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ANTHROPOLOGY

ANCIENT HUMAN SKELETON (15th–19th CENTURIES) WITH MASTOID OSTEOMA, DISCOVERED IN IAȘI (ROMANIA)

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This study is focused on a case of mastoid osteoma, a benign tumor reported in a skeletal sample found at the "Adormirea Maicii Domnului" Roman Catholic Cathedral of Iași (Romania). The sample, containing 89 skeletons (children, adolescents, adults, mature and senile) originates from inhumation tombs and reburials, dating from the 15th–19th centuries. Bone benign tumors (osteomas) can be dangerous, as they may grow and compress the healthy tissues. Osteomas, quite rare in the temporal bone, could be caused by trauma, chronic infection, hormonal disfunctions, etc. The osteoma described in this paper was identified in the cranium of a mature male, in the mastoid area of the left temporal bone. Macroscopical examination, radiography and computed tomography (3D) were used to assess the cranium; the results show a homogeneous bone mass identified as an osteoma, a bone tumor type reported for archaeological samples.

Keywords: mastoid osteoma, radiography, computed tomography (3D), 15th–19th centuries, Iași – Romania.

1. INTRODUCTION

The archaeological research conducted in 1995 at the "Adormirea Maicii Domnului" Roman Catholic Cathedral of Iași (Iași county, Romania), led to the discovery of a necropolis with 89 inhumation skeletons coming from individual tombs and reburials. Based on the information provided by archaeologists, the skeletons (*children, adolescents, adults, mature* and *senile*) dated to the 15th–19th centuries. Bodies' orientation evidenced the Christian ritual. The preliminary estimation of sex indicates 36 males and 32 females. The anthropological study of this sample has not been finalized, nor published. In this article, we describe a single skeleton belonging to a mature male, and we report a mastoid osteoma identified on his skull.

Bone benign tumours can arise from the bone itself, from the cartilage or the soft tissues around the bone [31]. Osteoma is a benign tumor of mesenchymal osteoplastic nature, composed of well-differentiated osseous tissue with laminar structure [12].

Osteoma should be separated from ossification foci, namely reactive changes to pathological processes; osteomas are, instead, primary neoplasms [5].

The osteoma is the most common slow-growing benign osteogenic lesion, frequently affecting the skull and the paranasal sinuses. Morphologically, it appears as a sessile mass attached to the bone surface or as a pedunculated mass; it may be single or occasionally multiple, as in Gardner's syndrome [3]. The histology of cranial and facial osteomas is different. Osteomas of cranial bones are composed of mature lamellar bone, appearing as a circumscribed, ivory-like tumor, while those of facial bones are composed of immature bone and they are commonly related to a sinus, especially the frontal sinus [5].

Osteomas are rare in the temporal bone, mostly occurring in the external auditory canal, while mastoid osteomas are even rarer [13]. Generally, temporal bone osteomas represent 0.1% to 1% of all skull benign tumors [28]. Trauma, previous surgery, radiotherapy, chronic infection, and hormonal factors with disfunction in the hypophyseal gland are reported as causes of mastoid osteomas [16]. Osteoma affects more adult men than women, its frequency varying over time [5]. It also appears in animals, the oldest example of osteoma involving the dorsal vertebra of a *Mosasaurus* from the late Cretaceous [1]. Spectacular cases of "button" osteoma of the skull are reported by Moodie [21–23]: in an ancient Peruvian from Anćon; in an Egyptian of the Roman period [9]; in a pre-Hispanic Peruvian from Anćon [29]. A survey of osteomas in earlier British populations evidenced 17 cases on the skull: 7 in the frontal bone, 6 in the parietals and 4 in other regions [9].

2. MATERIAL AND METHODS

The preservation status of the skeleton examined in this study (codified as R12, originating from reburial) is unsatisfactory (precarious biometric and morphological data).

The age at death was estimated based on the obliteration of cranial sutures [10,11,18], while sex estimation was based on skull morphology [2,11,32]. We used the main measurements and indices according to Martin and Saller [20], while morphometrical evaluation was made using the dimorphic scales of Alexeev and Debetz [4]. The morphological observations were registered and analysed with the methods recommended by Broca, Eickstedt and Olivier [8,15,24]. The stature was estimated from the dimensions of the long bones of the lower limb (femur and tibia). The dimensional scales proposed by Manouvrier, Breitinger, Bach, Trotter and Gleser [19,7,6,30] were also employed. Framing of the stature in the appropriate sex category was made by Martin and Saler [20].

The osteoma was evaluated by consulting the main paleopathological literature [25,5] and macroscopic observation involved imaging analysis. We utilized conventional medical radiological equipment. Direct Cone Beam Computed Tomography (CBCT) was used to obtain 3D acquisition and the OnDemand3D software was used for image processing.

3. RESULTS AND DISCUSSION

Preservation status. Skeleton R12 is incomplete and poorly preserved; it belonged to a mature male (55–60 year-old). The cranial skeleton appears slightly better preserved than the postcranial one. The fragmented skull was restored to *calvaria.* From the postcranial skeleton, only the right femur and the left tibia are present.

Morphometrical data. The cranial dimensions and indices are listed in Table 1.

Table 1

Skeleton R12 (♂, 55–60 year-old): cranial dimensions (mm) and indices

Martin No.	Dimensions	Value (mm)
1	g-op (maximum cranial length)	177
8	eu-eu (maximum cranial breadth)	157
9	ft-ft (minimum frontal breadth)	96
10	co-co (maximum frontal breadth)	129
12	ast-ast (maximum occipital breadth)	117
20	po-b (height of the calotte);	123
43	fmt-fmt (upper facial breadth)	102
$43_{(1)}$	fmo-fmo (internal biorbital breadth)	94
	Indices	**Value**
8/1	Cranial index	88.70
20/1	Auricular –longitudinal index	69.49
20/8	Auricular- transversal index	78.34
9/10	Frontal-transversal index	74.41
9/8	Frontal-parietal index	61.14
12/8	Parietal-occipital index	74.52
9/43	Frontal-parietal index	94.11

The longitudinal diameter (g-op) of the neurocranium offers a small size; the transversal one (eu-eu) presents a very large size, the report giving a cranial index of hyperbrachycranic type (Fig. 1).

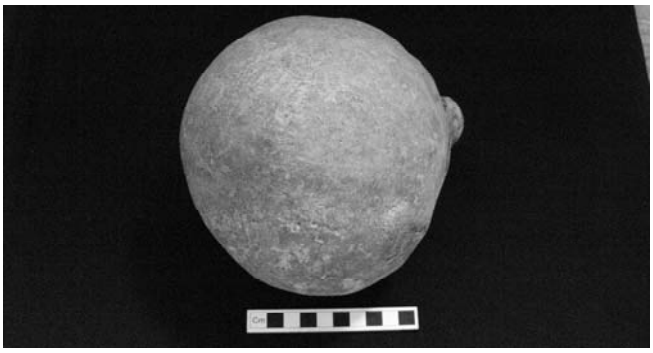

Fig. 1. *Norma verticalis* of the skull (R12, ♂, 55–60 year-old).

The forehead is moderately blunt. The minimum diameter of the forehead (ft-ft) is middle-sized. The maximum frontal width (co-co) offers a very large size, meaning a stenometopic frontal-parietal index, therefore indicating a spherical contour of the forehead, with diverging margins from the parietals. Regarding the degree of occipital curvature, the skull presents a bulgy and short occipital. The width of the occipital (ast-ast) belongs to the very big-sized category.

The occipital-parietal index is medium-sized. The shape of the neurocranium in *norma verticalis* is ovoid, while in *norma occipitalis* is the one of the "house". The cranial bone relief is marked. Regarding the development of the glabellar relief, it indicates a IVth degree, while the supraorbital, a – Ist–IInd degree. The external occipital protuberance indicates a Ist–IInd degree, while the development of the mastoid apophysis indicates a IVth degree.

The postcranial skeleton presents small-to-medium robustness; because of the failure of the restoration process, only the diameters and the circumferences were taken from the limb bones (right femur and left tibia) (Table 2).

Table 2

Skeleton R12 (♂, 55–60 year-old): postcranial dimensions (mm) and indices

	Martin No.	**Dimensions and indices**	**Value**	
Femur	6	Anterior-posterior midshaft diameter	right	left
	7	Medial-lateral midshaft diameter	23	–
	8	Midshaft circumference	25.50	–
	9	Medial-lateral subtrochanteric diameter	30	–
	10	Anterior-posterior subtrochanteric diameter	22	–
	6/7	Pilasteric index	90.19	–
	10/9	Platymeric index	73.33	–
Tibia	8	Anterior-posterior midshaft diameter	-	33.50
	9	Medial-lateral midshaft diameter	-	24
	8a	Maximum diameter at the nutrient foramen	-	41
	9a	Medial-lateral diameter at the nutrient foramen	-	33
	10b	Minimum circumference of the diaphysis	-	84.50
	9/8	Midshaft cross-section index	-	71.64
	9a/8a	Platycnemic index	-	80.48

The femur is hyperplatymeric in the subtrochanteric region, with pronounced muscles insertions, forming pits and ridges. Linea aspera is prominent. The pilaster is not present at the right femur. The tibia is eurycnemic (platycnemic index).

The stature, estimated by considering the length of the right femur, is around 162 cm, a value that falls in the lower middle category for males.

Pathology. In the macroscopic analysis of the skull, we found an oval bone mass diagnosed as osteoma, located in the mastoid area of the left temporal bone (Fig. 2). It measures approximately 44 mm in its anteroposterior diameter, 40 mm in its transverse diameter and 25 mm in its cephalocaudal diameter.

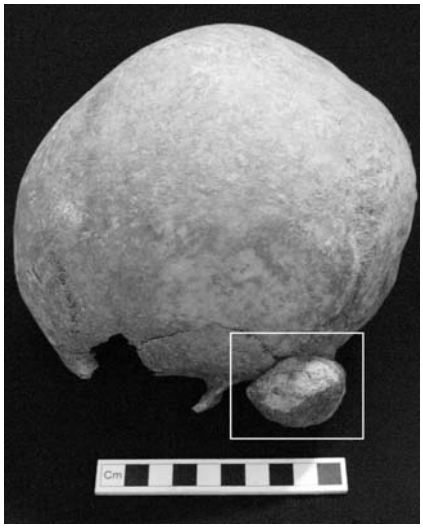

Fig. 2. *Norma lateralis* of the skull (R12, ♂, 55–60 year-old); Macroscopic view of the mastoid osteoma, at the left temporal bone.

To confirm the diagnosis and to analyze the tumor, radiography and computed tomography (3D) were used. They are the most common methods for the identification of this type of tumour, not only in the analysis of historical materials, but also in contemporary clinical cases. The images of radiography and computed tomography (3D) revealed a homogeneous oval bone mass of intense opacity, with a net contour, and with an interface to the adjacent bone of about 42x16 mm (Fig. 3 – a, b; Fig. 4 – a, b; Fig. 5). The structure of the mastoid cells under the osteoma is not altered. The described lesion is suggestive for a typical mastoid osteoma.

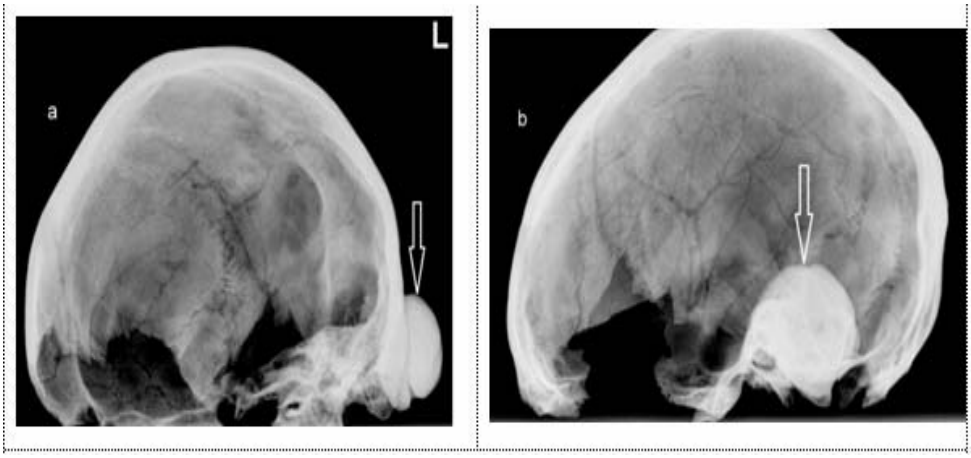

Fig. 3. Radiography (X-ray photo): mastoid osteoma at the left temporal bone (R12, ♂, 55–60 year-old); (a) antero-lateral view; (b) lateral view.

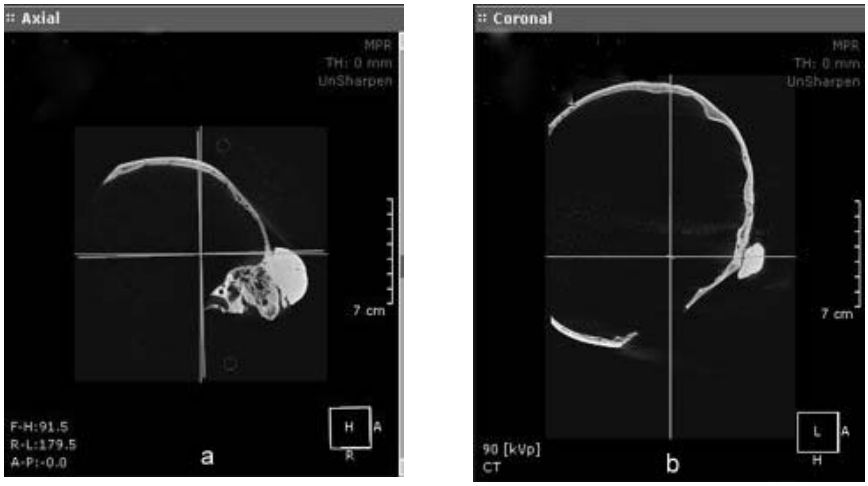

Fig. 4. (a) CBCT axial view of the mastoid osteoma (R12, ♂, 55–60 year-old); (b) CBCT coronal view of the mastoid osteoma (R12, ♂, 55–60 year-old).

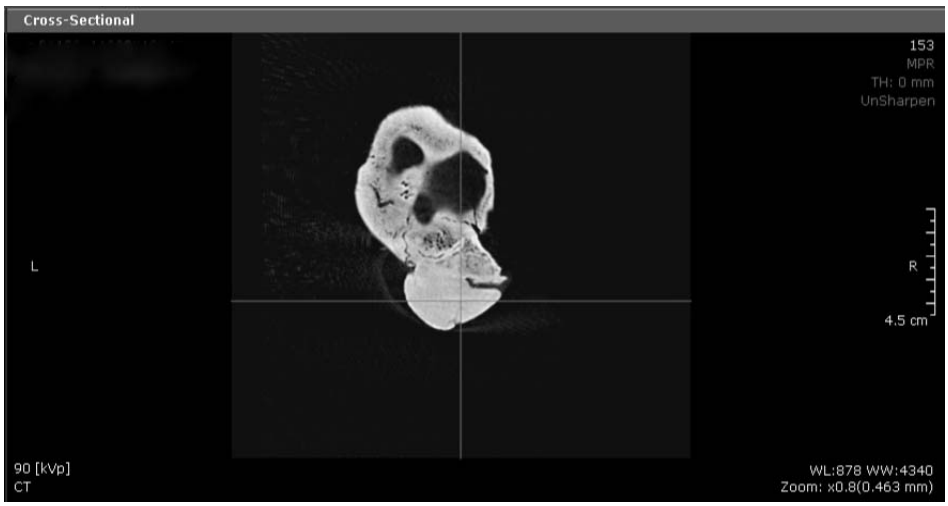

Fig. 5. CBCT cross-sectional view of the mastoid osteoma (R12, ♂, 55–60 year-old).

Mastoid osteomas have been identified in different specimens; D'Ottavi and collaborators reviewed 100 cases of mastoid osteoma [14]. In the temporal bone, the external auditory canal is the most common location for osteomas, followed by the mastoid and the temporal squama [26]. Osteomas are mostly asymptomatic, but they can give deformity, swelling, pain, deafness, and chronic discharge [17].

In our evaluation, the skeleton under examination exhibited no other pathological marks.

4. CONCLUSIONS

In this paper we analyzed a case of mastoid osteoma, a benign tumor reported in an ancient human skeleton (15th–19th centuries) found at the "Adormirea Maicii Domnului" Roman Catholic Cathedral of Iași (Romania). Skeleton morphometric data is precarious, due to unsatisfactory condition of preservation.

Osteomas are benign slow-growing tumoral lesions appearing within bones and on their surfaces [27] with a male predilection. In our case, the osteoma was identified in the skull of a mature male, in the mastoid area of the left temporal bone. The tumor was diagnosed as mastoid osteoma based on radiographic and computed tomographic (3D) evaluation. Radiography and computed tomography (3D) revealed a homogeneous oval bone mass of intense opacity, with a net contour.

In the analysed skeleton, the mastoid osteoma is not associated with other pathologies.

The study provides new evidence regarding the primary skull neoplasms in the ancient populations of Romania.

Authors contributions: Vasilica-Monica Groza (first author) – 40%; Ozana-Maria Petraru (co-author) – 20%, Mariana Popovici (co-author) – 20%, Bejenaru Luminița (corresponding author) – 20%.

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