Cranial Deformation Cases from Shoofly Village Burial Remains

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Bones found in archeological sites provide information regarding the way of life of the early inhabitants. Cranial deformation evident in skeletal remains suggest pathological, environmental and/or cultural factors which may have affected the community.

Excavations at the Shofly Village Ruin began in 1974. During the 1974 and 1975 season, seventeen human burials were exhumed, often in fragmented and isolated conditions. Some of the burials found in clusters, tend to overlap earlier burials, resulting in loss of skeletal remains. Some of the earlier burials may have been removed at the time of interment of a more recent burial.

Despite the lack of uniformity of the burial, efforts are being made to reassociate the fragmented parts with the appropriate remains. The high degree of fragmentation makes it difficult to analyze the majority of these bones. Cranial remains from eight individuals have been reviewed for analysis.

Burial One was discovered in the room fill of the South Enclosure (E107 N66'). Upon exhumation, an extremely fragmented infant skeleton was found. Based on dentition, the child was aged 2.5-3 years.

A large portion of the postcranial skeleton was present, though severely fragmented. Pathological conditions affect the entire
skeleton, primarily due to a systemic infection resulting in an anemic bone response (Atwell, 1983). The most severely affected area is the skull, where porotic hyperostosis is evident on the occipital, extending to the right and left parietal. Cribrum orbitale, creating formation of spongy bone at the roof of the eye socket, extends into the parietals. It appears heaviest at the bosses and orbits.

Artificial or intentional deformation of the cranial fragments is obvious. The occipital is severely flattened and the parietals display extreme curvature. Complete analysis of the deformation is difficult due to the fragmentation of the infant remains.

Burial Two, found in the South Plaza (ET6 N73), was aged through dentition which suggests an individual of 11-12 years of age. The postcranial skeleton is present, but many of the bones are incomplete. The cranium is fairly well preserved, with only parts of the occipital and spheno-ethmoidal condition.

Cranial deformation is evident by the flattened remains. Six wormian bones present at the lambdoidal sutures may indicate intentional or artificial deformation.

A subadult, approximately 12 years of age, was found in the South Plaza beneath a stone cap. The postcranial skeleton was incomplete, however, remains found were fully observable. The cranium was fragmented but sufficiently present for analysis. Pathologically, porotic hyperostosis and cribrum orbitale affected the bones leaving a porotic surface.
Burial Four was exhumed from the South Plaza. The infant may have been 1-1/2 years of age. The cranial and postcranial skeleton are very incomplete and fragmented. Pathology appears slight with mild porotic hyperostosis and cribra orbitalis.

Exhumation of Burial Eight, found in the North Periphery area, revealed a subadult, most likely male. The fairly robust skeleton was nearly complete but fragmented. The occipital revealed moderate pathology resulting from anemia and possible cranial board deformation.

A male skeleton found in the North Periphery was an individual of approximately 35 years of age. This fairly complete skeleton is designated Burial Twenty.

The cranium displays mild anemic reaction, with possibly a healed pathology of cribra orbitalis. The mandible shows evidence of osteomelitis. Cranial deformation is obvious in a discolored parietal area. Suggestion has been urged (Braxe, 1973) that this could be the outcome of a healed skull fracture.

Burial Fifteen was found in the South Plaza with an infant. This female is a fairly complete and unfragmented young adult of 20-35 years of age. The cranial fragments display a thick skull vault of the parietals, occipital, and frontal bones. The individual may have suffered from a depressed fracture of the parietal which resulted in death (Braxe, 1973). Pathologically, effects of anemia are mild.

Burial Thirteen, infant found with its preserved mother in the South Plaza, is aged 9-12 months. The postcranial and cranial remains are very
Incomplete and fragmented. The cranial displays woven bone (Atwell, 1973), which is very thick, indicating possible damage caused by anemia.

Following analysis of the burial reports and in viewing a number of the skulls and cranial remains, the deformation of bone revealed in the population may be attributed to pathological or biological causes, earth pressure, or artificial deformation.

Pathological causes of deformation may result from genetic or hereditary origins or possibly through dietary deficiencies. Modifications of bone may be caused by a number of disease processes. It is difficult to discern particular pathological conditions because the bone may be affected in a similar manner.

Bone syphilis, affecting the skull, is usually acquired rather than congenital. The cranial vault may display areas of osteitic erosion (Brothwell, 1965), and the inflected bones may be particularly deteriorated in the nasal region.

Yaws, unlike syphilis, often begins during childhood. Facial distortion is often severe, especially in the nasal and palatal region. Scarring may be extensive if the disease extends to the advanced stage.

Congenital osteogenesis imperfecta (Ubelaker, 1977), prevents the body from effectively producing retard which allows for strength in skeletal growth.

Endocrine malfunctions resulting from endocrine imbalances adversely affect bone growth. Dysfunction of the pituitary gland (acromegaly) is a chronic disease which causes an enlargement of bones in the head.

Pathological deformities may be misinterpreted for
what is actually post mortem disturbance to the skeletal remains.

Archaeological remains may be affected by earth pressure, creating deformation of human bone. If the cranial remains in fact, the fusion of sutures protects the skull from distortion, to some extent. Fragmented cranial remains, however, often suffer some deformation. The decomposition of calcium in the bone and pressure from the soil can distort the original state of the bone. Burial Three, found in the South Plaza, is an example of post mortem warping of the occipital bone. The disturbance caused difficulty in reconstruction.

Manipulation of the skull to create artificial deformation through the application of external forces is possible during infancy and the first years of life. At this early stage of growth, the child's head is soft and malleable and the sutures between the various bones are unfused.

The flexible, cartilaginous interstices between the skull bones join, forming interdigitations (Rogers, 1974), which fuse throughout maturity. The cycle of suture fusion is not uniform; however, in an individual usually has a closed suture by young adulthood (27-37 years). The sutures behind the parietal bones are the last to fuse when an individual is beyond 75 years of age.

A sutureal bone may form during ossification of the margins of the sutures. This small bony bone may form within the suture. When found at the apex of the lamboidal suture, it is referred to as Dheth's ossicle or the pineal bone (Rogers, 1974).

In normal skulls there may be two to three sutureal bones, while over one hundred may form in
hydrocephalic skulls. The formation and purpose of these bones may be associated with the excessive growth of the skull. These bones are often found in the event of cranial deformities.

The age at which sutures begin to fuse and complete fusion varies. Cranial deformation, however, does not occur in an individual after 5 years of age. The cranium is basically formed by this stage. During the first year, portions of the temporal bone and the sphenoid unite. The two halves of the frontal bone begin to fuse by the second year, and the lateral parts of the occipital bone unite with the basilar process of the occipital bone in the third year.

Cranial deformation resulting from retarded or premature fusion (synostosis), caused by congenital, pathological or accidental means, can create varying degrees of distortion.

The most common deformation caused by abnormal fusion growth is scaphocephaly. The skull vault appears long and narrow due to the lack of growth along the sagittal suture.

Plagiocephaly results in an abnormally narrow frontal bone. The occipital suture, which is usually fused during the first years of life, closes before birth, creating growth distortion.

Plagiocephaly is caused by variation in cranial growth rates. Abnormal growth along the coronal suture may also cause this anomaly.

During the early stages of life, a child's skull is extremely malleable. Force applied to the skull may be intentional, to produce a specific shape, or unintentional, the result of certain behaviors.

Guenther (Weleber, 1973) grouped cranial deformities into
Ventral-occipital: This type refers to the deformation created by wrapping the infant with its head pressed against a hard cradle board. The flattened occipital seems to be an unintentional consequence reflecting the length of time the child remained in this position. Ventrolateral refers to the flattening that occurs on the upper occipital, near the joining of the parietal. Causes for this deformation have been attributed to possible cradle-board use, or intentional deformation due to tying a flat object against the back of the head.

Occasionally, the frontal is only flattened. Steward suggests this kind of deformation is the result of tying a band across the forehead to support weight carried from the back; a practice which would have to begin in early childhood.

Fronto-occipital deformation results when pressure is applied to both the frontal and occipital areas, creating a flattened surface on both areas.

The skull remains from Shofly Village Burial have displayed obvious cranial deformation. Hypotheses as to why and how the deformation occurred vary. Following analysis of the burial reports, pathological deformation has been noted. The intentional and non-intentional deformation, caused by external force, is more difficult to determine.

Evidence of cradle-board deformation is apparent in the archeological remains in areas of northern, western and southern South America, the Andes, and the United States. (Ubelaker, 1977). The deformed skulls analyzed from Shofly Village may be the results of similar practices. Cranial remains from particular burials display the possibility of intentional...
or artificial deformation. The adult remains from Burial Fourteen and Burial Fifteen show flattened deformity
in the parietal areas. Suggested (Bender 1975) has been
made that these deformities are the results of fractures
of the skull. Stewart's vertex occipital type of deformation
caused by cribal band practice may, however, be applicable
to these cases.

The younger individuals show a higher degree
of deformation. Occipital disturbance is often found
in conjunction with frontal deformation. Stewart's
fronto-occipital category may be exemplified in
these remains. It is possible that pressure was
applied to the both the front and back cranial area
of these young individuals. Pressure applied to these
areas may cause a flattened occipital and parietal
with indentation on the frontal brow. Cases
which exist during infancy and early childhood would,
therefore, be more pronounced.

The cranial remains from Burial Two were
fairly well reconstructed. The frontal bosses are extremely
over-pronounced, and the occipital is flattened.
The deformation is not as obvious in the
adult remains.

Theories as to why deformation occurs
vary. Pathological causes, if discerned, may have
been unavoidable resulting with deformity.
Artificial causes are not as easily identified or
accepted.

Theories to cause cranial deformity
may have been intentional or non-intentional.
Theories state varying motives for the influence
which carried unique significance for different
individuals or groups: aesthetics, class distinction,
religious motivation, practicality. In a mobile community, infants were often strapped firmly onto the wooden cradle boards and carried on the back. The heads were prevented from swaying for much during climbing and walking by being tied securely around the neck to the board.

The obvious deformities found in Shortly Village are especially difficult to comprehend because of the small collection of cranial remains. The many unanswered questions may be studied through ongoing and future excavations.

As traditions evolved within the small community, were new customs adopted through assimilation or mobile neighbors, cranial deformation varied among the Shortly remains. Why does greater deformation exist among some of the younger individuals? Would evolving child-carrying practices over time create changing and increased cranial deformation. Is social stratification or village locality play a role in the extent or type of deformation?

Analysis of the Shortly Village burial remains, reveal varying deformation. Hypotheses and theories regarding the inception and purpose of this practice or pathology, are offered, yet formal analysis to test these theories are incomplete.

Cranial deformation found within the Shortly remains appear unique to the particular area. Yet, could the abnormalities found in the few burials be the result of isolated instances of
Cranial deformities from different areas of the world are displayed. Could the deformations from Shoofly Village be related in practice or pathology to these cranial disturbances?

An Indian woman with her child which has a board attached to its forehead in order to flatten the skull.

Queen Helvig's skull showing pronounced flattening and elongation.
an overexertion of pressure on the lambdoidal, occipital, and frontal areas, through binding?

The questions have been raised and remain to be answered as to the causes and possible motivations of cranial deformation. In studying the conditions which may lead to these abnormalities, information may be gained in regard to the behavioral, cultural, and traditional ways of a people who inhabited Shortfly Village from 1150 to 1270 A.D.
Negro princess with an elongated skull

Sculpture of an Amarna princess, one of Akhnaten's daughters, showing pronounced elongation of the skull.

Two extremes of deformation of the skull. Left, a specimen from New Potrerania showing elongation of the skull and right, a Patagonian example showing extreme shortening of the skull.

An excessively deformed skull of an Indian from Lake Tacarigua, Venezuela.
A female skull showing fronto-occipital deformation from a pre-columbian cemetery in Mississippi.

Dessicated remains of a child from Moquegua on the south coast of Peru. The head has been tightly wrapped to produce fronto-occipital deformation.
PERUVIAN.
FROM THE TEMPLE OF THE SUN.

Lith. of John Calton, No. 798 Third St. Phila.
NATCHEZ.
PROFILE VIEW.

W.C. Sanders del.
Fig. 87. A skull showing vertico-occipital deformation from a cemetery in the Chicama Valley of Peru.

Fig. 88. A male skull showing lambdoid deformation from a Pueblo cemetery in the southwestern United States.
Bibliography


REFERENCES
