

A case study of an adult male from a Late Woodland site in Indiana

Michelle Sivulich, Department of Life Sciences
 Shawn M. Phillips, Department of Geography, Geology, & Anthropology
 Indiana State University

Introduction

This case study reports observations on an individual that may be interpreted as having possible markers of cleft palate. Although cleft palate is a common defect of the face, the condition is rarely reported from archaeological contexts. Here, we describe the skeletal anomalies observed from an adult male and compare them with cases of cleft palate from clinical and paleopathology reports. Cleft palate is a developmental defect that can range in severity from a bilateral notch, cleaving the palatines, to a full bilateral cleft. The defect can also be expressed as a unilateral notch to a full unilateral cleft. The defect is associated with the Grider Site (Late Woodland context, Pike County, Indiana). The analysis draws on clinical and paleopathology literature to consider other possible conditions responsible for the skeletal anomalies. In modern populations, cleft palate occurs about 1 in 750 live births, it is the most common defect of the face. Significant consequences of the condition is communication between the oral and nasal cavities which can disrupt feeding, increase risk of upper respiratory infections, and impair speech. Contemporary medicine addresses the condition in early infancy with corrective surgeries that greatly reduce the risk of mortality. Despite the high frequency of cleft palate, few cases are reported from the archaeological record. It is possible that, in the past, few infants survived extreme forms of cleft palate, and such cases are not present to be recorded. Or, it is possible the lesion simply goes undocumented. This analysis outlines the markers of cleft palate in this individual and demonstrates that a prehistoric culture could overcome the health issues experienced by an infant with the condition (full communication between the oral and nasal cavities) and survive to adulthood.

Materials & Methods

The case study in this report is associated with the Grider Site, recovered from Pike County, southwest Indiana. The Grider Site was excavated during the mid-1970s and has since received minimal skeletal attention. Thus, though we are confident in the assertion that this skeletal series is from a prehistoric context, the exact time frame for this site remains tenuous. Over 40 individuals were recovered during the excavation. Here we focus on a single burial from this site, which is represented by a fragmentary but well-preserved cranium and is the only individual from this skeletal series with the condition reported in this analysis.

Standard cranial sexing and aging observations were utilized in this analysis. Differential diagnosis protocols were followed to ascertain the most parsimonious interpretation of the anomalies observed. Finally, a literature review including clinical and archaeological studies was conducted.

Results

Age & Sex

The individual is estimated to be between 20 and 30 years based on the following observations:

- The mandibular and maxillary third molars are fully erupted
- Dental attrition is extensive enough to expose dentin in all visible teeth
- The cranial sutures are fully open

The individual is identified as male based on the following cranial observations:

- Robust mastoid processes
- Rounded supra-orbital margins
- Robust mandible
- Two prominent mental eminences
- Flared masseteric tuberosities at the gonial angle

Pathology

Development Defects

- Maxillae (See Figures 1 & 2)
 - Possible congenital absence of hard palate
 - Possible congenital absence of nasal conchae
 - Possible congenital absence of right maxillary central incisor
- Unusually small nasal aperture, sclerotic buttressing along aperture margins
- Possible congenital absence of right and left palatines (See Figure 2)
- Nasals present with unusual flattened morphology (See Figures 1 & 2)

Infectious disease observations

- Active sinusitis in the left maxillary sinus
- Open cloaca in the right maxillary sinus (cyst or abscess?) permitting full communication between the sinus and the oral and nasal cavities
- Carious right maxillary first molar
- Four apical abscesses along the maxillary alveolus



Figure 1 : Anterior view. Note the presence but flattened appearance of the nasal bones, the unusually small and rounded morphology of the nasal aperture (diameter less than one centimeter), the possible congenitally absent right maxillary central incisor.



Figure 2 : Inferior view. Note the absence of the hard palate (palatines and maxillary palate), enlarged incisive foramen, and the open abscess on the right maxillary sinus.



Figure 3 : Lateral view. Note the lack of a nasal arch giving the face a flattened appearance in this view and the apical abscess in the maxillary alveolus at the first right molar.

Discussion

A possible interpretation of the developmental defects in this individual is cleft palate, the congenital agenesis of the hard palate. Based on the symmetrical lesion, this case would classify as a *bilateral full cleft*. Another possible diagnosis is a midline cyst, which can form early in cell differentiation when "epithelial tissue is caught between the palatal processes and the premaxilla as they unite" (Barnes, p. 177) and thus interrupt normal development. Though we are willing to consider either interpretation, pathology tones assert that midline cysts in the hard palate tend to be located in or near the incisive foramen. In such cases the incisive foramen is obliterated along with most of the hard palate during development. In the present case, the incisive foramen is still intact. The foramen is somewhat enlarged, but does not otherwise appear to be involved in the suite of defects.

Cleft palate is somewhat of an enigmatic condition in paleopathology literature. Despite the defect being common in modern populations, it is quite rarely recovered from the archaeological record. Paleopathologists have interpreted this absence as a lack of survival of individuals with this condition. The basis of this reasoning is that the biggest obstacle to survival would have been feeding an infant with cleft palate. With communication between the oral and nasal cavities, swallowing can be difficult with food and liquids escaping through the nasal aperture, sucking can be impossible, and the risk of choking increases greatly. Of note in this individual is the unusual morphology of the nasal bones and nasal aperture. In other reported cases of cleft palate, such morphology is not noted. In addition, there is sclerotic buttressing around the nasal aperture, which might indicate some continual pressure was being exerted in the area. It is possible the unusually small nasal aperture may have assisted in this individual's survival. Given the flattened appearance of the nasals and the small nasal aperture, it is assumed that the soft and cartilaginous tissues of the nose were greatly reduced. If that were the case, then simply plugging the aperture would have aided in swallowing, assuming the soft palate aided with blocking the trachea during ingestion. Like many paleopathology conditions, there is a dilemma in comparing clinical cases to those from the past. In the modern context, an infant presenting these developmental defects experience a series of corrective surgeries and receive the benefit of feeding aids to ameliorate feeding issues. Since this is the case, rarely do we see modern cases of cleft palate in adults who received no such treatment, thus we have little clinical comparative cases of how this condition would manifest in an adult in the complete absence of medical corrective measures.

It is evident that this individual suffered from other health complications that are associated with modern cases of cleft palate. For example, infections of the oral cavity were observed in this individual. Although infections of the oral cavity are common in general, they are more so with cleft palate and tend to be more problematic. For this individual, an active sinusitis infection was present at the time of death and the maxillary sinus abscess suggests the possibility that this individual may have suffered a chronic infection of the oral cavity. Despite these compromises to health and quality of life, this individual still survived to adulthood. Others have reported possible evidence of compassion via the care of disabled individuals in the archaeological record (Hawkey, 1997). It seems possible to assert that argument here as well. Given the presumed prodigious effort it would have taken to rear an infant with a bilateral full cleft palate, we can assume the caretakers recognized the necessity of the extra caretaking.

References

Aufderheide, A. and C. Rodriguez-Martin, (1998) *The Cambridge encyclopedia of human paleopathology*. Cambridge: Cambridge University Press.
 Barnes, E., (1994) *Developmental defects of the axial skeleton in paleopathology*. Denver: University Press of Colorado.
 Hawkey, D., (1998) Disability, compassion and the skeletal record: Using musculoskeletal stress markers (MSM) to construct an osteobiography from early New Mexico. *International Journal of Osteoarchaeology* 8:326-340.
 Ormer, D., (2003) *Identification of pathological conditions in human skeletal remains*, 2nd ed. New York: Academic Press.
 Resnick, D., (1995) *Diagnosis of bone and joint disorders*, 3rd ed. London: W.B. Saunders Company.
 Roberts, C. and K. Manchester, (1995) *Archaeology of disease*. Cambridge: Cambridge University Press.

Acknowledgements

We owe thanks to the Indiana State University Anthropology Laboratory for access to the Grider Site collection and records, to Dustin Holmes for his dedicated research efforts, and to the Department of Geography, Geology, & Anthropology for research support funds.