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Case Report

BONE INJURIES IN THE VISIGOTHS OF CLUNIA (BURGOS). 5th-7th CENTURIES A.D.

Daniel Turbón*

Zoology and Anthropology Sub Dept of Evolutionary Biology, Ecology and Environmental Sciences, Faculty of Biology, University of Barcelona, Avda. Diagonal 643, 08028 Barcelona, Spain

***Corresponding author:** Daniel Turbón, Zoology and Anthropology Sub Department of Evolutionary Biology, Ecology and Environmental Sciences. Faculty of Biology, University of Barcelona, Avda, Diagonal 643, 08028 Barcelona, Spain

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Abstract

The skeletal remains studied in this article come from an area within the ruins of the ancient Roman city of Clunia (Burgos, Spain). The grave goods found near the skeletons are Visigothic and date back to the 5th-7th centuries CE. Twenty complete adult skeletons have been conserved, 15 of which are male, 3 female and 2 of undetermined sex. There are few remains of adolescents or children. Several traumas have been detected in the skeletons, along with a number of major diseases and non-pathological changes to bone plasticity. The site is important in palaeopathological terms because of two lesions that are uncommon in this field of study: a malignant neoplasm of the femur (individual 6) and a possible teratoma (individual 7). Previous studies have only mentioned a few of these conditions [1].

Keywords: Visigoth population; malignant neoplasm; cavernous aneurysm.

Introduction

Clunia is an ancient Roman city in northern Spain (Peñaranda de Duero, Burgos). It was built on the road from the Mediterranean Sea (Tarraco, Tarragona) to the Atlantic coast, passing through Caesaraugusta (Zaragoza) (Figure 1). Founded in the reign of the emperor Tiberius (42 BC-37 AD), it was an important administrative centre for two centuries. Depopulation then took place and the city was burnt by Frankish-German invaders in the 3rd century AD. After a subsequent period of occupation by the Visigoths, it was then invaded and occupied by Berber invaders from North Africa. The stones of Clunia have been used over the centuries to build fortresses and nearby towns, making the current archaeological site smaller than it was two thousand years ago.

This article sets out to describe some cases of bone lesions of the Visigoths of Clunia. The skeletons were buried individually, with Visigothic grave goods of the 7th c. AD, although two of the burials may be from an earlier period. Many of the tombs contained animal bones, especially sheep and goats. The marks of dismemberment and the repeated burial of certain bone types may indicate that they were left there next to the body as food. Twenty complete adult skeletons have been found to date, of which 15 are male, 3 are female and 2 of undetermined sex. There are few remains of children and babies. Notable features include considerable physical activity, general bone robustness and a high stature, calculated according to Pearson's formulae [2], the values of which are only comparable to the ones found by Varela [3] in the Visigothic population of the Iberian Peninsula.

Case Studies

Fracture of femur

Clunia 5 is a very robust male skeleton of between 40 and 60 years of age. Despite the signs of deterioration, the left femur is notable for an intense deformation at the upper end with considerable lowering of the head and neck, creating an angle of inclination of 90° (normal angle is between 120° and 135°), which caused an intense coxa vara (Figure 2 right). The head and neck of the femur underwent a major internal rotation with an angle of declination of 50° (normally between 12º and 15º). The Alsberg

angle has also gone down to 0° (normally between 25° and 50°). The intense coxa vara and rotation led to the lesser trochanter coming into contact with the ischium to produce a synostisis (Figure 2 left). Osteophytes can also be seen on the upper edge of the greater trochanter. There are no signs of ankylosis on the head, but there is wear on the top with bone condensation below, most likely caused by wear of the cartilage. Osteoporosis in both epiphyses is very evident, where the lower one has deteriorated to the point where the external condyle has disappeared. The deterioration of the upper epiphysis includes a line of bone condensation that is very visible in the X-rays (Figure 2 left), and which joins the greater trochanter with the lesser and which is more than likely to be the scar callus of a fracture. Despite the bone's deteriorated state, we consider the restoration process to be correct, and our conclusion is that the bone shows signs of a Böhler type IV fracture of the neck (bifragmented pertrochanteric without thickening due to internal rotation). This type of fracture is more common amongst the elderly or middle-aged and is a secondary feature of a violent internal rotation. There was no attempt to carry out (bone) reduction. The lesion fused defectively while the individual rested, and the leg was subsequently deformed, with shortening, intense coxa vara and major internal rotation. A secondary process of arthritis associated with progressive osteoporosis then commenced.

Figure 1: Left. Main Roman roads in Hispania. Credit Wikimedia Commons, the free media repository. Right. Partial view of the ruins of the Roman theatre of Clunia.

Figure 2: Right. Left femur of the Clunia 5 male, which shows the anomalous position of the head and neck, as described in the text. Left. X-ray of the upper third of the femur of Clunia 5. The arrow indicates the direction of the facture following by consolidation, with evident bone condensation. The cavities are posthumous and some dense nuclei are in fact soil remains that were not extracted during cleaning due to concerns about increasing deterioration. The narrowing of the cortical area can be seen at the level of the femoral head. Exostosis "1" corresponds to ankylosis with the ischium.

Fractures in arm and leg of Clunia 23

The Clunia 23 skeleton was an adult who was probably male. It presents two fractures, one on the right forearm (radius) and another on the left leg (tibia and fibula) (Figure 3). There is another lesion in a phalange of the hand that is unrelated to the other fractures mentioned here. There is an evident and perfectly fused fracture of the lower third in the right radius (Figure 3 left). An unsealed fissure that crosses the callous is postmortem and is indicated with white arrows. The ulna has not been conserved, but the morphology of the radial fracture indicates that the bone was not damaged. We support the view where, in fractures of the distal third of the radius, the action of the pronator cuadratus muscle leads to a lower radial-ulnar subluxation, without shortening, since the ulna acts as a splint.

Figure 3: Left. Right radius of Clunia 23. The fracture here has caused a slight deviation to the middle line and a thick callous with good consolidation. The fissure marked by the arrows is post mortem. Right. Helical fracture of the left tibia and fibula of individual 23. The arrows indicate the limits of the fractures and the callouses.

There are also fused fractures in the left tibia and fibula that fused during the individual's lifetime. A jagged one in the middle third of the tibia, with a slight deviation towards the middle line and another jagged one in the upper third of the fibula (Figure 3 right). Both are covered in thick bony callouses. The morphology of the fractures leads us to think that they were caused by twisting the leg, which often happens when the foot is stuck in a rut and the trunk turns sharply, as may happen when the foot is trapped inside a stirrup when riding a horse. An alternative option is that it is an oblique fracture caused not by twisting but by a direct lateral impact. The fractures of the forearm and the leg may have been independent injuries, but there also exists the probability that they took place at one and the same time.

Malignant neoplasm

Clunia 6 is an adult male with a fractured femur with a loss of about 4 to 5 cm of the shaft in the middle-upper third (Figure 4). The lines of fracture are transversal with dome shaped damage, in which the concavities face each other. The areas close to the lesion show a moderate increase in vascularisation (Figure 5). At the level of the linea aspera, which is more notable in the distal area, a small amount of newly formed bone can be seen, along with another on the outer distal edge of the diaphysis (Figures 4 & 5). The impression here is that the destructive lesion commenced in the medullar cavity, and then progressively and uniformly invaded the bone until it divided the diaphysis, leading to a spontaneous fracture, although this may have also been a postmortem event. X-rays confirm our hypothesis in the macroscopic description (Figure 4 center and right). The most likely cause was a malignant neoplasm that probably led to the individual's death. The histological nature of the tumour makes it difficult to give more precise details, and a number of options are available: any one of the many varieties of sarcoma, Kahler's multiple myeloma, Ewing's tumour. We feel that the most likely cause was a sarcoma, the first for a young adult, and the second for an adult nearing middle age.

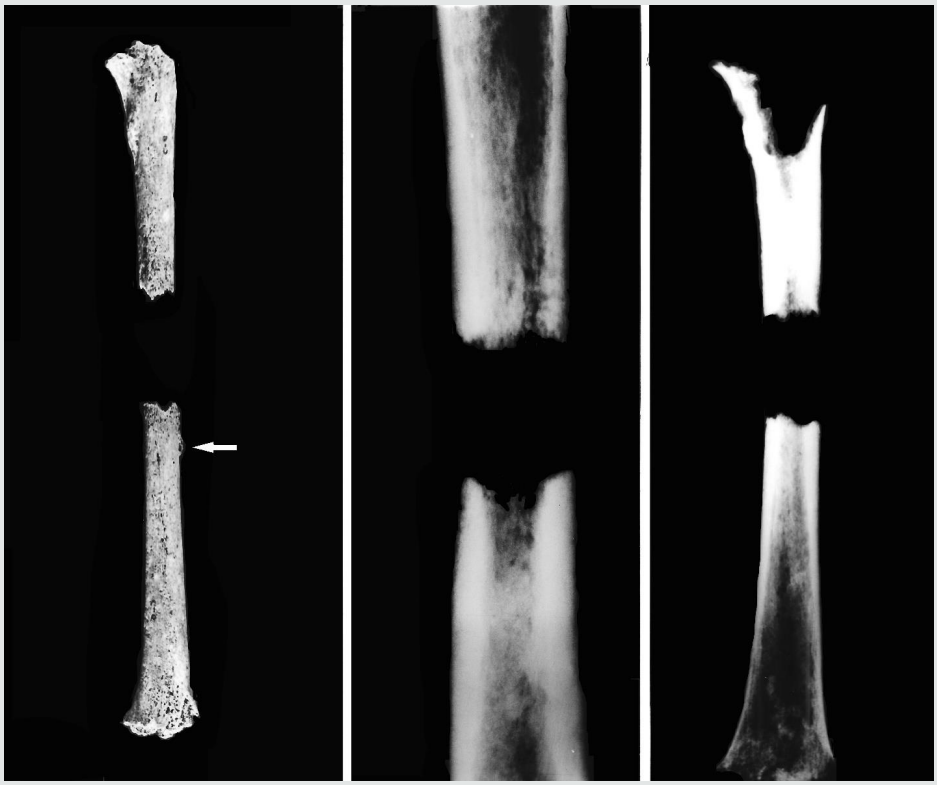

Figure 4: Left- Right femur of individual 6. The loss of bone substance replaced by the tumour probably matches the surface area between both fragments of diaphysis, at both ends there are many vascular orifices of neoplasic origin. The arrow indicates an area of tumour hyperostosis. Centre and right. X-rays of the right femur of Clunia 6. The ends of the injuries clearly show the changes of the bone that show secondary dome-shaped structures in reaction to the neoplasm.

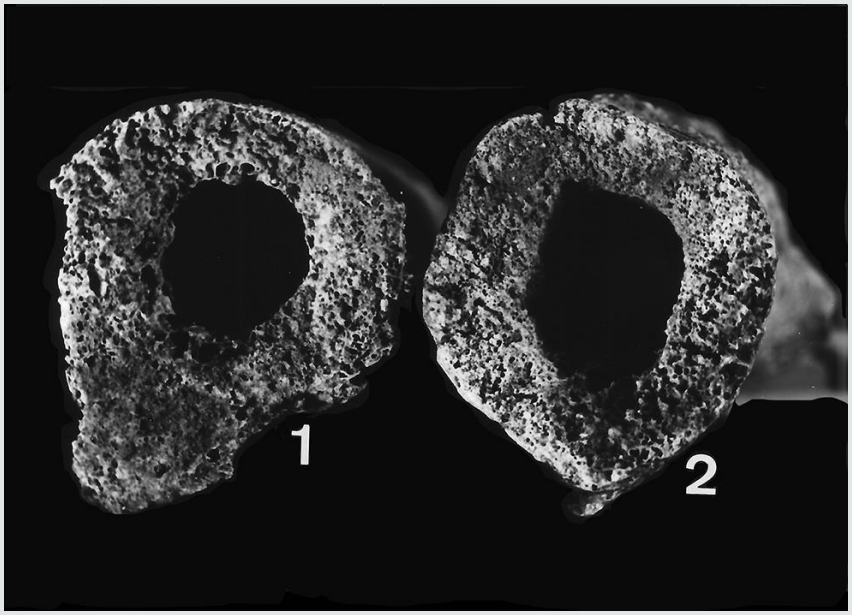

Figure 5: Right femur of Clunia 6. Surfaces where the tumour invaded, distal (1) and proximal (2) areas.

Tumour affecting the greater wing of the sphenoids

Clunia 7 is a skeleton of what was probably a middle-aged male. The most notable feature of this individual is a tumour that affects the greater wing of the right sphenoids (Figure 6). Macroscopic examination, X-rays and the microscopic structure all led us to the conclusion that it was an osteoma. Our diagnosis is that it was an arteriovenous or cavernous aneurysm, given the histological characteristics, which show an eccentricity in the newly formed and thickened bone tissue, and several anomalous tubular structures that are associated with cavities in tumour formation.

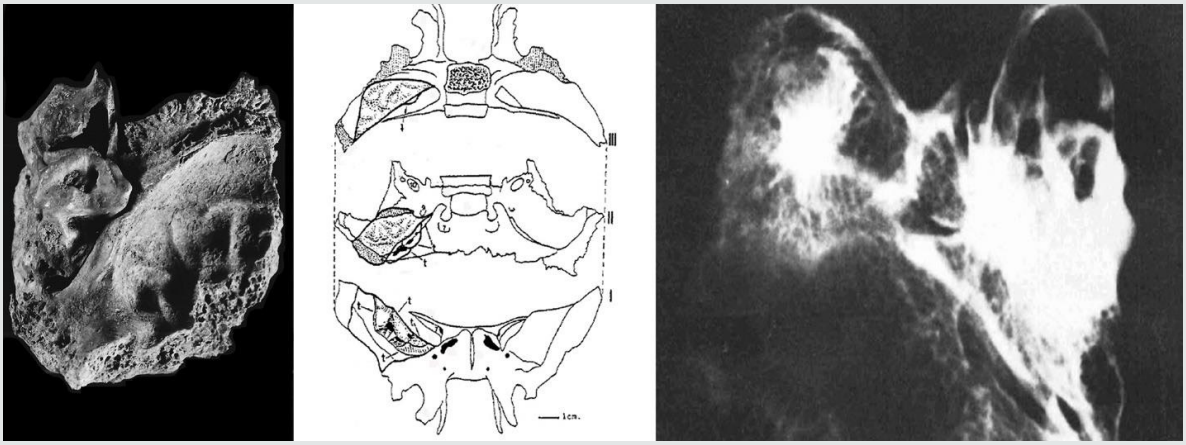

Figure 6: Left. Sidelong anterior photo of the greater wing of the sphenoids of Clunia 7, which shows the orbital and external surfaces. Centre. Location of pathological fragment in the sphenoids. Right. X-ray of the piece, which shows the intra-tumorous cavities, the vascular tubes and the thickened zone.

This case was described in a detailed anatomical-pathological study by Campillo et al. [4-5] with the help of X-rays and histological analysis. Here we give a brief summary of what we feel are two possible anatomical-pathological interpretations. On the one hand, bone sclerosis in a large part of the lesion, along with the location and unstructured appearance of the trabeculae point to an osteoma. The alternative diagnosis is that the large intertrabecular spaces are vascular in origin, probably an aneurysmal malformation, which lead to a reactive proliferation of sclerotic bone (Figure 6 right). We are inclined to think that it was an osteochondroma. The diagnostic conclusion is that the macroscopic appearance of the lesion, which apparently was a teratoma, taken together with the microscopic study, and the presence of vascular tubes, show that it was probably a cavernous aneurysm that over time led to a reactive osteoma.

Conclusions

Several traumas have been found in the Visigothic skeletons Clunia, along with some important pathological and conditions and non-pathological alterations of bone plasticity. Four of the twenty adults studied presented important diseases. It has been repeatedly demonstrated that shock trauma are the most common lesions to be found in paleopathology, and Clunia is no exception, given that four of the 20 adults present fractures (making a total of six fractured bones), which represents 20% of the total, while all the injuries belong to males (26.7%). However, the site is very important in paleopathological terms thanks to the presence of two uncommon lesions: a malignant neoplams of the femur (individual 6); and a possible teratoma (individual 7).

Acknowledgement

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Disclosure statement

The author reports no conflict of interest.

ORCID

Daniel Turbón ® https://orcid.org/0000-0002-4782-6657

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