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SHORT COMMUNICATION

Skeleton of a dwarf from excavations

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ABSTRACT The authors describe the skeleton remains of a dwarf with achondroplasia dating from the 13th century. The finding is from a Hungarian site and can be found in the historical anthropological collection at the Department of Anthropology of the University of Szeged.

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Skeletons of dwarf individuals can rarely be found among skeletons dating from various archeological times. In 1964 there was a well-preserved dwarf skeleton finding from the 15th century found in Vajdas g (near Subotica, Yugoslavia) at Ludos-Csurg site, which showed the symptoms of chondrodystrophia hyperplastica (Farkas and Lengyel, 1974).

There is another dwarf skeleton among the 16,000-piece collection at the Department of Anthropology of the University of Szeged, which will be discussed in this article. Unfortunately, this is an incomplete skeletal remain. However, as such skeletons are a curiosity in populations dating back several hundred years, this case may also be of interest from a medical historical point of view.

Materials and Methods

The skeletal remain was found east of the River Tisza (Eastern Hungary), at the Hortob gy-M ta-Szeghalomhat r site, on July 22, 1985, by archeologists Ibolya Nepper and Gy rgy M dy, in a churchyard dated to the 13th century. It is a sporadic finding without a grave-number. It bears the record number 16,143 in the above-mentioned collection. The uncovered pieces are the following: a calvaria, left humerus, two femurs, left tibia, left ulna, right scapula, right clavicle, right hip and two ribs (Fig. 1).

Radiographs were taken of the five, more or less well preserved tubular bones (femur, tibia, humerus, ulna, clavicula). We used AGFA ORTHO CP-G PLUS 24x30 cm film, the intensifying screen pair was green-light ORTHO MEDIUM CURIX screens. The pictures were taken at 40 kV, 75 mA, 0.175 s exposure time.

Computer tomography (CT) was carried out with a Siemens Somatom 4 Plus machine, using spiral data collection. The parameters were the following: 120 kV, 170 mA, 1 mm thick laminas, 1 pitch. The reconstructions were made using Maximum Intensity Projection (MIP), Volume Rendering Technique (VRT) and Surface Shaded Display (SSD).

Results

As usually the case is with anthropological remains, first the age at death and sex of the skeleton was defined. The cranial sutures both on the endo- and ectocranial surfaces are completely open. The distal epiphyses on the two femurs and the caput humeri are not yet fused with the diaphysis. The two caput femoris and the great and small trochanters are not yet completely ossified, the surface of the crista iliaca is rough, not ossified. According to these attributes, the age at death was approximately 18-20 years.

The glabella is smooth (grade 0), the margo supraorbitalis is thin, the processus mastoideus moderately developed (grade 3), the tubera frontalia and parietalia are marked, the shape of the skull is rectangular. According to these characteristics, the individual should be identified as female.

There is sutural bone in the sutura lamboidea. The tuberositas deltoidea on the humerus is especially marked. The two collum femoris are short, the diaphysis of the right femur is thicker than that of the left, the two fovea capitis are deep, the fossa acetabuli shallow.

There are few data available for the metric characterisation of the finding. The maximal width of the skull is 165 mm, the fronto-temporal width is 108 mm. In the norma verticalis, the shape of the neurocranium is spheroidal. The length of both femurs is 210 mm (without the distal epiphysis), the maximal length of the left tibia is 196 mm, the transversal diameter of the caput femoris is 43 mm, the left is 41 mm, the circumference of the diaphysis of the right femur is 86 mm, the left is 79 mm.

Based on the available data we tried to assess the height of the individual. Because of the exceptionally short long

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bones of the skeleton, the most widely used Bach-Breitinger and Trotter-Gleser methods for estimating height in adult skeletons could not be used. Moreover, the distal epiphyses of the long bones were also missing. Thus, we used Pearson's method (Martin and Saller 1957), which offers eight ways for assessment of height. From these only three can be used in case of a female skeleton. The results are the following: 1) height = 69.154 + 1.126 x (length of femur + length of tibia) = 114.9 cm; 2) height = 72.844 +1.945 x length of femur = 113.7 cm; 3) height = 69.561 + 1.117 x length of femur + 1.125 x length of tibia = 115.1 cm. As the distal epiphyses of the femurs were missing, we had to assume that the individual was taller than our results (114-115 cm) show. If we suppose that the missing condyle was 2 cm long, the maximal height of the individual must have been around 117-118 cm.

We also carried out radiological tests on the finding. The slightly incomplete os frontale, both ossa parietale and also a small part of the os occipitale were pieced together in the right position, and axial, anterioposterior and lateral X-rays were taken, as well as of the piece of calvaria, including the incomplete left os temporale. Later on the bones were also subjected to CT (Fig. 2). The structure of tubular bones can be perfectly assessed on traditional radiographs. Bones are wide but short. The V-shaped proximal epiphyseal plate of the stubby tibia is very characteristic of achondroplasia. (Fig. 3). Judging from the occasionally present epiphyseal plate zones and the well-developed points of muscle adhesion makes it likely that the skeleton belonged to a young adult.

Summing up the results from the traditional radiographic pictures and the different sort of reconstructions by spiral CT carried out on the skull fragments, we can say that for the examination of the bone structure the traditional X-ray resulted a picture of much better quality. Whereas the the 3D CT reconstruction, using the postprocessing functions of digital imagery, made it possible to study the whole of the cranial bones from different angles. In theory, it is possible to reconstruct the whole skull with the help of a special software.

As opposed to the usual descriptive anatomical and anthropometrical examinations, the instrumental analysis of the

Figure 1. The skeletal remain found at the Hortobágy-Máta-Szeghalomhatár findspot.

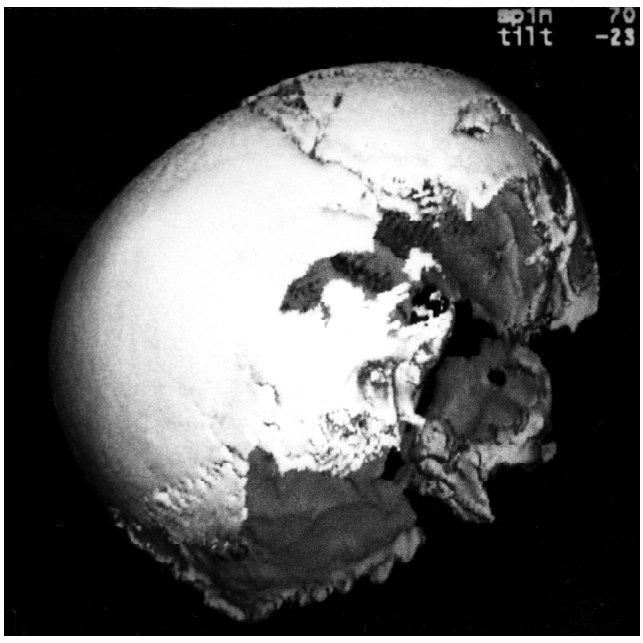

Figure 2. CT scan of the skull.

Figure 3. See Results for details.

fine structure of bones help to learn about the pathological deformations in anthropological finds. They also present a new opportunity for research in case of developmental anomalies influencing longitudinal growth. That is why we thought it was worthwhile to carry out these modern radiological tests on these skeletal finds.

Discussion

In case of sporadic finds the taxonomic examinations and the appraisal of the results may raise a number of problems, especially when the height and age at death of an individual of abnormal growth (dwarf) must be assessed. Determining height based on the length of the limb bones in an individual suffering from bone formation disorder is especially difficult, as the index numbers and regressive diagrams were determined based on bone size and height in normal populations. The usual formulas can only result in a rough estimate in height when examining a dwarf suffering from chondrodystrophy. Unfortunately, there is no index number available for pathologists and paleopathologist to use when assessing the size of limb bones which could be used in such cases instead of the current practice of rough estimation.

Figure 4. See Results for details.

Most certainly, there are other methods for the assessment of height and age at death than the position of epiphysial lines in limb bones, their distance from the marrow cavity, the structure of cancellous tissue in the epiphysis, the level of ossification in sutures, etc (Nemesk ri et al. 1960).

The modern X-ray diagnostic methods can also help historical anthropological research to construct the missing pieces of a fragment skull with the help of a software. A fragment skull of unknown origin could be compared to a painting or photograph of a known person for the purposes of identification. Imaging radiological methods and identification techniques using superimposition open up new territories both in forensic and historical anthropology (Iscan and Schaaffhausen 1875, 1883; His 1895a, b; Gr ner 1901; Stadtm ller 1948; Gr ner and Reinhard 1959; Fikentscher 1978; Hunger and Leopold 1978; Welcker 1883; Helmer 1984).

Archeological and historical anthropological studies have shown that skeletons of dwarfs with dysplasia can be found in most ancient societies and cultures (Egyptian, Precolumbian, Greek, and other European) (Seligmann 1912; Keith 1913; Priesel 1920; Bleyer 1940; Brothwell 1967; Brothwell and Sandison 1967; Fakas and Lengyel 1974; Hoffmann 1976; Orthner and Putschar 1985). The skeleton finds do not show any signs of violence indicating that ancient and medieval societies treated these "handicapped" people with sympathy, they had a place in society. This assumption is also supported by another Hungarian find. An adult skeleton dated to the 11-16th century was uncovered in a churchyard in B tmonostor which had the femur and tibia united at right angles as a result of an infectious disease (Fig. 4). The individual would have been unable to walk without an aid (a wooden "artificial leg" which could be attached to his own), still, society did not expel him.

We also agree that these results are correct as far as cultural history is concerned, which is also supported by the results of paleopathological examinations, namely that in these cases the cause of death was most probably natural.

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