A possible case of tuberculosis from a medieval site in northeast Italy. The infant of the Immacolata and San Zenone church, Tassullo, Trentino.

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Abstract. We present a possible case of tuberculosis found in an infant from the Immacolata and San Zenone church. The cemetery was investigated/found during the 2003-2006 archaeological campaigns in the main nave of the church. In particular, we focus our attention on SU 21 c, a 9 months subject that shows pathological evidence on both the skull and the thorax. In the endocranium, we found evidence of *Serpens Endocrania Symmetrica* (SES) and marked porosity, and on the ribs, we detected new bone tissue apposition on the ventral surface. The subject presented here contributes to the literature related to the prevalence of tuberculosis in Italy during the last centuries in north Italy.

Keywords: tuberculosis, *Serpens Endocrania Symmetrica*, infant, Middle Age, Italy

Introduction

The human remains presented in this article come from the church of the Immacolata and of San Zenone in Tassullo (546 meters above sea level), in Trentino Alto Adige, in the north-east Italy (Figure. 1). The sacred building was involved in archaeological analyses resulting from the restoration of the church floor between 2003 and 2006.

The removal of the old floor allowed the investigation of the subsoil layers inside the church. Moreover, some drainage pits excavated close to the external perimeter walls allows us to record other archaeological information. The oldest finds are those of a cemetery. The depth of the tombs concerning the floor must have been about 50 cm. The graves were built of stones held together by lime mortar, which also covered the bottom of the burials. The discovery of few grave goods allowed, cautiously, to frame these tombs as early medieval. Indeed, unfortunately, the objects could come from previous phases intercepted during the excavation and filling of the pits (1).

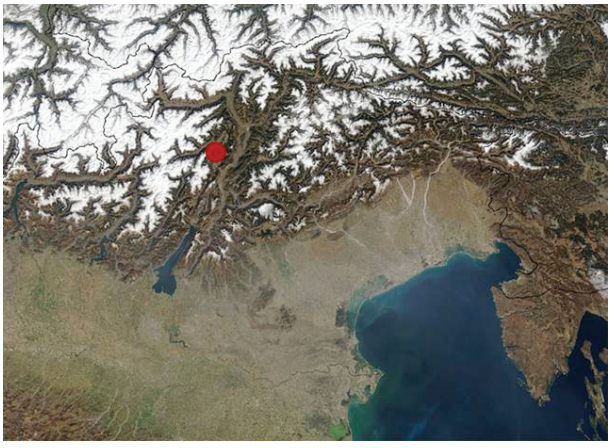

Figure 1. Map showing the location of Tassullo (Trentino Province, Italy) where is located the Immacolata and San Zenone church.

Among the skeletonized subjects coming from the site, attention is paid to children. In addition, many pathological skeletal lesions have been found on them. In particular, this work presents the subject of SU 21 c, an infant who has multiple pathological lesions, both

in the cranial and thorax area. This contribution presents a differential diagnosis that attempts to verify the aetiology of this evidence, a theme still alive today and a source of debate in the paleopathological field and little investigated in the Trentino area from which the remains come (2, 3, 4).

Materials and Methods

SU 21 c is a skeleton belonging to a sub-adult subject characterized by excellent preservation of the bone tissue and a non-optimal representation of the skeletal elements (Figure. 2). As already stated, the skeleton dated back to the Early Medieval Age, and comes from the ancient funeral area discovered in the church nave. The age of the individual was estimated from the epiphyseal bone fusion (5), from the measurement of the length of long bones (6, 7) and, lastly from the evaluation of teeth development (8). Dental age estimation was preferred, exploiting its poor dependence on nutritional stress and diseases (9). Macroscopic observations, performed with a magnifying lens, were carried out to study the porosity of bones (10).

Results

Anthropological investigations conducted on the SU 21 c allowed us to identify a subject with an anthropological age estimated in 9 ± 3 months based on dental development, according to the evaluation of the diaphysis length and epiphysis fusion. Several bones exhibit macroscopic pathological manifestations, especially in the skull (Figure. 2, 3). It is worth noting that the identification of pathologies in osteoarchaeological human remains may be more complicated due to a bad state of preservation of the remains; completeness and conservation are indeed important aspects to be considered. Overall, in our case, bones and bone tissue, in general, are in an excellent conservation state and, thus, we can argue that taphonomic changes do not affect our analysis.

As regards the cephalic skeleton, the presence of serpiginous intracranial lesions (Serpens Endocrania Symmetrica - SES) on the parietal and occipital areas should be noted. Despite being fragmented, the

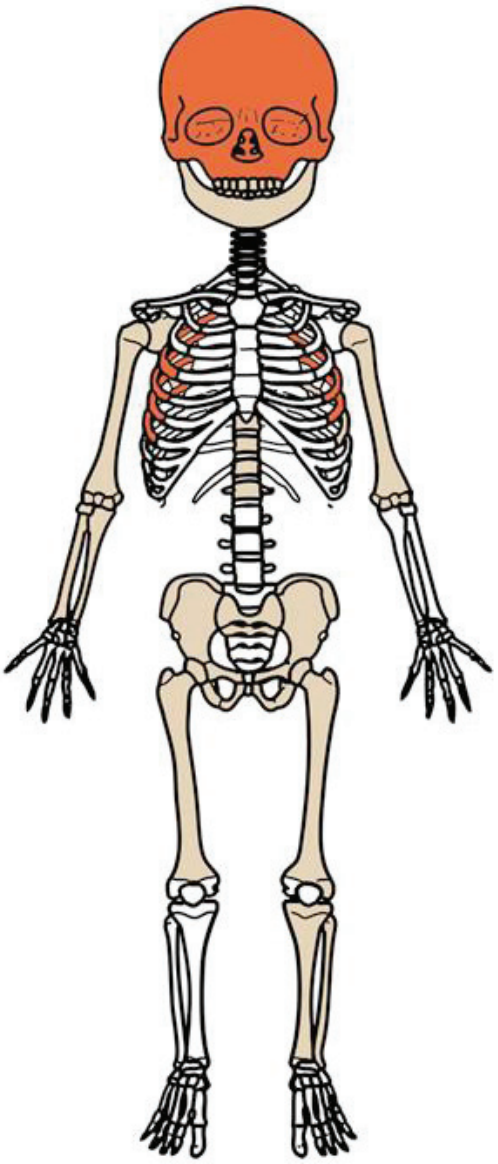

Figure 2. Diagrammatic illustration of the skeleton SU 21 c. Missing parts are intentionally left blank; preserved ones in light ochre. In red are highlighted the bones that show morphological changes probably linked to pathology.

bones of the skull show several pathological changes, including severe porosity, grooves and SES (Figure. 4). In addition, the bones affectby SES and endocranial porosity are the right parietal and the occipital, particularly near the eminentia cruciformis.

While the spine is free from injury, six ribs, four right and two left shows pathological periosteal remodelling. These attacks, limited in the distal region of the ribs, are characterized by the new hyper vascularized bone sitting on their visceral surface (Figure. 5).

Figure 3. Anatomical location of the lesions detected on the endocranium of SU 21 c.

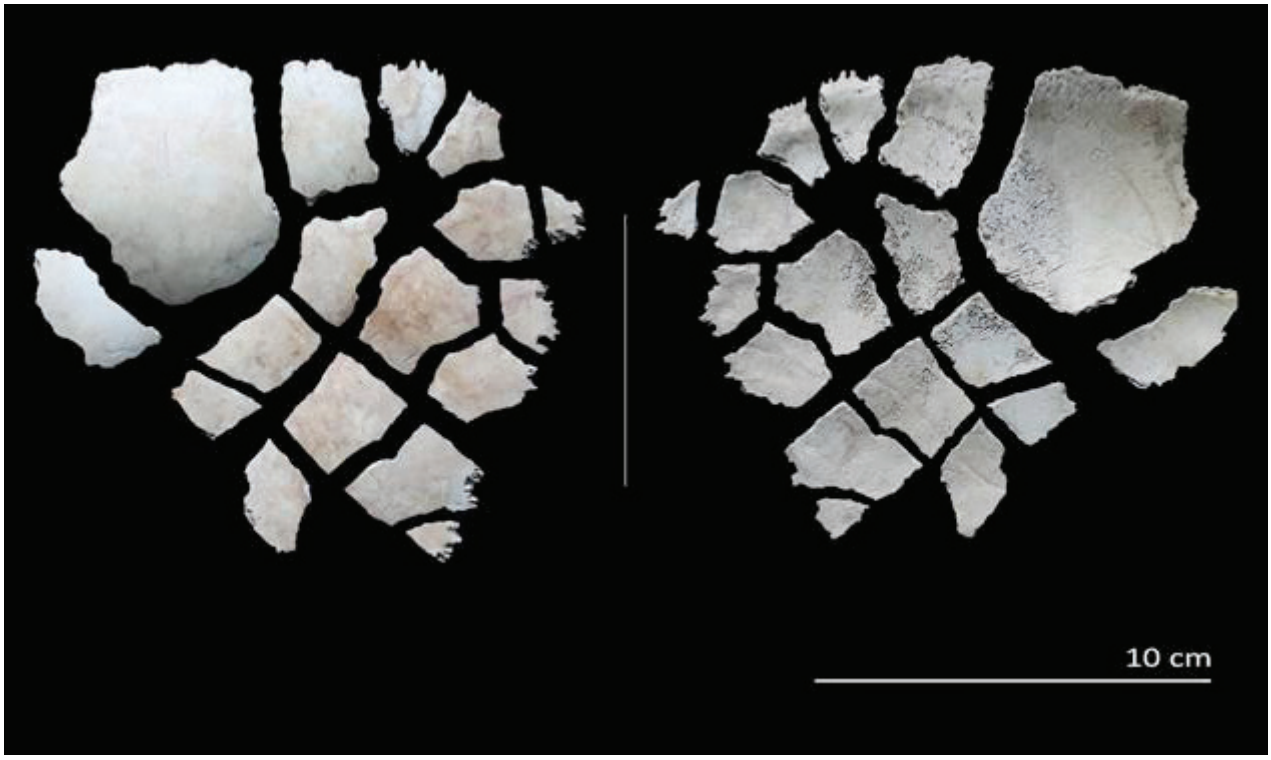

Figure 4. Left parietal of SU 21 c from the church of Immacolata and S. Zenone church showing *Serpens Endocrania Symmetrica* (SES) and increased porosity. Ectocranical (left) and endocranical (right) view.

Discussion

Cranial lesions such as SES and marked porosity are those that most characterize the pathological picture of this subject. These new bone productions and lesions, witnesses of meningeal inflammation and/or subdural haemorrhage, can derive from various pathologies. In recent years, these attacks have received increasing attention in the paleopathological literature (11, 12, 13, 14) and have been linked to several aetiologies, including chronic meningitis, trauma, anaemia, neoplasms, scurvy, rickets, or tuberculosis (14). Studies conducted in recent years on reference osteological collections, consisting of skeletons of individuals whose cause of death is known, showed a significant relationship between new bone formation on the

Figure 5. 5th right rib of SU 21 c on which there are areas of apposition of new bone tissue.

visceral surface of the ribs and pulmonary tuberculosis (15, 16). However, similar lesions can be seen in other lung infections (16, 17).

The evidence identified on the US 21 c testify a pathological condition characterized by intracranial and intrathoracic inflammatory reactions. The topography and nature of the recorded lesions lead to a discussion of the different aetiologies. Periosteal remodelling involving the visceral side of the ribs could suggest that the individual was suffering from lung disease. While various pathologies can induce such lesions, they are undoubtedly mainly found in people with pulmonary tuberculosis (16). This disease is also considered a potential cause of bone remodelling of the intracranial region (13, 14). The SES recorded on the parietals and the occipital of the SU 21 c subject could be linked to chronic meningitis, of which tuberculosis is currently the majority cause (18). However, could this diagnosis satisfactorily explain the lesions highlighted? In the absence of injuries to the spinal area, it can only remain a hypothesis (19). In this regard, it should be remembered that SU 21 c is part of a larger sample, whose developing paleopathology analysis provides information regarding the presence of infectious diseases in this human group. Not only that, SU 21 c represents one of the possible documented cases of tuberculosis and shows itself as a fundamental element in the study of infectious diseases that in the past affected the northern Italian population that our group deals with (20, 21, 22).

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