


Description of human skull with AATM and secondary comorbidities in university collection

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ABSTRACT

This article proposes a case study of analysis in forensic anthropology and bone pathology in a human skull deposited at the Dental Sculpture Laboratory, human anatomy sector of the Institute of Biosciences, Federal University of Mato Grosso do Sul, and possible interpretations for these alterations. In addition to diagnostic hypotheses, we intend to present possible comorbidities, as well as estimates of biological sex, approximation of age and other elements that can be determined through human identification criteria in forensic anthropology. The methodology used consisted of qualitative analysis of completely skeletonized bone material, in three criteria – sex, age and ancestral affinity – as well as a survey of the possible bone pathology, its etiology and consequences on the individual's health while still alive. The results point to the presence of a debilitating disease of inflammatory origin and several secondary problems resulting from this condition.

Keywords: Temporomandibular ankylosis, Osteology, Pathology, Forensic anthropology.

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INTRODUCTION

Ankylosis is the Greek word for "rigid joint." The term "ankylosis of the temporomandibular joint" (TMAA) refers to the bony or fibrous adhesion of the anatomical components of the joint and their consequent loss of function. Adhesion can occur between the condylar head of the mandible and the glenoid fossa of the temporal bone, or between any component of mandible tissue (hard and soft) and the maxilla, zygoma, or skull base (Bello *et al.*, 2011). TMHA has different forms of manifestation in different degrees of restriction to mandibular movements (Manganello-Souza, Mariani, 2003), and extreme cases can be recorded, such as ankylosis of the temporal-mandibular joint (TMA), of a permanent nature with complete paralysis of the mandibular joint.

Ankylosis is a disabling condition that has stressful consequences such as speech disorders, chewing difficulty, facial disfigurement, impairs breathing and psychological stress (Kumar *et al.*, 2014; Ko *et al.*, 2005).

CASE REPORT AND ETIOLOGY

TMJ ankylosis is classified according to the combination of site (intra- or extra-articular), type of tissue involved (bone, fibrous or fibro-bone) and the extent of fusion (complete or incomplete) (Chidzonga, 1999; Erdem and Alkan, 2001). It can be caused by malformation or trauma, or both associated. Classifying TMJ ankylosis in children, Sawhney (1986) identified four different types: In type 1 there is minimal fusion, but extensive fibrous adhesions around the joint; type 2 has more bone fusion, especially at the outer edge of the articular surface, but no fusion on the most medial surface of the joint area; in type 3 there is a bone bridge between the mandible and the temporal bone; and in type 4 the joint is replaced by a mass of bone. TMAA is a pathological fusion of the mandible with the skull base, and the fusion can be partial or complete, and its connection can be fibrous, fibro-osseous, or completely bony. TMJ ankylosis can be acquired in conditions resulting from condylar trauma at birth or childhood, septic arthritis, systemic infections such as tuberculosis, syphilis, or smallpox (Chouinard *et al.*, 2018). The pathology can also be associated with trauma, local or systemic infections, systemic diseases, such as ankylosing spondylitis, rheumatoid arthritis, psoriasis, untreated or inadequately treated condylar fractures (Rodrigues, 2011).

Figure 1 – Bone fusion in the temporal-mandibular joint.

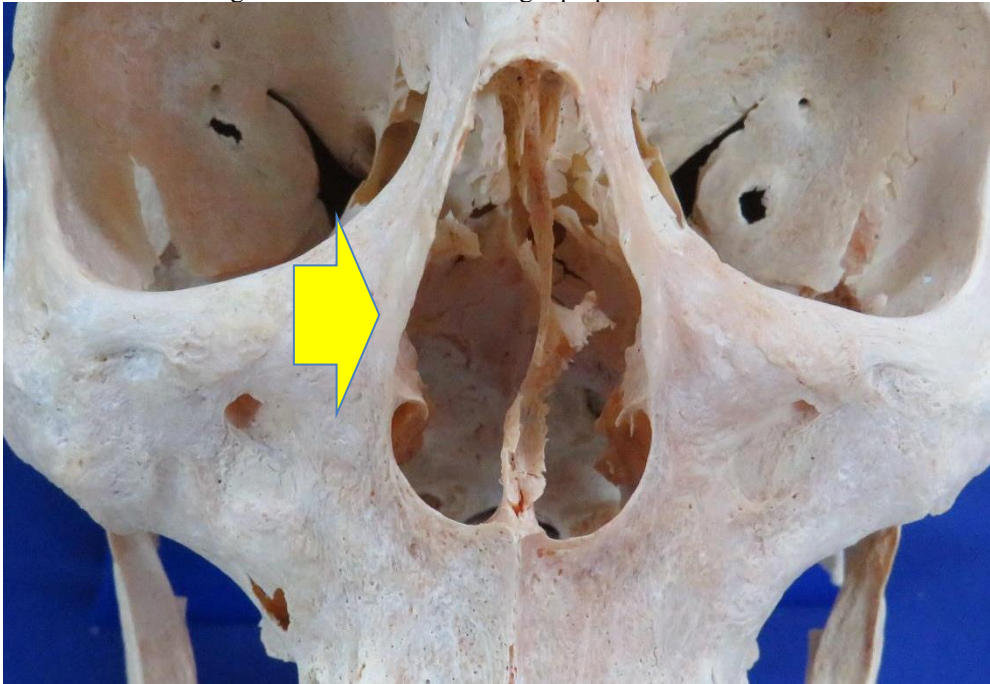


Source: Lini and Soares, 2024

On examination of the condylar adjacencies, no scarring processes resulting from fractures were observed, so that, apparently, the condition does not originate from condylar trauma, thus suggesting that the process resulted from an inflammatory or acquired systemic condition. The stage of complete immobility of the joint indicates that the individual no longer had the ability to chew (Figure 1). It should be noted that the skull under examination is completely edentulous, with the alveolar portion closed and signs of significant bone resorption.

From the analysis of the orbital foramina, the presence of *cribra orbitalia* is verified. This was classified by Knip in 1971, according to its morphology and extension, dividing it into four groups. In *hyperostotic osteoporosis*, at the cranial level, the diploe is thickened at the expense of the external surface, which is very thin. This alteration usually predominates in the frontal bone and in the anterior portion of both parietals, its appearance is usually granular or microareolar, giving rise to a very characteristic "bristle" spicular radiographic image (Isidro and Malgosa, 2003). They occur initially in the anterior third of the orbital roof, and may extend throughout the orbital cavity, as well as in the lower part of the frontal bone scale, in addition to other areas of the external skull table, in the parietal, occipital, temporalis and sphenoids (Mello and Alvim, Uchoa and Gomes, 1991). They are associated with nutritional deficiencies, such as anemia, vitaminosis C, A and complex B. Hengen (1971), establishes a strong association between iron deficiency anemia and parasitic infections, specifically worms, in European populations of tropical and subtropical areas.

Figure 2 – Deviation in the right perpendicular lamina.

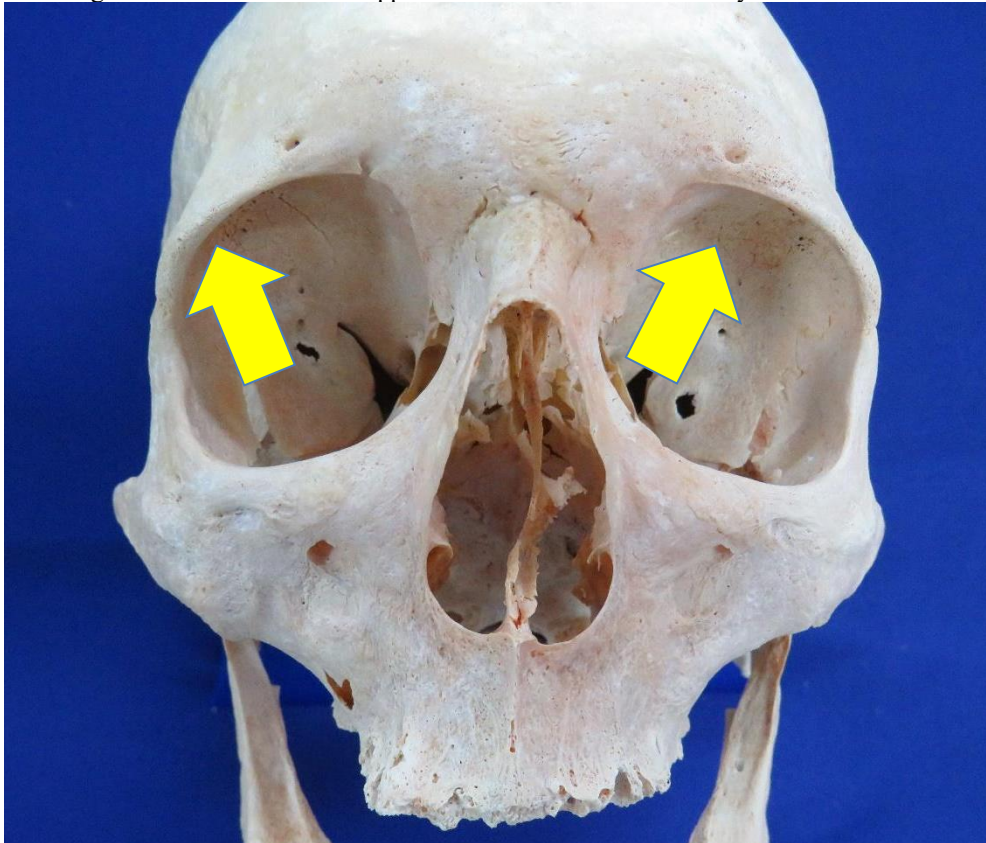


Source: Lini and Soares, 2024

Considering that the skull under analysis is associated with an older individual, the vitamin deficiencies mentioned result in hypochromia, and, in this age group, types of anemia are more commonly found as anemia of chronic disease and iron deficiency. Most elderly people have normocytic and normochromic anemia, which is suggestive of anemia due to chronic disease. In 50% of cases of anemia of the chronic disease, hematimetric alterations are found hypochromia (Buffon *et al.*, 2015).

From the analysis of the nasal foramen, a significant deviation in the perpendicular lamina in the right direction can be perceived, apparently due to a cumulative injurious process (Figure 2). The use of a nasogastric tube is one of the options for the maintenance of patients affected by trauma or processes that prevent full chewing and swallowing (Peixoto *et al.*, 2019), as in the case of AATM. Considering the position, the condition of joint immobility presented, it is suggested that the deviation, although not exclusively, has been aggravated by the presence of a medical apparatus for life support, in this case, a cannula for the administration of enteral diet.

Figure 3 – Porosities in the upper wall of the orbital foramen by *cribra orbitalia*.



Source: Lini and Soares, 2024

The analyzed material comes from a collection deposited in the collection of the Dental Sculpture Laboratory, Human Anatomy sector, of the Federal University of Mato Grosso do Sul, in the city of Campo Grande, state of Mato Grosso do Sul, Brazil. This material is used for practical classes in dentistry and dental sculpture, and in the case of the specimen under study, it consists of a male individual, over 45 years of age, of predominantly Caucasian ancestral affinity, who presents, in addition to TMAA, signs of tooth loss in adulthood, possibly caused by vitamin C vitaminosis (scurvy). as well as signs of *Cribra Orbitalia* in both eye sockets, however, in the left orbit, in addition to the porous aspect, which indicates active injury, healing points are observed. These points may suggest a normalization or reversal of the health conditions of the individual affected by the injury (Figure 3). The individual under analysis was incorporated into the Laboratory's collection in the 1990s, and probably comes from an unclaimed burial by relatives, in the city's municipal public cemetery.

METHODOLOGY

Analysis of the human bone sample through the existing osteological collection in the Laboratory, in comparison with the case study. Results and conclusions: Through comparison with existing samples, the presence of Bilateral Mandibular Ankylosis as well as other diseases caused by



it was detected. We conclude that studies on dry bone materials are relevant for the diagnosis of arthrosis at different stages.

DISCUSSION

The absence of evidence of trauma to the maxilla/mandible complex points to the formation of TMAA in adulthood, with probable formation of type 4 calcification due to autoimmune disease. Traumas such as bruises, dislocation, or fracture are not noticeable on either side of the jaw. TMAA caused significant loss in the patient's quality of life, with regard to food, speech and most likely self-esteem. The possibility of using a nasogastric tube reflects concern regarding the maintenance of existence, but the origin of the skull also refers to socioeconomic conditions of low stratum, in addition to the other comorbidities detected, such as scurvy and *cribra orbitalia*.

CONCLUSIONS

The study of collections is an important means for characterizing pathologies at different stages. The observation of pathological processes can help in the identification of individuals, as well as to ascertain *antemortem* and *perimortem* processes, even in isolated case studies. The care, ethics and good preservation of the materials present in collections of this nature are of great importance for the study not only of anatomy, but also for the critical analysis by academics and researchers about the living conditions and health problems suffered by a large portion of the population. Thinking about the etiological factors of the pathologies present in bone remnants in the custody of research centers is a way to democratize knowledge in forensic anthropology, but also in the anthropology of human health and corporality.



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