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PALEOPATHOLOGY FROM A PORTUGUESE MEDIEVAL CEMETERY (SANTIAGO DO CACÉM)

ABSTRACT: 14 individual recovered from 5 medieval graves at Santiago do Cacém (Portugal) led to the reconstitution of a paleopathological congenital pattern, in one of the skeletons, which also had a spondyloysis. Traumatic lesions, degenerative processes, as well as metabolic pathologies were observed on the sample. We registered a great amount of infant and children, pointing out to a probable high level of mortality in the first years of life.

KEY WORDS: Congenital diseases, spondyloysis, degenerative diseases, medieval portuguese cemeteries.

INTRODUCTION

Spring 2001, a building located in the center of Santiago do Cacém, south coast of Portugal (Figure I), has been renovated in order to install a Museum of Sacra Art there, the building works included an archaeological survey in the area. This study, undertaken by Dr. Isabel Inácio, has brought to light a series of archaeological items, among which a necropolis, represented by 5 sepultures which outlived centuries.

These founds led to the intervention of the team composed by anthropologists from the Laboratory of Biological Anthropology (L.A.B.), part of the Department of Biology of the Évora University. This team proceeded to the excavation, register, survey and posterior analysis of the human osteologic material.

Since the radiocarbon analysis is not concluded yet, it has not been possible, so far, to precisely determine the chronology of this necropolis.

Another dating element from this necropolis is represented by coins which have been found inside the hands of some of the skeletons and which have been coined in the middle of the 15th century.

Actual residents in that city have stated that the necropolis should have extended to the contiguous areas, being destroyed in the early 20th century during the construction of a garage in the house next door.

METHODOLOGY

After cleaning, marking and identifying the bones exhumed during the excavation, we have proceeded to the determination of the minimal number of individuals per sepulture.

Afterwards, it has been determined, for each one of the individuals, the sex and the age by death. The following methods have been used:

Sexual Diagnosis of Immature Individuals:

We tried to use, as systematically as possible, the method proposed by Schutkowski (1993) which bases the diagnosis on the analysis of the hip bone.

Sexual Diagnosis of Adults:

If the hip bone was present, we used it for the sexual diagnosis using the Bass (1995) and
Ferenbach et al. (1980) recommendations.

In cases of absence of this bone, or in which its conservation wouldn't allow its use, we have chosen the following bones, presented here by our preference order and mentioning the methodologies used in each case: cranium - Bass (1995) and Ferenbach et al. (1979), femur - Cardoso and Cunha (2000), tibia - Holland (1991), humerus - France (1983) in Bass (1995), clavicle - Thieme (1957) in Bass (1995), and sacrum - Bass (1995).

**Age at death of Immature Individuals:**


**Age at Death of Adolescents:**

For this age group we have used preferentially the fusion times of epiphyseal union as in Scheuer and Black (2000).

**Age at Death of Adults:**


**Oral Pathologies:**


**Degenerative Pathologies:**

Crúbey, Morlock and Zammitt (1985) in Cunha (1994) was the methodology used for the study of this kind of pathologies.

**Enthesopathies:**

These pathologies were observed using the Cunha's (1994) adaptation of Crubey's (1988) method.

**RESULTS**

**Material Description**

In the 5 sepultures we have identified 14 individuals, distributed as follows:

- Sepulture 1 - One female individual, with an age at death of approximately 50 years old;
- Sepulture 2 - It holds two overlapped burials, separated by a small layer of ground. The individual found in the most recent burial has been identified as individual 2-I and the one laying in the older burial as individual 2-II. The first one was a male adolescent with an age at death between the 14 and 15 years. The second one, also a male, died by an age superior to thirty years and due to a reduction of the burial 2-I, from which few material has been left but clavicles, scapulas, sternum, hands, ribs and vertebrae, it has not been possible to determine the upper limit of the age interval. Beyond these two burials, this sepulture also contained an ossuary, in which 4 individuals have been identified: an infant about 4 months old and an adolescent which age at death has not been possible to precise (both of indeterminate sex) and two adults, one male, 50 years old approximately, and a young female, which age at death also remains undetermined.
- Sepulture 3 - This sepulture contained a burial of an individual, probably a female, whose death occurred by an age of nine lunar months, being thus a prenatal. Beyond this burial, an ossuary was also present, which contained, at least, three individuals, all of undetermined sex, and the following ages at death: six months, one year and another between two and three years old.
- Sepulture 4 - Two individuals of undetermined sex have been exhumed: one, six months old, from a burial, and the other, about 1-2 years old, from a ossuary.
- Sepulture 5 - This sepulture contained only one individual, a 5 year old child, which sex has not been possible to determine.

**PALEOPATHOLOGICAL ANALYSIS**

SEPULTURE 1:

The female, nearly 50 years old, exhumed from the sepulture 1 disclosed degenerative pathologies which signs are generalized but not accented, since only with vertebrae L4 and L5, and with one of the ribs, degree 3 is
obtained (Figure 2). We also observed in almost all thoracic vertebrae laminar spurs, with degree 2 generalized.

In sacrum, a degenerative process of great dimensions has been observed, namely in the promonitory, on the right hand anterior side, constituting an osteophyte degree 3. (Figure 3).

Concerning pathologies with unknown etiology, we observed a periosteal either in tibia and in fibulas. For the pathologies actually related with stress conditions we registered the presence of Cribra orbitalia, inactive, as well as porotic hyperostosis in palatine vault, in squama portion of the temporal bone above of the external auditory meatus and at basilar part of the occipital bone.

Of all the teeth, where one looks for hypoplasias, only the right canine was present, with three hypoplastic lines. The missing teeth had been lost ante-mortem.

Concerning traumatic pathologies we observed a not healed complete fracture in a right rib (Figure 4), as well as a healed fracture in a left one (Figure 5).

This individual disclosed a set of congenital alterations, which were: 2 cervical ribs, very asymmetrical, being the left the smallest (Figure 6).

This asymmetry, with the left side always lesser, was also observed in the maximum length of the humerus, being the left 1 cm smaller (Figure 7), in clavicles, where this asymmetry is visible over all in the robustness, and in sacrum where it has been observed at accessory sacral facets.

Still belonging to the same group of alterations we included the foramina’s absence at transverse processes in 7th cervical, by this reason classified as a transitional vertebra (Figure 8).

We also observed an agenesis of the left inferior articular process of T12, as well as of the superior articular process from the L1. The absence of these processes in the vertebra mentioned above, is functionally surpassed by the presence of a separate transverse process, as shown in the photographs (Figures 9, 10 y 11). This bone piece serves as left inferior articular process of T12 and as left superior articular process of L1, to whose morphology it resembles.

This individual also presented incomplete bifid spine (Figure 14).

We also observed at L5 a symmetrical and complete spondylosis (Figures 12, 13 y 14).

SEPULTURE 2 - I:

This individual, with an age at death between 14 and 15 years old, revealed the presence of hypoplasias and incomplete spina bifida. The hypoplasias observed are presented in the following table:

<table>
<thead>
<tr>
<th>Maxilla</th>
<th>Mandible</th>
</tr>
</thead>
<tbody>
<tr>
<td>L</td>
<td>L</td>
</tr>
<tr>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>3</td>
<td>3</td>
</tr>
<tr>
<td>n.o.</td>
<td>2nd</td>
</tr>
<tr>
<td>1</td>
<td>C</td>
</tr>
</tbody>
</table>

Legend:
L - left
R - right
1 - incisor
C - canine
no - not

SEPULTURE 2 - II:

This male individual, with an age at death over 30 years old and which skeleton was incomplete, presented reduced degenerative alterations, under the form of macroporosities, generalized in all the present bones. We also observed laminar spurs (degree 2) in the vertebrae T4, T5, T6 and T7. The other pathology observed, of traumatic nature, consists of 2 unconsolidated complete fractures in right ribs.

SEPULTURE 2 - OSSUARY:

In this ossuary, consisting of remaining portions of the 4 individuals above mentioned, we observed the following pathologies in 3 of them, since its register in the adolescent was not possible. The child, about 4 months at death and undetermined sex, presented Cribra orbitalia active, as well as porotic hyperostosis through the sagittal suture. The individual of masculine sex, about 50 years old at death, presented degenerative pathologies at the skull, in the occipital condyles, which presented a degree 2 as well as in the thoracic vertebrae present (T7 - T10 and T12) where its degree varied from 0 to 3, evident in T10 (Figure 15).

Also in the lumbar vertebrae (all present), was observed a predominance of degree 3, particularly in the vertebral bodies (Figure 16). Inside of this kind of pathology we also registered the presence of laminar spurs, almost of degree 2, in thoracic and lumbar vertebrae, with the exception of L1. Also related with the age at death, 6 teeth were lost ante-mortem, as well as one accentuated and generalized dental wear. Still in the oral pathology we observed hypoplasias, which are represented at the table 2.

Table Hypoplasias present in the male individual from the ossuary of sepulture 2

<table>
<thead>
<tr>
<th>Maxilla</th>
<th>Legend:</th>
</tr>
</thead>
<tbody>
<tr>
<td>L</td>
<td>L - left</td>
</tr>
<tr>
<td>no</td>
<td>R - right</td>
</tr>
<tr>
<td>1</td>
<td>I - incisor</td>
</tr>
<tr>
<td>2</td>
<td>C - canine</td>
</tr>
<tr>
<td>3</td>
<td>no - not</td>
</tr>
</tbody>
</table>
The last one of the individuals from the ossuary of this sepulchre that presented pathologies, corresponded to part of a young adult female skeleton. This presented Cribra orbitalia inactive. At the degenerative level we registered in all of the elements from the column that we possessed a degree 1 generalized, which meets our age determination to the individual.

In the burial 3, inhumation and ossuary, we didn’t detect any pathologic alteration, probably due to the early age of these individuals.

In the individual of indeterminate sex, and with an age at death of about 6 months, proceeding from inhumation from sepulture 4, we registered one porotic hyperostosis generalized in all the skull, particularly evident in the frontal and the left parietal (Figure 17). For the individual, also of indeterminate sex and between 1 and 2 years old at death, proceeding from the ossuary of this sepulture we didn’t registered, in the existing material osteologic, any pathology.

Sepulture 5, which contained only one incomplete 5,5 year old individual of indeterminate sex, we did not register any pathological alteration.

DISCUSSION AND CONCLUSIONS

From among the results obtained, it seems important to point out the existence on the same individual (the woman of sepulture 1) of a great deal of congenital alterations. Which seem to define a congenital pattern, not only by the asymmetries, as by the existence of incomplete spina bifida, and by the formation of supernumerary bones - see itself the cervical ribs, the separate transverse process, which is replacing the agenesis of T12 and L1 articular processes, above cited - and also the absence of the foramina at the transverse process of C7 vertebra, which probably is related with the existence of two cervical ribs. All asymmetries were of the same type, always leading the biggest dimensions to the right side, being the humerus the bone where this asymmetry is more accentuated, reaching a difference of 1 cm. This value, seems us extreme to attribute its cause to the preferential use of the right side of the body.

Analyzing now the spondylosis present in the L5 of this individual, and conscious of the controversy existing in its etiology, which several times is attributed to traumatic, or genetic/congenital factors, between others Auferheide (1998) or Mann and Murphy (1990), or attributed by Roberts and Manchester (1997) to a mixed cause, where these authors point a congenital fragility as responsible by the traumatic pathology. It seems to us, that this individual should be included in the set of congenital pathologies, described above, constituting these the primary cause, not excluding the trauma, as a secondary cause for the spondylosis. As in the majority of the cases referred by several authors, also here the spondylosis appears associated to the spina bifida.

This spondylosis will have lead to an instability that will be in the origin of the osteophyte of great dimensions observed in the sacrum.

In spite of the small dimension of our sample, a porotic hyperostosis has been observed in all infant skulls (younger than 1 year old). Should we conclude that this isn’t result of the non-pathological nature of this characteristic but rather due to a development standard connected to the exponential skull growth observed in this age? Due to the lack on material, namely the almost inexistent tooth remains, it is not possible to test an hypothetical relationship between the skull external porosity and metabolic pathologies or nutritional inadequacy such as hypoplastic lines. A great deal of these were observable in all adults which teeth it was possible to assign. It is also curious that the place where this cemetery is located is called "old grave yard of the poor" by the locals.

Although the reduced dimension of this sample, it contains individuals of both sexes of all age groups, what usually happens when we are in the presence of a natural population burial site, in spite of a particular place to lodge a specific sexual or age group. For this reason it seems to us important to point out that the data indicate an high infantile mortality, representing adults only 29% of the sample.

ACKNOWLEDGMENTS

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