ABSTRACT

Introduction: Epipptic bones found in the pterion, the sutural confluence point on the lateral face of the cranium between the frontal, parietal, temporal and sphenoid bones, have a pattern of formation that varies according to the population. The anatomic location of the pterion is important in surgical interventions following surgical approaches to the anterior and middle cranial fossae.

Aim: To study the morphology and morphometry of the epipptic bones.

Materials and Methods: Total 256 crania were analyzed and epipptic bones were found in 64. Of these crania, 33 were male and 31 female. After careful analysis with the naked eye, seeking to identify the presence of epipptic bones, they were classified according to their shape. Their height and width were obtained by means of digital calipers.

Results: Among the 64 crania in which epipptic bones were found, 51.56% were male and 48.44% female. The frequency of epipptic bones in all the cases was 19.14%. Morphologically, the irregular type occurred most frequently, followed by the triangular type. The length and height were also greater in the irregular and triangular types.

Conclusion: Knowledge of the morphological and morphometric variations of the epipptic bones is important in neurosurgery, especially in relation to surgical accesses that use the pterion; and also for forensic anthropologists, in evaluating incomplete archeological remains.

INTRODUCTION

The pterion corresponds to the site of the anterolateral fontanelle of the neonatal cranium, which disappears approximately three months after birth [1]. Wang et al., [2] classified the pterion into six types: Frontotemporal, in which the frontal and temporal bones are in direct contact; Sphenoparietal, in which there is contact between the sphenoid and parietal bones; Stellate, in which the frontal, parietal, temporal and sphenoid bones are connected at a single point; Zygomatic-parietal, in which the zygomatic bone has a tongue that connects to the parietal bone; Zygomatic-temporal, in which the zygomatic bone has an extension that connects to the temporal bone, thereby separating the sphenoid bone from the frontal and parietal bones; and Epipletic, in which a small sutural bone is found.

In relation to the development of sutural bones, there is still no unanimity regarding their occurrence. They are considered to be just a simple anatomical variation for which the mechanism of development is not fully understood [3]. When present in the region of the pterion, they are called epipptic ossicles, epipptic bones or even flower bones [4,5]. One or more epipptic bones may appear between the sphenoid angle, parietal bone and greater wing of the sphenoid bone [6]. According to Oguz et al., [7], exact knowledge of the location and relationships of the pterion on the left side of the cranium is of great importance in undertaking surgical interventions, particularly with regard to the course of the branches of the middle meningeal artery and the location of the speech motor area (Broca’s area). With the aim of expanding the knowledge of pterion, the present study had the objective of studying the morphology and morphometry of the epipptic bones.
MATERIALS AND METHODS
An anatomical study of descriptive nature was carried in 256 dry human crania that had been identified regarding sex and age and belonged to the Laboratory in Anatomy and Forensic Anthropology (LAFA), at the University Tiradentes Brazil, where all the skulls were examined, over 12 months from January 2015 to February 2016. The sample was selected from skulls of men and women who were perfect state of preservation anatomic.

First the examiners, consensually, identify and recognize at each of the skulls anatomically known as pterion. There have been no variability among the observers. Following this, the crania were carefully analyzed with the naked eye, and were classified according to their shape. Morphometric measurements (height and width) were obtained by means of digital calipers of precision to 0.01mm [Table/Fig-1]. There have been no limitations to carry out the study.

RESULTS
Among the 256 crania studied, 49 of them (19.14%) were seen to have epipetric bones (64 bones). Of these, 33 (51.56%) were in male crania and 31 (48.44%) in female crania. The frequency of epipetric bones was slightly higher in the male crania [Table/Fig-2].

The epipetric bones were classified into four morphological types: irregular, quadrangular, triangular and circular [Table/Fig-3]. The irregular type of morphological classification occurred most frequently, followed by the triangular type [Table/Fig-4].

![Table/Fig-1]: Morphometry of the epipetric bone. H – Height of the epipetric bone. W – Width of the epipetric bone.

<table>
<thead>
<tr>
<th>Morphological types</th>
<th>Sex</th>
<th>Total % (n)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Male</td>
<td>Female</td>
</tr>
<tr>
<td></td>
<td>% (n)</td>
<td>% (n)</td>
</tr>
<tr>
<td>Right</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Irregular</td>
<td>15.63 (10)</td>
<td>14.06 (9)</td>
</tr>
<tr>
<td>Triangular</td>
<td>3.13 (2)</td>
<td>3.13 (2)</td>
</tr>
<tr>
<td>Quadrangular</td>
<td>7.81 (5)</td>
<td>1.56 (1)</td>
</tr>
<tr>
<td>Circular</td>
<td>3.13 (2)</td>
<td>0.00 (0)</td>
</tr>
<tr>
<td>Total</td>
<td>29.7 (19)</td>
<td>21.88 (14)</td>
</tr>
</tbody>
</table>

The morphometric data (height and width) of the epipetric bones were generally slightly larger in the irregular morphological type [Table/Fig-5].

DISCUSSION
The frequency of epipetric bones has ranged from 2 to 51.4% according to the population studied [Table/Fig-6]. In the present study was found a frequency of 19.14%. This finding was closer to 18.5% found by Murphy [8] and 20.8% by Lee et al., [9]. The present findings are still very different compared to the ones found, in particular, in the Indian population [6]. The significance of the occurrence of such variation of pteric bones in the population, until now, has not found a satisfactory explanation.
As regards formation Annam and Baipe [14], agree with the hypothesis of Ranke [15], which can be the result of a possible failure to unite of the de um separate center of ossification with the greater wing of the sphenoid bone, during the ossification. The distribution and frequency of morphological types of pteric bones concerning the sex and side of the skull has not occurred predominance among these variables. Bhargavi et al., [16] considered as minimum these differences aside the skull and sex.

The presence of sutural bones in the pterion may be a pitfall within surgical guidance and recognition of this anatomical feature may make pterion craniotomy safer [14,17]. Furthermore, it may also be taken as the false impression of fractures when present in pterion region. In case of the real presence of a fracture, It may also be interpreted as presence of epipteric bone [6]. For this reason, knowledge of the morphology and morphometry of epipteric bones may become especially important for radiologists, with the aim of making possible to avoid diagnostic errors, and also for anthropologists, neurosurgeons and forensic pathologists in cases of trauma in this region.

**CONCLUSION**

Epipteric bones were present in 19.14% of the crania studied and the irregular form predominated in both sexes. Knowledge of the morphological and morphometric variations of epipteric bones is important in neurosurgery, especially for surgical access to the anterior and middle cranial fossae, in operations in the speech motor area (Broca’s area) and in repairs to aneurysms of the middle cerebral artery. Moreover, it is of interest in particular to forensic anthropologists, in evaluating incomplete archeological remains.

**REFERENCES**


AUTHOR(S):
1. Dr. José Aderval Aragão
2. Dr. Roberta de Oliveira Carvalho
3. Dr. Paula Gurgel Barreto
4. Dr. Felipe Matheus Sant’Anna Aragão
5. Dr. Iapunira Catarina Sant’Anna Aragão
6. Dr. José Roberto Pimenta de Godoy
7. Dr. Francisco Prado Reis

PARTICULARS OF CONTRIBUTORS:
1. Associado Professor, Department of Morphology and the Postgraduate Physical Education and Applied Health Sciences Programs, Federal University of Sergipe (UFS), and Titular Professor of the Medical School, Tiradentes University (UNIT), Aracaju, Sergipe, Brazil.
2. Medical Student, Tiradentes University (UNIT), Aracaju, Sergipe, Brazil.
3. Medical Student, Tiradentes University (UNIT), Aracaju, Sergipe, Brazil.
4. Medical Student, University Center of Volta Redonda (UNIFOA), Volta Redonda, Rio de Janeiro, Brazil.
5. Medical Student, University Center of Volta Redonda (UNIFOA), Volta Redonda, Rio de Janeiro, Brazil.
6. Adjunct Professor, Department of Morphology of the Federal University of Brasília (UnB).
7. Titular Professor, Medical School of Tiradentes University (UNIT), Aracaju, Sergipe, Brazil.

NAME, ADDRESS, E-MAIL ID OF THE CORRESPONDING AUTHOR:
Dr. José Aderval Aragão,
Rua Aloisio Campos 500, Bairro Atalaia, Aracaju, Sergipe, CEP: 49035-020, Brazil.
E-mail: jaafelipe@infonet.com.br

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