Journal of Archaeological Science 60 (2015) 57–65

Contents lists available at ScienceDirect

Journal of Archaeological Science

journal homepage: http://www.elsevier.com/locate/jas

Taphonomic study of the human remains from the Magdalenian burial in El Mirón Cave (Cantabria, Spain)

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ARTICLE INFO

Article history:
Available online 9 April 2015

Keywords:
Magdalenian burial
El Mirón Cave
Cantabrian Spain
Primary deposition
Red ochre

ABSTRACT

This article presents the taphonomic history of the human remains recovered in El Mirón Cave (Cantabria, Spain) and an interpretation of their burial. At the back of the vestibule and within the occupation area of the cave, an interment was made during the Lower Magdalenian, nearly 19 cal. kyr BP. Biostratinomic and diagenetic modifications found on the bones of an individual woman have provided essential information with which to understand the origin of the burial and related formation processes. The skeletal representation, bone modifications, spatial distribution and signs of disturbance within the burial area jointly suggest that the skeletal remains recovered in El Mirón are possibly the result of a primary burial deposition which, after soft tissue decomposition, was disturbed to extract the cranium and most of the long bones. Those bones may have been deposited elsewhere, either inside or outside the cave, perhaps in a partial secondary burial that remains undiscovered. The rest of the skeleton was ritually covered over again with red ochre, sediment and stones. Other than the ochre, no unequivocal grave goods were associated with the human remains.

1. Introduction

Taphonomy has become an essential discipline for determining the origin of faunal accumulations recovered in archaeological contexts. It allows understanding how deposits were formed as well as identifying the post-depositional alterations that could have modified the original osseous assemblages, thus ensuring a reliable interpretation (Botella et al., 2000; Duday, 2009; Lyman, 1994; Shipman, 1981). Therefore, it should also play a major role in the study of buried human remains, not only to avoid drawing invalid conclusions about the intentionality of the burial, but also to provide direct and distinctive evidence of the ritual activities that took place after the death of the individual and the posterior biostratinomic and diagenetic modifications suffered by the corpse (Boulestin, 1999; Botella et al., 2000; Villa, 1992; White, 1992).

For example, the primary nature of an inhumation is commonly characterized by an almost complete representation of the human body in anatomical articulation, by taphonomic alterations consistent with those of the animal fossils located in the same layer or by a relatively clear association with grave goods. In contrast, secondary burials usually consist of isolated human remains, evidence of disarticulation of the corpses but with arranged bones from one or more incomplete skeletons, reuse of the burial space with the rearrangement of bones from previously decomposed bodies, reburial in clusters or bundles of various bodies in different stages of decomposition, and circulation of body parts or body treatment as reflected by bone surface modifications (Armentano and Malgosa, 2003; Orschiedt, 2013; Pettitt, 2011; Villa, 1992).

Nonetheless, the initial layout of the burial, whether primary or secondary, may have been easily affected after its deposition, hindering or biasing its posterior interpretation. On the one hand, during the Upper Palaeolithic the loci of burials were also used as places where humans groups usually lived (Pettitt, 2011), implying significant chances of alteration of pre-existing graves. On the other hand, non-human biological agents such as carnivores or rodents can discover and modify the human remains. Fortunately, these activities produce specific, easily recognized kinds of marks on the bones, which a taphonomic analysis will reveal.

Despite their apparent benefits, the application of taphonomic techniques in the study of human burials has been relatively limited. In the interments recovered before the 1960s, determining the exact provenance and disposition of the remains is often difficult, as it is the characterization of the associated sediment or the identification of the disturbance processes that could have affected

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http://dx.doi.org/10.1016/j.jas.2015.03.032
0305-4403/

the burials (Villa, 1992). While in recent years the study of prehistoric cannibalism (Aura et al., 2010; Boulestin, 1999; Villa et al. 1986; Villa, 1992; White, 1992) has stimulated the use of taphonomy to reconstruct not only how human bodies were processed in comparison with the animal remains, but also the very nature of their burial. The lack of taphonomic studies is still remarkable in the Upper Palaeolithic of southwestern Europe, resulting also from a striking scarcity of burials in caves (Pettitt, 2011:218). In sum, this fact has limited our knowledge of the funerary rituals practiced during this period.

The discovery of the human burial in El Mirón Cave is thus a good opportunity to fill this gap, allowing taphonomy to show its full interpretative potential. The burial is dated to 15.460 ± 40 uncal. BP (approximately 18.700 years ago), corresponding to the beginning of the Lower Cantabrian Magdalenian (Straus et al., 2011), thus being the first of this sort found in Iberia (Arias and Alvárez, 2004; Aura, 2010) and one of the 26 primary burials recovered from the European Late Upper Palaeolithic containing in total 31 individuals (Orschiedt, 2013). In fact, in the Iberian Peninsula, there are only a Gravettian juvenile burial from Lagar Velho (Zilhão and Trinkaus, 2002) and several Late Magdalenian human remains from Galería da Cisterna whose archeological context show evidence of a multiple burial (Trinkaus et al., 2011). El Mirón is, therefore, the only human Magdalenian burial found in the Iberian Peninsula in a clear, intact stratigraphic context. It is located in a small, shallow, and at least partially natural grave within the context of an occupation deposit at the rear of the cave vestibule.

In this paper, the results of the taphonomic study conducted on the human bones of El Mirón burial based on methodology habitually used in archaeozoology are presented (Marín-Arroyo, 2010). Evidence at hand, in particular the skeletal representation, carnivore tooth marks and diagenetic modifications, together with the spatial distribution of the bones, all point to a possibly primary burial, modifying the initial attribution as a secondary burial (Straus et al., 2011). Our favored hypothesis is that, after decomposition of the body *in situ*, the cranium and most of the long bones were removed by humans and taken to some other unknown place(s), perhaps for secondary burial. The rest of the skeleton was ritually covered over again with red ochre powder, sediment and stones. The justification for this interpretation is outlined in the following analysis.

2. Materials and methods

El Mirón Cave is located in northern Spain, in the eastern part of Cantabria province, midway between the cities of Santander and Bilbao and 20 km from the present coastline. El Mirón is located in the upper Asón River valley at 260 m a.s.l in a montane environment surrounded by peaks of ≥1,000 m a.s.l. It is a large limestone cave with an ample vestibule where three different excavation areas have been opened: the front part or Cabin, the rear or Corral, and an intermediate trench between both areas. The excavations have been directed by L.G. Straus and M. Gónzalez Morales since 1996.

The human remains studied here were recovered during field seasons in 2001 and between 2010 and 2013 in the Corral excavation area of El Mirón Cave, at the rear of the vestibule, behind a large engraved block (Fig. 1). The excavation of the burial was very difficult as it was located in a narrow area between a large block and the cave wall (Fig. 2). However this limitation did not affect the careful recovery and piece-plotting of the human remains. The human skeleton (specifically a fibula) is directly dated to 15,460 ± 40 BP (MAMS-14585). Stratigraphically, the bones correspond mainly to Level 504, but also to 503, 505 and 506, coming from an area of ca. 3 m^2 (1 m^2 in X6 and partial squares X7, Y7 and Y6) (see Straus and Gónzalez Morales, 2015). Together with the human remains, the excavation of this area also yielded abundant lithic artefacts and faunal remains, plus far smaller numbers of shells and osseous artefacts, also studied in this issue (Fontes et al., 2015; Gutiérrez-Zugasti and Cuenca-Solana, 2015; Marín-Arroyo and Geiling, 2015) (For descriptions of the stratigraphic position, depositional context and excavation of the burial and photos of the remains, see also the articles by Straus and González Morales, Geiling and Marín-Arroyo and by Carretero et al. 2015).

Level 504 is characterized by the presence of red ochre that impregnates the sediment. This ochre contains abundant specular hematite crystals (see Seva et al., 2015), which gives a shiny appearance to the organic materials found in the area. Many of the bones were completely stained red and bore many small crystals. Thus, virtually none were washed, since the staining might provide information on the ritual treatment of the remains and on the taphonomic modification that had taken place in the burial area.

In order to identify biostratinomic and diagenetic alterations, all the bones were examined in macro- and microscopic detail through a LEICA S8 APO binocular microscope. Carnivore tooth marks on bone surfaces were classified as pitting, scoring, furrowing and scooping-out (Binford, 1981; Haynes, 1980, 1983; Sutcliffe, 1970). CT scanning of all El Mirón remains was done using an YXLON Compact (YXLON International X-Ray GmbH, Hamburg, Germany) industrial multi-slice computed-tomography scanner housed at Burgos University, Spain. Scanning parameters were: scanner energy 160 kV and 4 mA. The CT images were visualized using the commercially available software package MimicsTM (Materialise, NV, Belgium) (see Carretero et al., 2015). The length and breadth of carnivore pitting marks were measured on the scanned images using Mimics software version 16. Measurements could only be taken on the tibia shaft. Previous studies show that this is the best way to identify the carnivore agents (Andrés et al., 2012; Sala et al., 2014). Metric data obtained for gnawing marks were compared to other experimental data obtained from modern carnivores of the same species represented archaeologically in the Cantabria Upper Palaeolithic (*Canis lupus*, *Vulpes vulpes*, *Crocuta crocuta*, *Panthera leo*, *Panthera pardus*, *Ursus* sp.) (Andrés et al., 2012; Campmas and Beauval, 2008; Domínguez-Rodrigo and Piqueras, 2003; Sala et al., 2014; Saladie et al., 2013). Tooth pit breadth on shafts was used to infer the possible carnivore agent.

Bone fractures were classified according to the criteria of Villa and Mahieu (1991). This method records the fracture type and location, noticing the fracture outline (longitudinal, transverse and oblique), fracture angle (oblique, right or mixed) and fracture edges (jagged or smooth) in long bones. Fracture information determines the way in which each break was produced. Due to the scarce presence of long bones in the El Mirón sample, shaft circumference was not documented.

Amongst other biostratinomic factors that can occur between the death of the individual and the burial of the remains, weathering stages were defined according to Behrensmeyer's definitions (1978). As diagenetic evidence, manganese oxide concentrations were recorded through the presence of manganese dendrites on bone surface and their anatomical position. These dendrites appear depending on the environmental conditions of each kind of soil. Potter and Rossman (1979: 1226) define as "unknown" how far below the ground surface or at what time cracks and dendrites are formed. In manganese dendrites, the manganese is generally present as romanechite or a hollandite-group mineral and is sometimes the major