

“HAIR-BRUSH” SKULLS IN EARLY MEDIEVAL FINDS OF MIKULČICE

L. VYHNÁNEK, J. KOLÁŘ, M. STLOUKAL, PRAGUE

The rich osseous material from *Mikulčice* presents a possibility to study various pathological bone conditions of the inhabitants of this prominent Great Moravian Empire center, being of great importance for anthropological analysis. Graves studied at the famous archaeological locality of *Mikulčice* number about 1500 at present.

Among many pathological findings there are three skulls with changes of high interest. All of them are skulls of children. The first of these (grave No. 748) died at the age of about 9 years. Tubera frontalia and parietalia are distinctly exaggerated and the surface of their outer table is compound by a system of irregular narrow spaces, limited by thin bone lamellas. Periphery of the bones is normal, the neighbourhood of the sutures presents no thickening of bone as well as any changes of the inner table. The pathological areas are limited sharply as to the normal periphery bone. Occipital and temporal bones have a normal appearance, as well as the rest of the skull (*Fig. 1*).



Fig. 1. Mikulčice, the skull from the grave No. 748.

The roentgenographic study in routine and tangential projections reveals a distinct enlargement of the width of the calvarium shadow in the region of the protuberance. The inner table is completely intact, the shadow of the outer table is absent. The shadow of the diploic space is enlarged; it is narrowed in the vicinity of the sutures only. It is formed by vertical striations, creating the typical picture of a „hair-brush“ appearance (*Fig. 2*).



Fig. 2. „Hair-brush“ appearance of the left tuber parietale in the tangential projection of the same skull.

The 2nd and 3rd skull are those of children who died in early childhood: the child from the grave No. 420a died at the age of about 3 years, the child from the grave No. 771 at the age of about 12–18 months. There is a thickening of bone in the region of tubera frontalia, symmetrically placed in the frontal bone of the 2nd skull, with an anomalous spongy appearance of the outer table and being of a smooth surface. Similar changes are to be seen in the left parietal bone forming circumscribed excentric area in the posterior part of the bone and extending up to the sutura lambdoidea. The opposite parietal bone is damaged, the occipital bone is of a normal appearance.

The 3rd skull of a very young child remained in poor fragments only. There are spongy circumscribed areas in the fragment of the right parietal bone in an excentric posterior localisation again, extending up to the lambdoid suture.

The roentgenographic study of the second and third skull presents a moderately enlarged shadow of the pathologically changed parts of calvarium bones, but the degree of the changes doesn't lead to the roentgenological „hair on end“ appearance yet. Only the granular character of the bone structure with radial arrangement in the changed areas presents the only pathological finding in the roentgen picture.

In the histological picture there is, nevertheless, a spongiosa rarefaction with an enlargement of the diploic marrow spaces, the inner table being narrowed and the outer table completely destroyed. It is worth mentioning that there are not changes in the other bones.

To resolve the problem of the diagnosis it is necessary to consider especially the diseases, causing symmetric limited changes in the frontal and parietal

bones, with a „hair-brush“ appearance in the roentgenological investigation. The normal vicinity of the sutures is of a great differential diagnostical value, as well as the normal appearance of the other bones. These findings are present as typical changes in several types of anemias: in the Cooley's anemia, in the sickle cell anemia, and in the familiar hemolytic icterus. All of them are characterised by the developing of abnormal erythrocytes inherited as a congenital mutation abnormality. Their etiology is unknown. The bone changes are considered to be due to the extensive proliferation of the erythroblastic elements of the bone marrow. Such a process is more often observed in the bones of the skull. The long bones present sometimes a rarefaction, and seldom bone infarcts.

Cooley's type of anemia is frequent in the surroundings of the Mediterranean, in Switzerland and China; sickle cell anemia is almost exclusively limited to the Negro race. The familiar hemolytic icterus happens to be found in our country. The differential diagnosis includes further the incidence of the „hair-brush“ calvarium in the Alder-Reilly's anomaly of leukocytes and in the iron deficiency anemia.

The skull changes in these pathological conditions occur however so seldom that the probability of their findings is really minimal.

Last but not least, it is necessary to consider the skull changes in rachitis. In this condition the bones of the calvarium are mostly diffusely thickened and the width of the calvarium is enlarged up to the neighbourhood of the sutures; in the periphery of the bones the production of the osteoid rachitic tissue is high. According to this process the sutures are cut into the thickened bones. This picture is in contrast with the changes in our cases, especially with the first one. The normal appearance of the other bones contradicts the diagnosis of rachitis, too.

In our opinion the pathological changes of the three skulls described above are the results of a hemolytic anemia, with great probability of the familiar hemolytic icterus. We find especially the changes of the skull from the grave No. 748 to be typical for this pathological condition. We explain the partial difference in the appearance of this skull and the 2nd and 3rd one by the uncompletely developed bone changes according to the early death of the children.