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First evidence of pre-Hispanic dentistry in South America – Insights from Cusco, Peru



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ABSTRACT

Intentional dental modification (IDM) derived from archeological or ethnographic contexts has been extensively documented across the globe. Despite the wealth of information on IDM for personal ornamentation and ritualistic purposes, evidence of IDM for therapeutic reasons among early Native Americans is poorly known and limited to a handful of cases. We report two upper canines from two pre-Hispanic individuals dated to the Late Horizon Period from Cusco (Peru), each showing a conical perforation on its incisal surface. Analyses were performed using traditional radiography, computed tomography and scanning electron microscopy. The depth and symmetrical location of the perforations at the center of the crown suggest that these two teeth were artificially drilled, rather than affected by taphonomic factors. The poor oral health of the individuals, the location of the perforations on the incisal surface, and evidence of intentional manipulation of the pulp chambers (as supported by their overall morphology and presence of striations and deep marks along the walls of the perforations) provide a strong case for the occurrence of prehistoric dentistry in the New World. The two canine teeth reported here represent the first pre-Columbian examples of IDM likely performed to ameliorate a dental pathology (presumably associated with the infection of the dental pulp) found in Peru and in the rest of South America.

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Introduction

Intentional dental modification (IDM) derived from archeological or ethnographic contexts has been extensively documented across the globe (Milner and Larsen, 1991). Since antiquity, this practice – including tooth ablation, tooth blackening, and dental mutilation via filing, chipping and inlays – has primarily been used for ritualistic or decorative purposes (Kennedy et al., 1981; Ortner, 1966; Pindborg, 1969; Romero, 1970; Sanvichien, 1966). Evidence of this practice in pre-Columbian America goes back to circa 1400 BCE and is mainly expressed as an alteration of the contour and/or labial surface of the tooth crown, especially in the anterior dentition (Milner and Larsen, 1991; Romero, 1970). In the New World, IDM was particularly common among pre-Hispanic Mesoamericans (Gwinnett and Gorelick, 1979; Romero, 1970), although several cases are also known from the United States and the Caribbean (Handler et al., 1982; Holder and Stewart, 1958; Ortner, 1966; Stewart and Groome, 1968). A few cases have also been reported in South America, including Argentina (Dembo, 1939), Amazonian Peru (Soto, 1967), and coastal Ecuador (Ubelaker, 1977, 1981, 1987).

Despite the wealth of information on IDM for personal ornamentation and ritualistic purposes, evidence of deliberate alterations of teeth for therapeutic reasons among early Native Americans is poorly known and limited to a handful of cases (Koritzer, 1968; Schwartz et al., 1995; White et al., 1997). This is surprising considering that prehistoric people did have the skills and knowledge to carry out rudimentary surgical procedures as revealed by the long tradition of trepanation in pre-Columbian America, especially in Peru and Bolivia (Andrushko, 2007; Rowe, 1946; Verano, 1997, 2003; Weiss, 1958). Although the motivations behind trepanation are not entirely clear, it has been generally attributed to medical reasons to either alleviate trauma-induced cranial swelling or cure illnesses such as headaches and epilepsy (Ortner and Putschar, 1985; Verano, 1997). The precise cuts and high-survival rates (50–70%) as evinced by bone regeneration around the modified area of some skulls demonstrate the ability and success of these prehistoric surgeons (Marino and Gonzales-Portillo, 2000). Surgical procedures in the postcranial skeleton have also been reported in pre-Hispanic America (Toyne, 2015; Verano et al., 2000). The technical proficiency and advanced methods of the early inhabitants of the New World are also manifested in a reported case of a gold cranioplasty with perfect healing around the frontal bone (Marino and Gonzales-Portillo, 2000), as well as in the dental implants made from metals and animal bones and inserted postmortem in the oral cavity of human trophy heads (*cabezas trofeo*) (Silva Reggiardo, 2002; Torres and Glowacki, 2012). Thus, the limited evidence found for therapeutic dental modification may not suggest a lack of understanding of proto-dentistry by ancient South American civilizations. Instead, the scarcity of recorded evidence could be the result of both the little attention paid to the subject and the difficulty of identifying oral treatment for curative purposes. Chronicles from Colonial Peru, for example, indicate that early Native Americans extensively used medicinal plants and roots to alleviate the pain and treat diseases affecting the oral cavity (Cobo, 1964; Garcilaso de la Vega, 2004). Silva Reggiardo (2001) also suggests that full tooth extractions might have been the first manifestations of prehistoric dental surgery in the Americas. However, he acknowledges that there are no written accounts of such procedures for curative purposes, although there are records that the Incas did practice tooth extraction as a form of punishment.

In this report we present two cases of permanent upper canines from two pre-Hispanic individuals from the city of Cusco in southeastern Peru, each showing a conical perforation on its incisal surface. The depth and symmetrical location of the perforations at the center of the crown suggest that these two teeth were artificially drilled, rather than affected by taphonomic factors. Given that the perforations are located on the incisal surface (rather than labially as shown in IDM cases for decorative purposes), and considering the poor oral health of the individuals, we investigate the likelihood that these drilling-type modifications were conducted for therapeutic reasons.

Materials and methods

The two individuals examined in this study are curated at the Cusco branch of the Peruvian Ministry of Culture and cataloged as PAS-CHG-5 and QT-R75-7. While the complete skeleton of PAS-CHG-5 was recovered, individual QT-R75-7 was only represented by the cranium. Features of the skull and pelvis of PAS-CHG-5 point to a young adult (25–29 years) male individual. The cranium of

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