A Computed Tomography Study on Two Skulls of Mistreated Dogs from the Roman Age

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Abstract

The study of ancient skeletons is of high interest, as the relationship between men and animals can be reconstructed. In dogs, head injuries frequently result from direct physical traumas. The excavation of a prehistoric well (Genoni, Sardinia) brought to light sixty canine bones of the Roman Age (2nd century AD), although this well was built during the Nuragic Age (1st millennium BC). Two canine skulls showing three traumatic lesions underwent computed tomography in order to study the endocast of the brain cavity and indirectly locate possible brain lesions. In the first case, a traumatic lesion was found in the left parietal bone with depression of the outer surface. This lesion determined compression of the left frontal cortex and was compatible with life, as can be deduced by the inflammation of the periosteum. In the second case, two different traumatic lesions were found. The former was a wide fracture of the right frontal bone near the orbital cavity. The injured area showed clear signs of bone remodeling which took place many months before death. The latter was a severe comminuted fracture involving both the outer and inner surface of the left frontal bone, which provoked a deep wound in the left frontal cortex. The sharp outline of bone splinters with no signs of bone remodeling indicates that the trauma was not compatible with life. All lesions described were consequent to severe blows from humans and testify mistreatment of dogs in the Roman Age.

Introduction

Zooarchaeological investigations are worth of interest since they often allow to reconstruct the economical, social and religious activities of ancient populations, also providing useful information about dietary habits, such as the kind of animals eaten, their age, sex, as well as slaughtering procedures. Indeed, skeletal remains may display signs that can frequently be interpreted as consequences of slaughtering practice. These signs are characterized by various extension and features owing to the different tools employed.

One of the most interesting topics of the zooarchaeological studies is paleopathology. Recently, it has been recognized as a real science, finalized to bring to light ancient diseases both in humans and animals [1].

The Prehistoric Age in Sardinia is strongly influenced by the Nuragic culture, which lasted from around 1800 to 232 BC, i. e. when Romans eventually conquered the island. More than 50 wells are known so far which were built during the Nuragic Age in many areas of the island. They are usually named holy wells, as religious ceremonies may have taken place, and one of them, 38mt deep, is located near Genoni (OR) and had surely been using during the Roman Age as refuse tip. The archaeological excavations carried out at that well dug out several objects, such as coins, ceramic and bronze statuettes and vessels, as well as tips of spears dating back until the Roman Age. Furthermore, numerous bone remains from domestic and wild species were brought to light including dogs. They appeared to be in excellent conditions of preservation likely due to their prolonged stay under water at the bottom of the well.

Aim of the present work is to describe the different lesions found in the canine skulls under examination by means of a computed tomography (CT) scan. That method has been indeed employed successfully in the studies on ancient human skulls [2-6]. In addition, CT has been revealed to be a very useful procedure for the investigations of ancient mammalian and avian skulls and their interesting paleopathological aspects [7-9]. The study of those lesions both through direct observation and computed tomography, should indeed be of some interest as it might contribute in reconstructing the mutual relationships among humans and animals during the Roman Age.

Materials and Methods

The bone remains found at the bottom of the holy well of Santu Antinu near Genoni (Sardinia) came from different

domestic species, namely cattle, sheep, goats, pigs and wild cats. Further bone material was classified as belonging to dogs. The minimum individual number (MNI) of dogs was 7. In details, there were 60 canine remains including whole and fragmented postcranial bones from various anatomical regions and 6 skulls, two of them showing lesions in the cranial vault. On the ground of the stratigraphic analyses performed by archaeologists, animal bones date back to the Roman Age and, more precisely, to the 2nd century AD. In the present investigation, skulls from two dogs were examined showing well-evident traumatic lesions. The material underwent computed tomography (Somatom Plus B 30B, Siemens, Erlangen, Germany) at settings of 137Kv and 180mA in order to clarify better the features of the injuries and study the endocast of the cranial cavity and indirectly locate possible brain damages.

Result

The two injured canine skulls found out at the bottom of the holy well of Genoni were well- preserved due to their
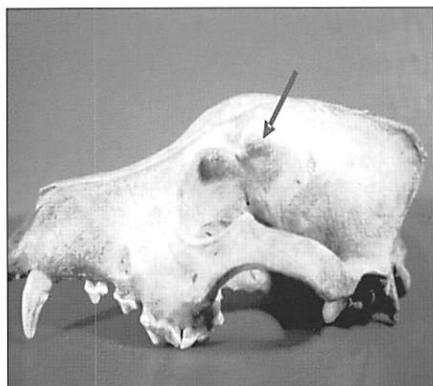

Figure 1. The outer surface of the left frontal bone (arrow) of skull No. 1 was hallowed by a heavy contusive blow, likely dealt around many months before death.
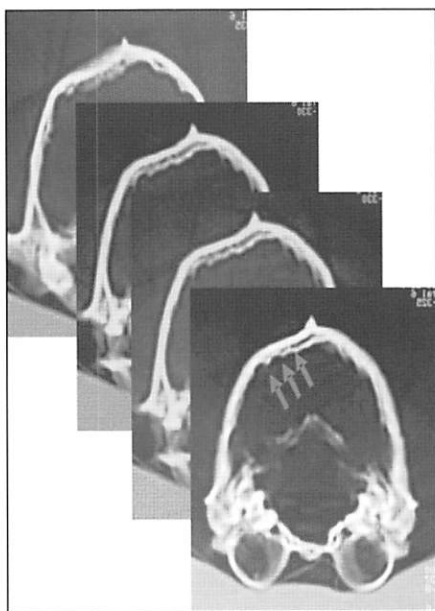

Figure 2. CT image, transverse plane, caudal view of skull No. 1. The lesion was compatible with life, as can be deduced by the severe inflammation of periosteum (arrows).

about a slight inflammation of the periosteum and an evident 2-3mm depression of the vault of the brain cavity underneath, as can be observed by means of tomography (Fig. 2).

In the second skull, two different traumas were present. The former consisted in a wide fracture of the right frontal
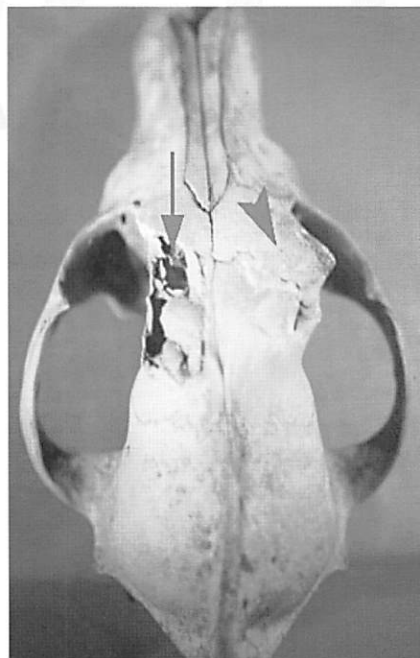

Figure 3. Dorsal view of skull No. 2. Both the frontal bones are injured. The lesion at the left side is a severe comminuted fracture which likely was incompatible with life.
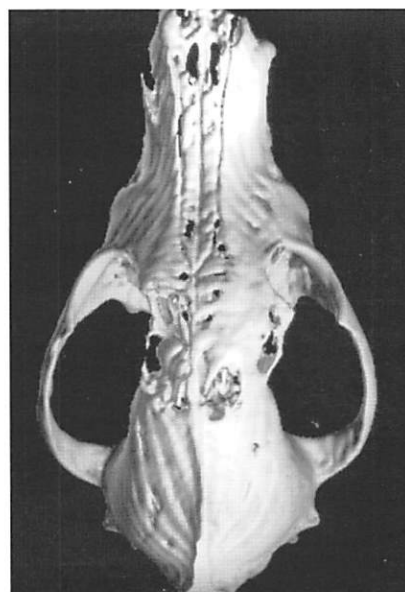

Figure 4. Axial 3-D-reconstruction of skull No. 2 showing low bone density areas corresponding to the traumatic lesions.

bone near the orbital cavity (Fig.3) and is characterized radiologically by low bone density areas (Fig.4).

The latter appeared to be a comminuted fracture involving both the outer and inner layer of the left frontal bone (Fig.3). The outlines of bone splinters are sharp with no signs of bone remodeling.

prolonged stay under water. The first skull (Fig. 1) showed a traumatic lesion in the left frontal bone. The lesion brought

Discussion

The traumas described in the two canine skulls from the Roman Age varied as to their features and seriousness. The lesion in the first skull brought about compression of the underlying frontal cortex of the left hemisphere and induced a slight inflammation of the periosteum of the left frontal bone, which might have occurred many months before death. So, that lesion was not very severe and thus compatible with life.

The two traumatic lesions observed in the second skull appear to have been of diverse degree of depth. The lesion involving the right frontal bone reveals low bone density, as testified by CT, and this suggests moderate bone remodeling which took place many months before death. So, the lesion appears to be compatible with life. The shape of the lesion involving the left frontal bone is consistent with a blow with a stick. That lesion is markedly deep, so it might have given rise to severe wound involving the frontal lobe of the left hemisphere. Since the outlines of bone splinters are sharp with no signs of bone remodeling, such trauma could be incompatible with life. The color of the edges of bone splinters seems to exclude the possibility of a recent breaking of the skull post-mortem.

The features of all the traumatic lesions here described suggest that they were consequent to severe blows from humans and thus testify reiterated mistreatments of dogs during the Roman Age.

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