African Journal of Biotechnology Vol. 11(23), pp. 6359-6363, 20 March, 2012
Available online at http://www.academicjournals.org/AJB
DOI: 10.5897/AJB11.3247
ISSN 1684–5315 © 2012 Academic Journals

Full Length Research Paper

Oral pathology in the Iberian Neanderthals

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Accepted 7 December, 2011

In 1994, a series of human bones was found at the Sidrón cave in Borines (Concejo de Piloña, Asturias), Spain. Since the investigators suspected that they were dealing with human remains from the Spanish Civil War (1936-1939), the bones were collected by the Civil Guard, but were not subjected to archeological scrutiny. The finding was reported then to the corresponding authorities, who had them sent to the Laboratory of Forensic Anthropology of the Forensic Institute of Madrid (Spain), where an anthropological study was undertaken. This revealed the extraordinary palaeoanthropological and palaeopathological interest of the remains. The specimen studied herein, a mandible catalogued as SDR 7-8 (SIDRON 7-8) by the Forensic Laboratory in Madrid (Spain) and belonging to *Homo neanderthalensis*, with an age of 90,000 to 40,000 years BCE, showed special characteristics of oral pathology, making it a specimen of great palaeodontological interest.

Key words: Mandible, Neanderthal, oral pathology, Sidrón, Asturias.

INTRODUCTION

The Iberian Peninsula in southern Europe is very rich in palaeoanthropological remains. The Atapuerca site complex in the province of Burgos (Spain) has yielded human remains that are considered to be among the oldest found in Western Europe. In 2007, a mandible was found at the Sima del Elefante locality and was catalogued as TE 9 (Trinchera del Elefante, level excavation 9); it is considered to be the oldest human remain found in Europe. By use of magnetostratigraphic techniques and biochronology, their age was set at 1,200,000 years (Carbonell et al., 2008; Arsuaga et al., 1993).

In the north of Spain (Asturias: Borines, in the Concejo of Piloña), there is an archaeological site called the "Cueva de Sidrón". In 1994, a set of 140 human remains belonging to a minimum of three individuals was found. Initially, they were believed to be the remains of people from the Spanish Civil War but, later, when they were sent to the Anthropology Laboratory of the Forensic Institute of Anatomy in Madrid (Spain) for study, they were catalogued as belonging to the middle of the Paleolithic (*Homo neanderthalensis)* with an age between 90,000 and 40,000 years BCE (Prieto et al., 2001). Among the remains found, there were two mandibles in a good state of preservation, although not complete. One of them, designated SDR 7-8, has certain special characteristics of oral pathology, making it a unique specimen.

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MATERIALS AND METHODS

The present work focused mainly on the analysis, both macroscopic and x-ray, of the mandible remains catalogued as SDR 7-8.

Gross analysis (Figures 1 to 3)

The specimen, showing an excellent degree of preservation, comprises two fragments. The first is made up of the left side of the mandible and a portion corresponding to the right mandible up to the canine. It features recent fractures of the gonionic angle and the posterior part of the ascending ramus and coronoid apophysis, together with the alveolar vestibular face of the incisor group, most

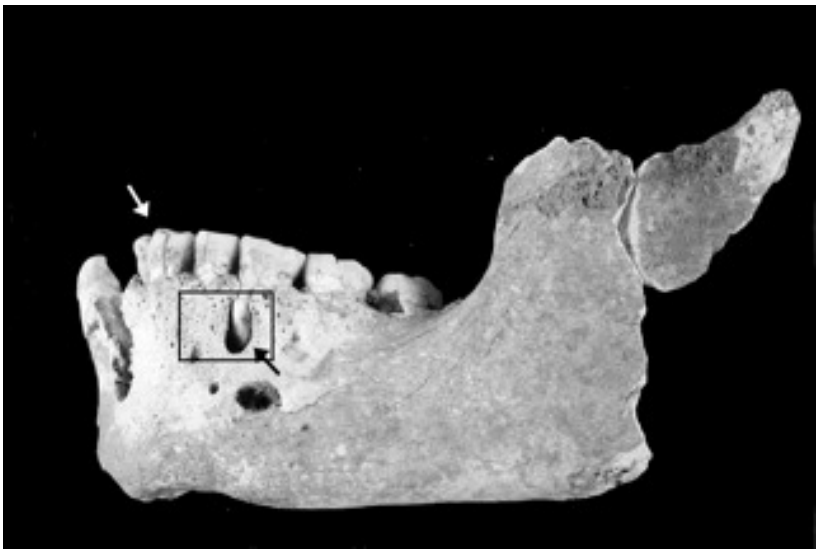

Figure 1. View from left side.

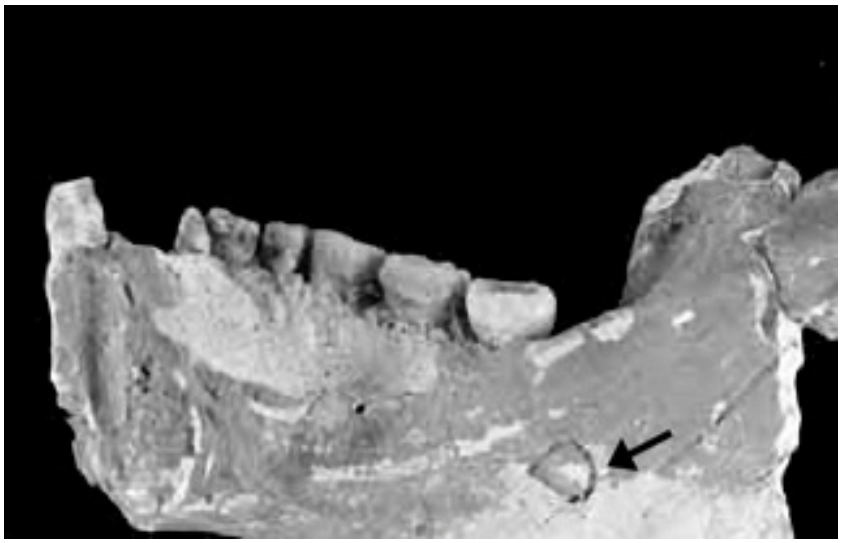

Figure 2. Lingual view, left side.

likely caused during the removal of the fossilized remains. The second fragment, which is complementary to the previous one, corresponds to the dorsal third of the sigmoid notch and condyle (Prieto et al., 2001).

The morphological characteristics are suggestive of an adult individual, exhibiting complete emergence of all the permanent teeth with a post-mortem loss of the central and lateral incisors and a completed apical closure at the level of the third molars. Moreover, regarding the age of the individual, in view of the scant attrition-abrasion of the occlusal face of the third molar, it may be assumed that the individual was young. Bearing in mind the morphological characters, mainly represented by the broad retromolar space and the retracted position of the chin orifices, and according to the literature consulted, the specimen can be classified taxonomically as belonging to *"Homo sapiens neanderthalensis"* (Bermúdez et al., 1995; Maroto, 1993; Trinkaus, 1986; Rosas et al., 1991).

On the left side, in the area of the canine, it was possible to see the presence of a smaller tooth with an abnormal shape; this could correspond to a supernumerary tooth in a position mesial to the first left premolar or to a temporary canine, exhibiting destruction of the crown (Figure 1). Furthermore, on the lingual side, at the level of the posterior portion of the left side of the mandible and immediately below the mylohyoid line and close to the gonionic angle, there is a rounded protrusion, with fracture of the internal face (Figure 2). On the outer face of the left side of the mandible, it was possible to note the presence of a large longitudinal bone defect associated with a cavitary lesion related to the mesial root of the first molar, with an abundance of vascular orifices in an area covering the two occusal thirds of the left side of the mandible between the canine and the interproximal portion of the first and second molar (Figure 1). The attrition of the molars was low (degree 5 of Scott), with incipient exposure of dentin at cuspid level. No caries could be observed in the extant teeth.

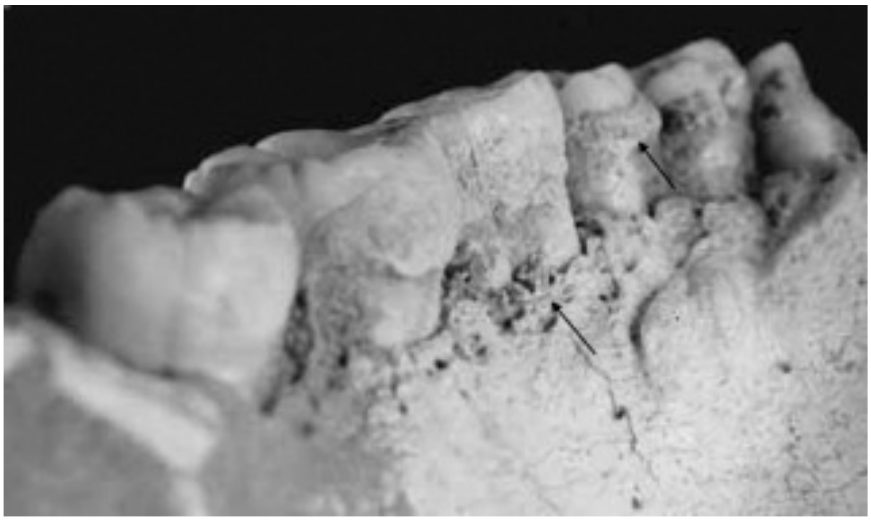

Figure 3. Lingual view, left side, at higher magnification.

Figure 4. Left lateral x-ray.

Also, we noted the presence of calculus in a pericoronary position both above and below the CEJ (Cement Enamel Junction) line. The surface of the alveolar ridge shows the remodeling of bone with a porous aspect (Figure 3). There was also a generalized loss of bone support, more pronounced on the lingual face, which was manifested by a distance from the amelocement line to the free alveolar edge greater than 3 mm and exposure of the furcation on the lingual face of the first molar.

Radiological analysis (Figures 4 and 5)

The radiological image showed the presence of an impacted tooth that morphologically resembles a large canine. It was located in the distal-most portion of the body of the mandible in a heterotopic position and is situated caudally to the apices of the second and third molars, at an intermediate height between the alveolar ridge and the base of the mandible.

It was also possible to observe a widening of the periodontal space at the level of the mesial root of the first molar, and a radiolucent periapical image, well delimited and compatible with an apical granuloma. The bone tissue surrounding the lesion showed increased radiological density as a manifestation of the associated condensing osteitis (Figure 4). All the above findings were consistent with a chronic apical periodontitis, most likely associated with an occlusion due to trauma.

RESULTS AND DISCUSSION

Evidence of periodontal disease in fossil hominids has been reported; it is usually associated with the presence

of calculus and an intense degree of attrition (Alexandersen, 1967; Chimenos and Martínez, 1990; Ripamonti, 1989). One of the features indicating inflammatory reactions of the alveolar bone is the porous aspect of the alveolar ridge, at the level of the interproximal septum, affording a "spongy" image (Figure 3). The pathology around the root in the specimen analyzed must have started with a periodontitis caused by occlusal trauma, later becoming associated with the inflammatory component, occlusal trauma, elicited by vertical bone reabsorption on the vestibular surfaces.

Granulomas are hyperplasic lesions located in the periodontal structures and are manifested as an inflammatory reaction; not intense but persistent (Neville, 2008). They grow and develop at the expense of the alveolar bone, which contains a cavity with circumscribed margins and a smooth, regular surface. Radiologically, they lack the typical "hardened" border of cysts (Pasler, 1991) Moreover, granulomas are generally smaller, with a size of 2 to 3 mm (Dias and Tailes, 1997). In themselves, granulomas are asymptomatic, although they may become infected and show the symptoms of an acute apical abscess, and indeed may even become fistulated and suppurate. Radiologically, they appear as a large radiolucent image with well defined contours. The defensive reaction of the bone surrounding them is manifested in the form a condensing osteitis. Such lesions are more frequent in the mandible owing to poorer drainage, in turn due to a greater thickness of the bone tissue at this level and, generally, it is possible to observe a tooth with long-term pathology of the pulp (Neville, 2008).

The term "supernumerary tooth" is used to define any extra dental element occurring in the dentition. They are often found to be retained in the maxillary bones and can only be seen with x-rays (García-Ballesta and Pérez, 1995). Hyperdontia, or the presence of extra teeth, has been reported in hominids from the Pleistocene, with a progressively increasing frequency since Paleolithic times (Brabant, 1967), and different forms of supernumerary teeth have been described, ranging from elements with a normal morphology to dysmorphic elements whose eruption is more frequent. Furthermore, the concept of "impacted tooth" refers to those seen within the maxillary bone beyond the normal date of their eruption, surrounded by their intact pericoronal sac, this latter being surrounded by a bed of bone (Neville, 2008). The presence of embedded permanent canines in the mandible is uncommon, with a prevalence of 0.05 to 0.4%.

In the maxilla, its frequency increases to 0.8 to 2.3%, and although the reasons for their presence have not been elucidated, they are attributed above all to embryological anomalies of germ development and, in just a few cases, only to spatial defects or the presence of pathological obstacles (odontomas or supernumerary teeth) (Taguuchy et al., 2001).

Weinberger has described the embedding of a left permanent mandibular canine, with the persistence of the milk canine in *Homo mousteriensis* (with an age of 100,000 to 40,000) (Weinberger, 1948). In humans, the intraosseal migration of non-erupted teeth is a rare occurrence that only takes place in the mandible and usually affects the second premolar and canine (Peck, 1998). Nelson (1997) has reported the case of a patient with an embedded second right mandibular molar followed up for 14 years after the age of seven. During that period, the molar migrated through the trabecular bone until it became positioned under the mandibular molars close to the mandibular angle. However, whereas the usual route of migration for the first molar is distal, the canine tends to migrate in the mesial direction, sometimes crossing the mid-line, a phenomenon called transmigration (Saphira and Kuftinec, 2003). This phenomenon of canine migration seems to be more under genetic control, bilaterality together with an association with anomalies of known genetic origin such as hypodontia and canine displacement towards the palatine bones being common. Based on personal experience, Peck offers the following data: a higher frequency in women (1.6:1); an age range between 10 and 62 years; no differences with respect to the left or right side (Peck, 1998).

Conclusion

The case of the Sidrón mandible is unique in the literature addressing dentistry and palaeopathology not only because it is the oldest specimen in which this type of alteration has been observed, but also because of the atypical presentation of the phenomenon, probably associated with macrodontia in a horizontally oriented tooth germ, which later became displaced in a direction opposite to its migratory route due to the osteo-condensing process secondary to infectious-inflammatory processes deriving from the periodontological pathology, the tooth being forced to follow the line of least resistance.

Superimposition of the gross and radiological images allowed the observation of the coincidence between the limit of bone condensation and the position of the coronal end of the canine, which supported our hypothesis (Figure 5). Hence, the evidences derived from the findings, both gross and radiological, indicated that the specimen studied was truly exceptional from the palaeopathological point of view.

ACKNOWLEDGEMENT

The author wishes to thank the Forensic Anthropology and Odontology Laboratory of the Forensic Institute of Anatomy in Madrid.

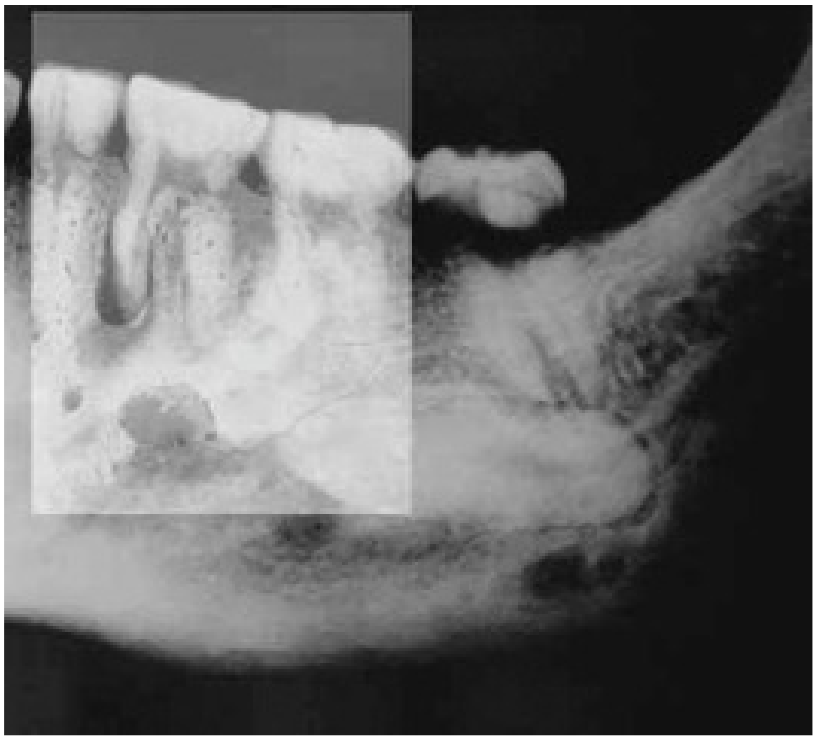

Figure 5. Superimposition of gross and radiological aspects.

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