

WORMIAN BONES: SHAPE, LOCATION AND RELATION TO EACH OTHER

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The material of the study was the skull of an 8-year-old girl. In the craniotomy, the following were identified: on the right side, the bone of the sphenoid fontanel or epipteric bone; bones of lambdoid suture - on the right side in the amount of 5, on the left side - 1 bone; preinterparietal bone, ospreinterparietale. By the craniometric method, the height and width of the bones were determined. The bone of the sphenoid fontanelle or epipteric bone is located between the frontal, parietal bones, the greater wing of the sphenoid bone, and the squama of the temporal bone. The width of the epipteric bone is 16.5 mm, height 9.5 mm. The bones of the lambdoid suture in the amount of 5 on the right and the 1st on the left were located in an elongated state. The largest bone was located in the middle of the right lambdoid suture; apparently, it was formed by the union of at least two Wormian bones. Preinterparietal bone has a triangular shape, the base of the triangle facing the sagittal suture, the tip, slightly rounded - in the direction of the occipital bone. The lateral angles of the preinterparietal bone are serrated, which, in principle, clearly distinguishes it from the parietal bones. The bone was single, no sutures or grooves dividing the preinterparietal bone into parts were observed. The width of the bone is 18.5 mm, height 13.8 mm.

Key words: Wormian bones, skull, epipteric bone, bones of lambdoid suture, preinterparietal bone.

VORMI SÜMÜKLƏRİ: FORMASI, YERLƏŞMƏSİ VƏ BİR-BİRİNƏ MÜNASİBƏTİ

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Tədqiqat materialı olaraq 8 yaşlı qızın kəlləsindən istifadə olunmuşdur. Kranioskopiya zamanı aşağıdakılar müəyyən edilmişdir: sağ tərəfdə əsas əmgək sümüyü və ya epiptirik sümük; lambdayabənzər tikiş sümükləri – sağ tərəfdə 5, sol tərəfdə 1 ədəd; təpəarasionü, preinterparietal sümük, os preinterparietale. Kranimetrik üsulla sümüklərin hündürlüyü və eni aşkar edilmişdir. Əsas əmgək sümüyü və ya epiptirik sümük alın, təpə sümükləri, əsas sümüyün böyük qanadları və gicgah sümüyünün pullu hissəsi arasında yerləşmişdir. Epiptirik sümüyün eni 16,5 mm, hündürlüyü 9,5 mm-dir. Lambdayabənzər tikiş sümükləri sağ tərəfdə 5, sol tərəfdə 1 ədəd olmaqla uzunsov vəziyyətdədir. Ən böyük ölçülərə malik sümük sağ lambdayabənzər tikişin ortasında yerləşmişdir. Çox güman ki, bu sümük, ən azı iki Vormi sümüyünün birləşməsindən əmələ gəlmişdir. Təpəarasionü və ya preinterparietal sümük üçbucaq şəklindədir; üçbucağın əsası sagittal tikişə, bir qədər yuvarlaq zirvəsi isə, ənsə sümüyünə baxır. Preinterparietal sümüyün lateral bucaqları dişlidir; prinsipcə, bu, onu təpə sümüklərindən ayırd edir. Sümük təkdir, tikiş və ya sırımın preinterparietal sümüyü hissələrə ayırması müşahidə edilmir. Sümüyün eni 18,5 mm, hündürlüyü 13,8 mm-dir.

Açar sözlər: Vormi sümükləri, epiptirik sümük, lambdayabənzər sümük, preinterparietal sümük.

Introduction. Sutural, intercalated bones of the skull or Wormian bones are primarily characterized by extreme variability [1, p.3243-3251; 2, p. 146-155]. It manifests itself both in localization and in shape, size, especially in the frequency of manifestation. The latter depends on many factors, among which ethnicity also plays a special role [3, p.689-706]. In fact, despite their relatively small size, these bones are quite

unique anatomical formations; this is due to the fact that they are of interest to specialists of a rather wide profile - anatomists, anthropologists, neurosurgeons, forensic experts.

Wormian bones are not unique to modern man; they were present in the skull of the extinct links of evolution: in the skull, which is approximately 85-127 thousand years old, belonging to a woman from the “atypical”

group of Neanderthals (skull from Saccopastore, Italy), sutural bones were revealed in the lambda region [4, p.23-36].

Another uniqueness of additional bones or Wormian bones is that they are a kind of “markers” of certain hereditary diseases, mainly bone dysplasias. It is worth noting that the presence of these bones can do without pathologies from the systems that make up the body, they are, as it were, “variations of the norm”. Unfortunately, to this day there are no comprehensive indications in the literature or, as was noted in the work, “thresholds” beyond which the Wormian bones can be regarded as a clinical case [5, p.428-432].

To date, the Wormian bones are identified as anatomical formations, which are localized mainly at the place of the fontanelles and along the cranial sutures, especially the posterior sutures [1, p.3243-3251; 6, p. 130-131]. The sporadicity of their location is indicated. It should be emphasized that often revealing a certain regularity that can reveal the topography of the Wormian bones, is a rather difficult task.

There are fragmentary works that indicate a certain relationship between the presence of the Wormian bones on the same skull. It is well known that the Inca bone often coincides with the presence of Wormian bones in the skull. The sutural or Wormian bones can cover the entire thickness of the bone in which they are localized or located only on the outer surface. Cases are quite rare in which sutural bones are detected only on the inner surface of the bones.

The relevance of studies of the Wormian bones, of course, in the first place should be dictated by clinical considerations. In addition to the fact that, as mentioned above, these bones directly indicate many diseases (imperfect osteogenesis, increased intracranial pressure), they can also cause an erroneous diagnosis (for example, if a fracture is suspected).

An analysis of the literature shows that in recent decades, comprehensive studies have been undertaken around the World of the Wormian bones for their presence/ absence in a particular ethnic group. We will return to them in the discussion section.

While I would like to note that these studies, of course, are very important. In our opinion, one should not forget the needs of clinical practice; at the very least, craniometry, which is so closely related to neurosurgery, should be supplemented with recommendations regarding the possible presence of a Wormian bone at a particular craniometric point. After all, it is these points that are used as marks or orienteers for surgical interventions on the cranial vault. Another important point is the combined presence in the same skull of several, located in different places of the Wormian bones. There are certain researches in the literature in which cases with a diverse combination of the Wormian bones within the same skull are indicated; however, in these works, there are more statistics than attempts to investigate each Wormian bone separately. In our opinion, each of these cases should be analyzed separately and thoroughly. This will serve to improve the identification of patterns of the topography of these bones and their relationships.

Based on the foregoing, we decided to conduct a study on the skull, in which several Wormian bones are present simultaneously - both of fontanel and sutural.

Material and methods. The study material was the skull of an 8-year-old girl. The craniotomy revealed the following in the skull: on the right side - the bone of the sphenoid fontanel or epipteric bone; bones of a lambdoid suture - on the right side in an amount of 5, on the left side -1 bone; preinterparietal bone, ospreinterparietale. By the craniometric method, the height and width of the bones were determined.

Research results and discussion. 1.

The bone of the sphenoid fontanel or epipteric bone is located between the frontal, parietal bones, the greater wing of the sphenoid bone and the squama of the temporal bone (Figure 1).

It was clearly differentiated from the rest of the bones; with the exception of a small

on the right and 1 on the left were located in an elongated state (Figure 2).

The largest was a bone located in the middle of the right lambdoid suture; apparently, it was formed by the fusion of at least two Wormian bones. The edges of the bone are very serrated, the transverse size prevailing over the height. The size of this

**Figure 1.
Epipteric bone**

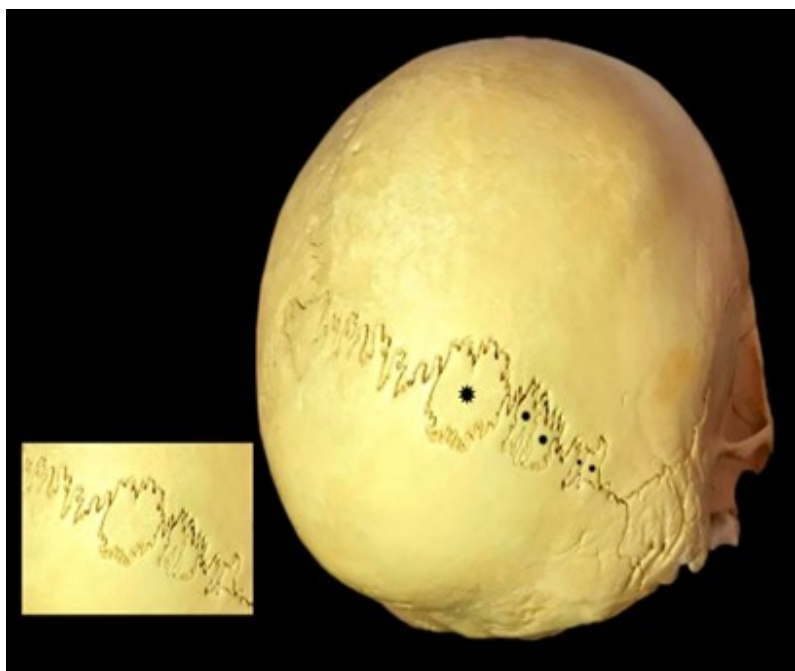


interval in the posterior-lower part. Here, the borders between the epipteric bone, the greater wing of the sphenoid bone, and the squama of the temporal bone, although present, but is “blurred”. Only the border outline is visible; compared to the upper and anterior-lower parts, it is not so clear. It is also necessary to note the vertical line following from the epipteric bone to the greater wing of the sphenoid bone. The width of the epipteric bone is 16.5 mm, the height is 9.5 mm. The edges did not form a notch, which would more characterize the suture bone. Also, a larger number of adjacent bones compared to sutural bones indicates a fontanelian, rather than a sutural origin. The shape of the bone is trapezoidal.

2. The bones of the lambdoid suture in 5

bone was as follows: width of -18.5 mm, a height of 13.8 mm. The remaining Wormian bones also had serrated edges, but the height of these bones was greater than the transverse size (width). Closer to the asterion, the size of the right Wormian bones began to decrease (especially the transverse). Still very close to the asterion, in the fifth Wormian bone, the transverse size again increased; the border between the 4 and 5th Wormian bones is not so clear and not jagged. Apparently, synostosis could be expected here. This is consistent with literature data indicating that throughout the course of a person’s life, the number of Wormian bones changes. The size of the Wormian bones of the right side of the lambdoid suture was as follows: the width of the second bone is 5.5 mm, height 13.5 mm;

Figure 2.
The bones of the lambdoid suture



width of the third bone 5.5 mm, height 11 mm; the width of the fourth bone is 2 mm, the height is 8.5 mm; the width of the fifth bone is 3.9 mm; the height is 9.5 mm.

The only one of the lambdoid suture on the left was a “standard” shape, elongated in the longitudinal direction, perpendicular to the lambdoid suture. Its width is 2.5 mm, height 10 mm.

3. The preinterparietal bone, os preinterparietale. There is a certain discrepancy in the name of this bone, which we will touch upon in the discussion. The preinterparietal bone has a triangular shape, the base of the triangle faces the sagittal suture, the apex slightly rounded toward the occipital bone. The lateral corners of the preinterparietal bone are serrated, which in principle clearly distinguishes it from the parietal bones (Figure 3). The bone was unified; no sutures or grooves dividing the premature bone into parts were not observed. The width of the bone is 18.5 mm, the height is 13.8 mm.

Localization on one skull of the Wormian bones, having different ranks

according to classification, is not a frequent phenomenon. A review of the literature shows that most studies emphasize the morphological features of one or the other Wormian bone; there are very few attempts to combine them and consider them in a complex. In the article [3, p.689-706], among other things, the authors touched on the problem of terminology, indicating that studies often do not differentiate between the preinterparietal bone and sutural bones (the first one was indicated as the Wormian bone, which further enhances the confusion). The fact that if the bone extends beyond the medial third of the lambdoid suture was especially emphasized, then it should be called interparietal. [7, p.429-438], analyzing a series of skulls from Bulgaria related to the Middle Ages and the modern period, they came to the conclusion that the preinterparietal bone is more common than the interparietal bone. [8, p.197-204], while studying fetal skulls, they came to the conclusion that the squamous part of the occipital bone, or rather that part of it that develops on the membranous base, has 1

Figure 3.
The preinterparietal bone



primary pair and 2 secondary pairs of ossification points. The manifestation of 4 pairs is also possible.

The interparietal bone (osinterparietale or Inca bone) develops when the fusion between the primary and secondary ossification points is disturbed. The preinterparietal bone develops from the 4th additional ossification point. In our opinion, this coincides in many respects with the opinion that the preinterparietal bones and bones of the posterior fontanel are confused and do not differentiate from each other by many authors. V.S.Speransky, A.I. Zaichenko (1980) wrote about this problem. However, this issue remains open, especially for adult skulls.

The prevalence of Wormian bones in the lambdoid suture is indicated in many works. [8, p.1687-1690] most of them were found on the left side of the lambdoid suture (40.7%). In [9, p.2331-2336], the authors touched on the clinical significance of the bones of the lambdoid suture by comparing these bones with fern leaves. One of the reasons for the

formation of these bones, according to researchers, is the artificial deformation of the skull. [10, p.373-382] give preference to the genetic factor in the formation of Wormian bones. According to the results of their study, based on 120 macerated skulls from East India, in 30% of cases, these skulls had more than one Wormian bone. If the number of these bones is more than 10, according to the authors, this case should be considered pathognomic.

The epipterion bone, according to the results of [11, p.363-365], constitutes a “surgical trap”. [12, p.325-328] emphasize the importance of pterion as a craniometric guideline for surgical intervention in the anterior and middle cranial fossae. The pterion is close to the middle meningeal artery, the Broca's speech center. The study of morphological features of the skull does not lose its relevance [13, p.63-67; 14, p.77-83; 15, p.78-79; 16, p. 66-68; 17, p. 253-255].

Thus, the Wormian bones of the skull, based on their theoretical and clinical significance, importance in anthropological

issues, require more attention. In our opinion, work with their comprehensive study, involving not only descriptive but also other research methods (explaining the mechanisms of occurrence, causes of prevalence in a particular population), having not only theoretical and statistical but also applied values, should be carried out in the future on a larger scale.

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