Chronic maxillary sinusitis: a comparison of osteological and radiological methods of diagnosis

Casna, M.; Schrader, S.A.

CHRONIC MAXILLARY SINUSITIS: A COMPARISON OF OSTEOLOGICAL AND RADIOLOGICAL METHODS OF DIAGNOSIS

Maia Casna (m.casna@arch.leidenuniv.nl), Sarah A. Schrader

Laboratory for Human Osteoarchaeology, Leiden University

INTRODUCTION

The study of chronic maxillary sinusitis (CMS) has recently received significant attention in bioarchaeology as the presence of CMS is generally considered indicative of poor air quality (e.g., Roberts, 2007). However, the main limitation many researchers still encounter is the difficulty to reach the sinuses in undamaged skulls, which is sometimes impossible due to anatomical variation (Ashman et al., 2020).

In this framework, Computed Tomography (CT) can be a valid tool for bioarchaeologists to investigate CMS in human remains, as the high definition of current CT scanners allows for even small lesions to be visualized, giving osteoarchaeologists a powerful tool to investigate disease in the past (Coqueugniot et al., 2020). This research analyzed a small sample of undamaged crania and scored CMS both endoscopically and through CT, investigating whether differences exist between endoscopical and radiological methods of analysis.

MATERIAL AND METHODS

A total of 32 crania from the Dutch post-medieval rural village of Middenbeemster (AD 1829-1866) were examined both endoscopically and through CT scans. Criteria for identifying CMS included presence of bone growth (Figure 1) and bone resorption (Figure 2) on all sinus walls (adapted from Boocock et al., 1995). Kendall's tau-b (τb) correlation coefficient was used to observe any statistically significant relationship between results. A *p*-value ≤0.05 was considered as statistically significant.

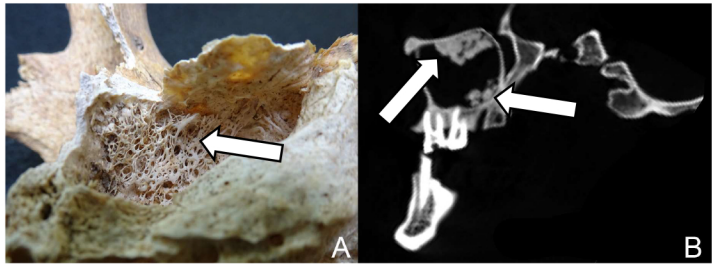

Figure 1. Bone growth associated with CMS. A) Macroscopical view; B) CT view

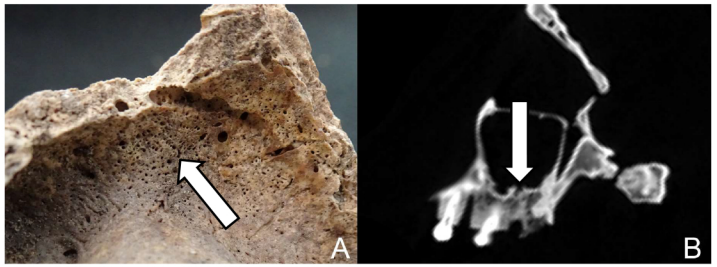

Figure 2. Bone resorption associated with CMS. A) Macroscopical view; B) CT view

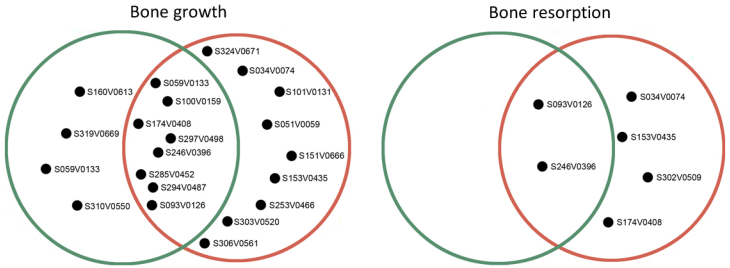

Figure 3. Individuals showing lesions associated with CMS when investigated endoscopically (green) and through CT scans (red)

RESULTS

In total, 12 cases of CMS were identified endoscopically, and 19 through CT scanning (Figure 3). In both diagnostical methods, bone growth was found to be more common than bone resorption. Statistical analysis revealed no significant differences in scoring CMS endoscopically or through CT imaging (τb=0.246, *p*=0.170). No statistical difference was found between bone growth observed through macroscopical and CT analysis (τb=0.246, *p*=0.170). However, the same analysis revealed a significant difference in endoscopically and CT-observed bone resorption (τb=0.374, *p*=0.037).

DISCUSSION AND CONCLUSIONS

Our results show that computed tomography is a valid method in the diagnosis of CMS in archaeological populations. As maxillary sinuses are not always accessible with an endoscope due to anatomical variation, CT offers a reliable and accurate alternative for bioarchaeologists who wish to study respiratory disease in the past (Zubova et al., 2020). Statistical analyses pointed out a significant difference in assessing the presence of bone resorption, possibly indicating discrepancy among diagnostic methods (i.e., overscoring through CT scans or underscoring through endoscopy). While this may be an effect of our limited sample size, further research is being considered to fully explore the role of CT in the study of CMS.

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