

Basilar portion porosity: A pathological lesion possibly associated with infantile scurvy



Joanna Moore^{a,b,*}, Hannah E.C. Koon^a

^a Archaeological Sciences, University of Bradford, Bradford, West Yorkshire, BD7 1DP, UK

^b Department of Archaeology, Durham University, Durham, DH1 3LE, UK

ARTICLE INFO

Keywords:

Basilar portion
Porotic lesion
Scurvy
Sub-adult
Wolverhampton
19th Century

ABSTRACT

Recent analysis of the juvenile (≤ 12 years) human remains from a 19th century site in Wolverhampton, England revealed a relatively high level of nutritional deficiency diseases within the population. Indeed, 41.7% of the 48 juvenile skeletons analysed exhibited a combination of porous and proliferative bone lesions consistent with the pathological alterations associated with nutritional stress. This paper describes a pathological lesion on the inferior surface of the basilar portion of the occipital bone, not previously reported in association with infantile scurvy, but which was exhibited by 90% ($N = 9$) of the 10 scorbutic individuals identified during this study.

1. Introduction

Scurvy is a nutritional deficiency disease resulting from a lack of dietary vitamin C (ascorbic acid). This deficiency impedes the hydroxylation process involved in collagen synthesis (a dominant structural protein in connective tissues), weakening collagen structures and culminating in defective, reduced or arrested osteoid formation and fragile blood vessels prone to haemorrhage (Ortner et al., 2001). These defects result in the formation of previously described lesions associated with scorbutic skeletal material (Ortner, 2003; Brickley and Ives, 2006), which primarily consist of porotic hyperostosis, cribra orbitalia and abnormal porosity (often with periosteal new bone formation) in the scapulae, long bone metaphyses, and mandible. These lesions tend to manifest bilaterally and are thought to be caused by chronic, low-grade haemorrhage of weakened blood vessels, predominantly at muscle attachment sites, which stimulates an inflammatory response (Ortner and Eriksen, 1997; Ortner et al., 1999, 2001).

Despite approximately 80% of scorbutic cases developing musculoskeletal alterations, and a myriad of historical literature attesting to its high prevalence, the disease remains a relative rarity within palaeopathology (Stark, 2014). It is likely that this discrepancy is due to the skeletal manifestations of scurvy being subtle and common to many other disease processes, as well as the often fragmentary nature of archaeological remains making a definitive diagnosis difficult (Geber and Murphy, 2012; Armelagos et al., 2014). In addition to this, the frequent co-morbidity of other pathological disorders with scurvy may mask its presence within the skeletal remains (Roberts and Manchester, 2010;

Ortner, 2003; Waldron, 2009). Thus, it is distinctive lesions described in the 'Ortner Criteria', such as those on the greater wing of the sphenoid, mandible and supraspinous fossae that prove vital to the successful identification of scorbutic skeletal remains (Zuckerman et al., 2014; Crandall and Klaus, 2014). To that end, a novel lesion noted on the basilar portion of the occipital bone from nine scorbutic juveniles is presented as a lesion that, when added to the current suite of characteristics used to identify infantile scurvy, may enhance the ability to successfully identify scorbutic individuals, especially within fragmentary and partial remains.

2. Historical background

The St. Peter's Collegiate Church overflow cemetery was a 19th century burial ground situated in a working class area of Wolverhampton, England (see Fig. 1). The poor diet, occupational and living conditions associated with the working-class, together with the high levels of environmental pollution inherent within 19th century industrial cities such as Wolverhampton, significantly increased the prevalence of diseases, including metabolic diseases such as infantile scurvy, within the local population (Wohl, 1983; Adams and Driver, 2007; Arabaolaza et al., 2007). In archaeological contexts infantile scurvy is an indicator of extreme nutritional stress in breast-feeding mothers and/or the use of nutritionally inadequate weaning foods (Lewis, 2007). Within the working classes, the need to work and the availability of factory jobs for female workers in industrial cities such as Wolverhampton may have necessitated the weaning of infants at a

* Corresponding author at: Department of Archaeology, Durham University, Durham, DH1 3LE, UK.
E-mail addresses: j.f.moore@durham.ac.uk (J. Moore), h.koon@bradford.ac.uk (H.E.C. Koon).

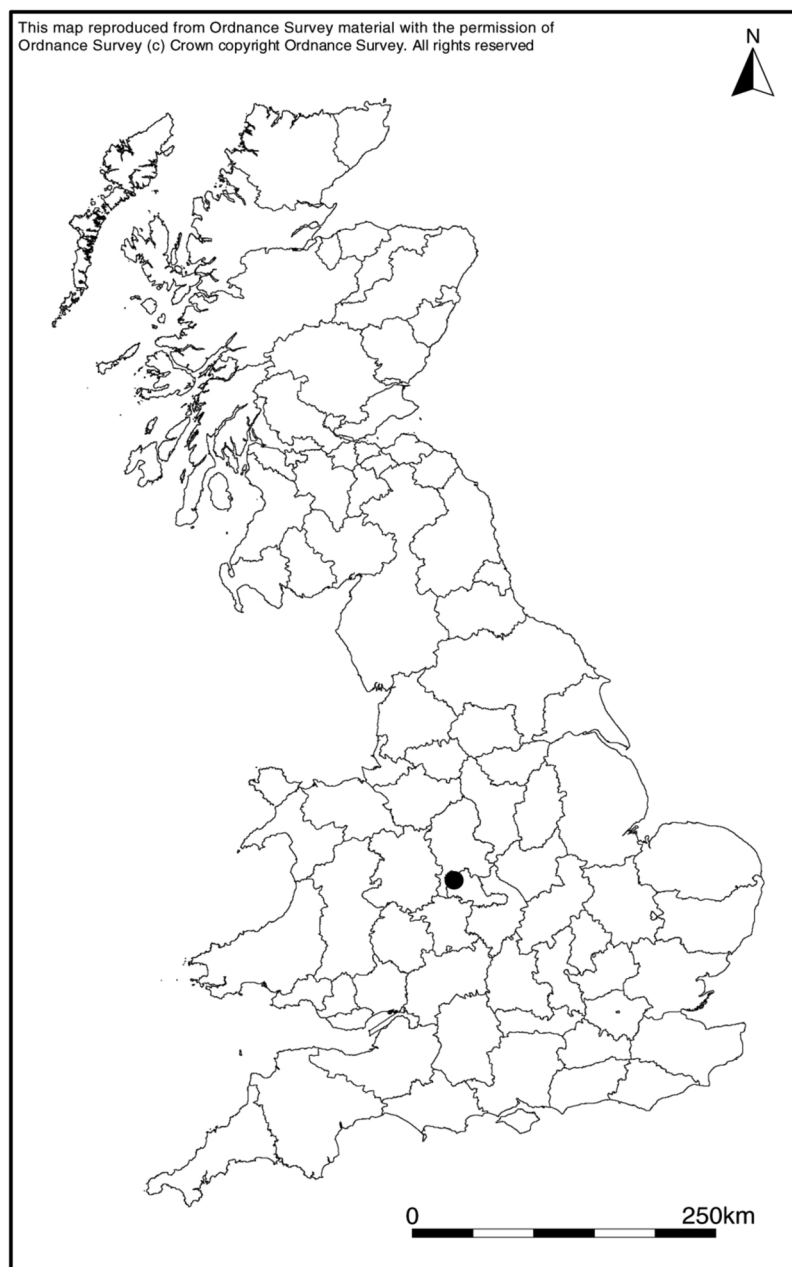


Fig. 1. Location map of Wolverhampton, England (source Ordnance Survey©).

young age (Fildes, 1986; Lewis, 2007). This was often done with nutritionally deficient foods such as pap (a flour and water mix) or condensed milk (Knodel, 1968; Wilson, 1986), inadvertently increasing incidences of infection and disease among children, which likely contributed to the high childhood metabolic disease and infant mortality rates associated with this period (Wilson, 1986; Atkins, 1992). Thus, the individuals interred within St. Peter's Collegiate Church overflow cemetery provided a predominantly working class population that was likely to exhibit high a prevalence of metabolic disease.

3. Materials and methods

The St. Peter's Collegiate Church overflow cemetery in Wolverhampton was a 19th Century burial site consisting of a combination of vaults and earth-cut burials, which had been densely interred (Adams and Colls, 2007). The cemetery was in use from 1819 to 1853 and during its excavation between October 2001 and January 2002 a

total of 150 human burials were recovered (Arabaolaza et al., 2007).

Age estimation was carried out using dental development and eruption (AlQahtani et al., 2010), long bone length (Scheuer and Black, 2000) and epiphyseal fusion (Scheuer and Black, 2004). Once juvenile status had been established, only individuals ≤ 12 years of age were analysed for evidence of scorbutic changes as outlined by Brickley and Ives, 2006, 2008; Geber and Murphy, 2012; Ortner 2003; Ortner et al., 1999, 2001 and Ortner and Erickson 1997 (see Table 1). Using the published diagnostic criteria outlined in Table 1, all macroscopic lesions for each individual were recorded as either present or absent. If three or more probable scorbutic features were present the individual was recorded as scorbutic, while individuals exhibiting no probable features but three or more possible features alongside any non diagnostic features were considered as possibly scorbutic. As rickets is a common co-morbidity with scurvy the criteria set out in Brickley and Ives, (2008) was used to diagnose any rachitic individuals.

Download English Version:

<https://daneshyari.com/en/article/6463057>

Download Persian Version:

<https://daneshyari.com/article/6463057>

[Daneshyari.com](https://daneshyari.com)