicuous.

Conclusion: For an extensive exposure of clivus and petrous regions and their associated neural and vascular structures the tentorium cerebelli has to be dissected. The bony projection is closely related to the attachment of tentorium cerebelli and to the superior petrosal and sigmoid sinus. Thus awareness about its incidence and nature is important for the neurosurgeon and neurootologist to avoid any neurological and vascular accident.

KEYWORDS: Bony projections, Petromastoid, Temporal bone, Tentorium-cerebelli, Bangladesh.

1. Dr. Akhtari Afroze, M. Phil
Assistant Professor of Anatomy,
 2. Dr. S. M. Akram Hossain, M. Phil
Professor of Anatomy,
 3. Dr. Lutfur Rahman, FCPS, MS
Associate Professor of Neurosurgery,
- 1-3. Rajshahi Medical College,
Rajshahi-6000, Bangladesh

Correspondence:

Dr. Akhtari Afroze
Assistant Professor of Anatomy,
Department of Anatomy,
Rajshahi Medical College,
Rajshahi-6000, Bangladesh
E-mail: enam@libra.net

* Received for publication: December 6, 2001

Accepted: April 15, 2002

INTRODUCTION

The shape, form and contour of bones are commonly variable¹. The skull is much variable in its morphology as it is a complex of numerous skeletal elements. Many previous workers^{2,3,4} by their experiments have stated that, variability of form of the skull depends on race of the people, physiological event or pathology. Presence of bony projection on the cerebral aspect of petromastoid part of temporal bone has been described by several authors^{5,6}. The bony projection present at the superior border of the petromastoid part of the temporal bone close to the sigmoid sulcus could act as a pegs of attachment of the tentorium cerebelli, the diaphragm of the meningeal dura mater,

which remained attached to the horizontal part of the groove of the transverse and sigmoid sinuses Hollinshead and Cornelius⁷ have described that the sigmoid sinus is the continuation of transverse sinus. For an extensive exposure of clivus and petrous regions and their associated neural and vascular structures dissection of tentorium is required. Rhoton AL¹⁰ have stated that the presence of bony projection on the cerebral aspect of temporal bone is significantly helpful to reach petroclival, cerebellopontine angle and internal acoustic meatus by different approaches like transtemporal, transpetrosal, retrosigmoid, translabrynthin and combined supra and infra tentorial approach.

Thus awareness about the position of the bony projection on the cerebral aspect of the petromastoid part of temporal bone, its incidence and morphometrical knowledge is important for the neurosurgeon and neurootologist at surgery in this region.

This study was undertaken to evaluate the incidence, side, position and morphometry of the bony projection on the cerebral aspect of the petromastoid part of the temporal bone in dry adult human Bangladeshi skulls.

MATERIALS AND METHODS

This study was done on adult dry human skull irrespective of sex of Bangladeshi people. Fifty skulls with the vault were removed and two temporal bones belonging to the same skull were considered in this study. The study was done in the department of Anatomy, Rajshahi Medical College, Rajshahi from March 2001 to September 2001.

The incidence, side, position and relation of the bony projections to the sigmoid and superior petrosal sulci were noted. Assessment of the size of the bony projection was made carefully in mm with the help of millimeter scale to present a range of variations. Other bony features along the superior border or petromastoid part of temporal bone were observed. The deepness of sigmoid sulcus and presence of any emissary foramen within the

sulcus was also noted.

RESULTS

Among the 100-petromastoid parts of the temporal bones, the bony projection was present in 44 at the superior border of the petromastoid part of the temporal bone close to the upper part of the groove for the sigmoid sulcus. They were found to be present unilaterally in 12 (27.3%) and in 32 (72.7%) it was present bilaterally (table-I). The number of the bony projections were 22 on both right and left side (table-II). Their length ranged from being barely discernible by the naked eye to a maximum approximately 3 mm. The sizes of the projections were small (<1mm) in 26 (59.1%), medium (1mm-2mm) in 15 (34.1) and large (>2mm) in 3 (6.8%). (Table-II: Fig. 1, 2 & 3)

The sigmoid sulcus was deeper and better marked on the right in 37 (74%) skulls. The groove for the superior petrosal sinus was located either superior 34 (77.3%) or inferior 6 (13.6%) to the projection (fig. 1,2,& 3). In 4 (9.1%) that sulcus was inconspicuous. The mastoid emissary foramen of varying size was

Table-I: The incidence of laterality of bony projections

Temporal regions (100)	Bony projections (44)	Incidence of total projection (44%)
Unilateral	12	27.3%
Bilateral	32	72.7%

Table-II: The size of the bony projections of the two sides (Their number and percentage are given)

Sides	Small	Medium	Large
Right-22 (50%)	13 (59.1%)	7 (31.9%)	2 (9%)
Left-22 (50%)	13 (59.1%)	8 (36.4%)	1 (4.5%)
TOTAL	26 (59.1%)	15 (34.1%)	3 (6.8%)

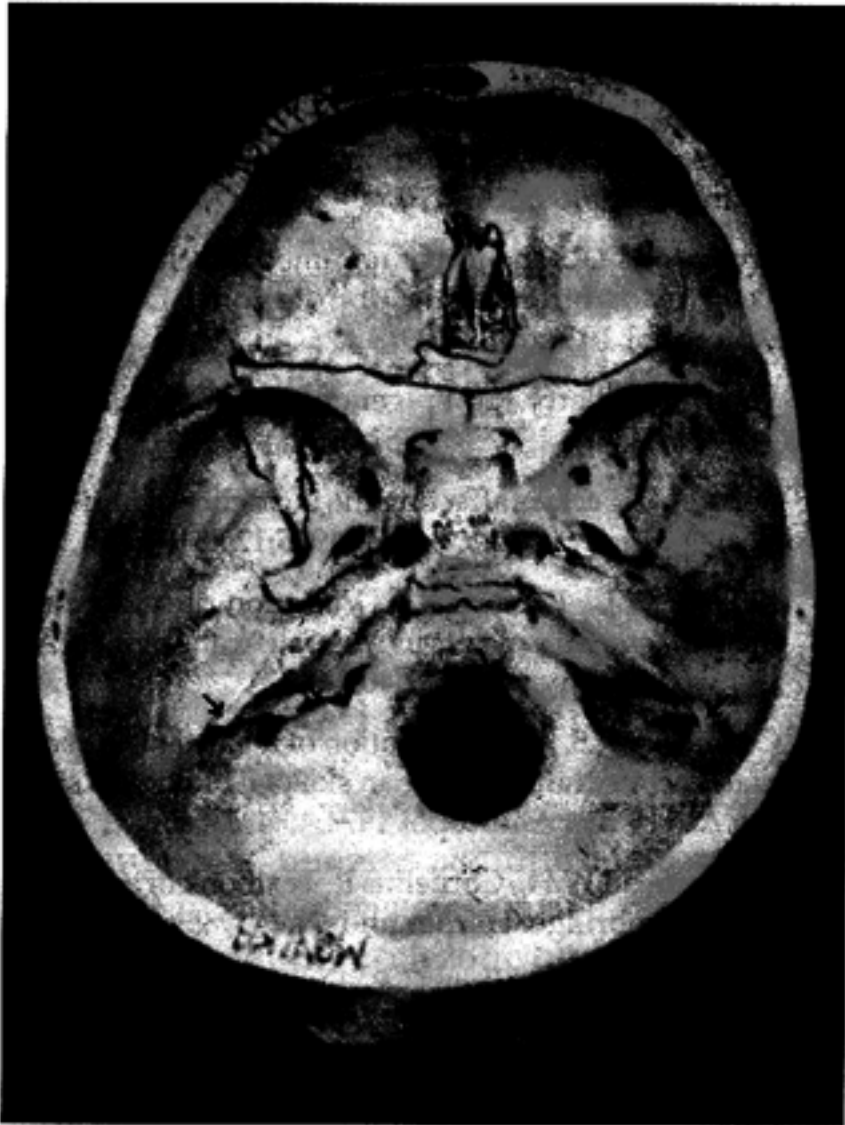


Fig. 1: Photograph of the cranial cavity viewed from above showing a medium size bony projection (arrow) on the left side and a large size bony projection (arrow) on the right, limiting the medial edge of the sigmoid sulcus as it is related to the superior border of the petromastoid part of the temporal bone. On both side the superior petrosal sulcus is superior to the projection.



Fig. 2: Photograph of the cranial cavity viewed from above showing a large size bony projection (arrow) on the left side and a medium size bony projection (arrow) on the right, limiting the medial edge of the sigmoid sulcus as it is related to the superior border of the petromastoid part of the temporal bone.

opened into the upper or middle part of the sigmoid sulcus in 64% cases.

DISCUSSION

In this study the total incidence of bony projection appears to be much more common than R. Choudhry⁹ findings. Presence of bilateral projection also found more common than the previous workers⁹. We found the bony projections equally distributed on both right and left side but in their study the bony projections were more commonly situated on the right side. Other morphometrical findings regarding the assessment of size of the projection was in accordance with them.

The position of the bony projection at the

superior border of the petromastoid part of temporal bone corresponds to the attached margin of tentorium cerebelli could acts as a peg for its attachment. The bony projection is thus closely related to the superior petrosal and sigmoid sinus and is significantly helpful to reach petroclival, cerebellopontine angle and internal acoustic meatus by different approach like transtemporal, transpetrosal, retrosigmoid, translabyrinthin etc.¹⁰ Sigmoid sinus is the continuation of transverse sinus⁷. Dissection of the tentorium cerebelli is required for an extensive exposure of clivus and petrous regions and their associated neural and vascular structures⁸. Thus awareness of the presence of bony projection in close proximity to the superior petrosal and sigmoid sinus and knowledge about

REFERENCES

1. Williams P.L., Warwick R., Dyson M., Bannister L.H. *Grays Anatomy*, 38th Edition, Edinburgh, Charchill Livingstone, 1995;269-270.
2. Brothwell D.R. The use of non-metrical characters of skull in differentiating populations. *Dtsch Ges Anthropol* 1958;6:103-109.
3. Berry A.C., Berry R.J. Epigenetic variation in human cranium. *J Ant* 1967;101:361-379.
4. Berry A.C. Factors affecting the incidence of non-metrical skeletal variants. *J Anat* 1975;120:519-535.
5. Kellock W.L., Parsons P.A. Variation of minor non-metrical cranial variants in Australian aborigines. *Am J Phys Anthropol* 1970;32:409-422.
6. Corruccini R.S. An examination of the meaning of cranial discrete traits for human skeletal biological studies. *Am J Phys Anthropol* 1974;40:425-445.
7. Hollinshead W.H., Cornelius R. *Textbook of anatomy*. Ed 4. Cambridge. Harper and Row 1985;686.
8. Spetzler R.F., Hamilton C.P., Daspit. *Clinical Neurosurgery*. Baltimore. Williams & Wilkins 1993;41:62-82.
9. Choudhry R., Tuly A., Choudhry S., Kakar S. and Raheja, S. Anatomical description and frequencies of bony projections on the cerebral aspect of the petromastoid part of the temporal bone in dry adult human skulls. *Acta Anat* 1998;162:56-60.
10. Rhoton A.L. The posterior cranial fossa, microsurgical anatomy and surgical approaches. *Neurosurgery*: 2000;47:211-253.



Fig. 3: Photograph of the cranial cavity viewed from above showing a small size bony projection (arrow) only on the right side, limiting the medial edge of the sigmoid sulcus as it is related to the superior border of the petromastoid part of the temporal bone. The superior petrosal sulcus is inferior to the projection.

its incidence and size is imperative for the neurosurgeon and neurootologist to avoid neurological and vascular damage.