

*Cranial Deformation  
Cases from Shoofly Village Burial Remains*

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Burials 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 Shoofly Village Ruins began in 1984. During the 1984 and 1985 season, seventeen human burials were exhumed, often in fragmented and isolated conditions. Some of the burials found in clusters, tend to overlay earlier burials, resulting in loss of skeletal remains. Parts 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 burials, 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 Periphery (E10° N60°). Upon exhumation, an extremely fragmented infant skeleton was found. Based on dentition, the child was aged 2½ - 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, 1954). The most severely affected area is the skull where porotic hyperostosis is evident on the occipital, extending to the right and left parietal. Cribriform orbitalia, 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 (ETG N85?) 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 sphenoid in fragmented condition.

Cranial deformation is evident by the flattened remains. Six wormian bones present at the lambdoid 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 cribriform orbitalia affected the bones leaving a porotic surface.

Burial Four was exhumed from the South Plaza. The infant may have been 1-1½ years of age. The cranium and postcranial skeleton are very incomplete and fragmented. Pathologies appear slight with mild porotic hyperostosis and cribra orbitalia.

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 cradle 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 Fourteen.

The cranium displays mild anemic reaction, with possibly a healed pathology of cribra orbitalia. The mandible shows evidence of osteomyelitis. Cranial deformation is obvious in a dispersed parietal area. Suggestion has been inferred (Swadlow, 1975), 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 20-25 years of age. The cranial fragments display a thick skull vault of the parietals, occipital and frontal bones. This individual may have suffered from a depressed fracture of the parietal which resulted in death (Swadlow, 1975). Pathologically, affects of anemia are mild.

Burial Nine infant found with its presumed mother in the South Plaza, is aged 9-12 months. Its postcranial and cranial remains are very

incomplete and fragmented. The cranium displays woven bone (Atwell, 1985), 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 bones revealed in the population may be attributed to; pathological or biological causes, earth pressures, or artificial deformation.

Pathological causes of deformation may result from genetic or hereditary origins or possibly through dietary deficiencies. Modifications of bones 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 facial bones may be particularly deteriorated in the nasal region.

Gaws, unlike syphilis, often begins during childhood. Facial destruction is often severe, especially in the nasal and palatal region. Scarring may be extensive if the disease extends to its advanced stages.

Congenital osteopenia, known as "Osteogenia Imperfecta" (Ubelaker, 1978), prevents the body from effectively producing osteoid which allows for strength in skeletal growth.

Glandular 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.

Archeological remains may be affected by earth pressures, creating deformation of human bone. If the cranium remains in tact, 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 joint between the skull bones join, forming interdigitations (Rogers, 1974), which fuse throughout maturity. The cycle of suture fusion is not uniform, however, an individual usually has a closed suture by young adulthood (27-28 years). The sutures behind the parietal bones are the last to fuse. When an individual is beyond 75 years of age

A sutural bone may form during ossification of the margins of the sutures. This small wormian bone may form within the sutures. When found at the apex of the lamboid suture, it is referred to as Goethe's ossicle or the Inca bone. (Rogers, 1974)

In normal skulls there may be two to three sutural bones, while over one hundred may form in

hydrocephalic skulls. The formation and purpose of these bones may be associated with the expansive 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.

Trigonocephaly results in an abnormally narrow frontal bone. The metopic suture, which is usually fused during the first year 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 behavior.

Stewart (Uebelaker; 1973) groups cranial deformities into

various types:

Vertico-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.

Lamboid refers to the flattening that occurs on the higher occipital, near the joining of the parietals. 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. Stewart 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 skulls remains from Shoofly Village Ruins have displayed obvious cranial deformation. Hypotheses as to why, and how the deformation occurs vary. Following analysis of the burial reports, pathological deformation has been noted. The intentional and nonintentional deformation, caused by external forces, 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, Mexico, the Antilles and the United States (Ubelaker, 1977). The deformed skulls analyzed from Shoofly 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. Suggestion (Sankar 1975) has been made that these deformities are the results of fractures to the skull. Stewart's vertico occipital type of deformation caused by cradle-board 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 areas of these young individuals. Pressure applied to these areas may cause a flattened occipital and parietal with an indentation on the frontal brow. Bases which exist during infancy and early childhood would, therefore, be more pronounced.

The cranial remains from Burial Two were fairly well reconstructed. The frontal bases are extremely over-pronounced, and the occipital is flattened. This 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 explained or accepted.

Behavior to cause cranial deformity may have been intentional or non-intentional. Theorists state varying motives for the interference 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 too much during climbing and walking, by being tied securely around the head to the board.

The obvious deformities found in Shoofly 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 of mobile neighbors. Cranial deformation varies among the Shoofly 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. Do social stratification or village locality play a role in the extent or type of deformity?

Analysis of the Shoofly village Burial remains, reveals 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 deformations found within the Shoofly remains appear unique to the particular area. Yet, could the abnormalities found in the few burials be the result of isolated instances of

*Photo-copies*

*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 over exertion of pressure on the lamboidal, occipital and frontal areas, through binding?

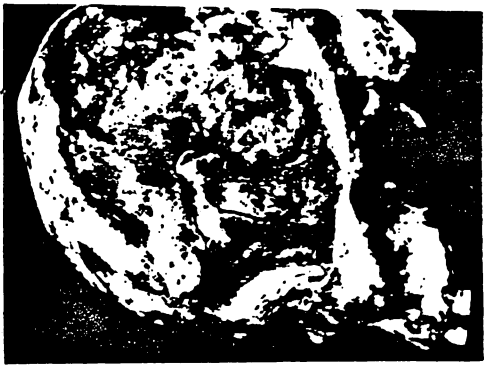
The questions have been raised and remain to be answered as to the causes and possible motivations of cranial deformation. In studying the conditions which may lead to these abnormalities, information may be gained in regard to the behavioral, cultural and traditional ways of a people who inhabited Shorfly Village from 1150 to 1280 A.D.



Negro princess with an elongated skull



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



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



An excessively deformed skull of an Indian from Lake Tacarigua, Venezuela





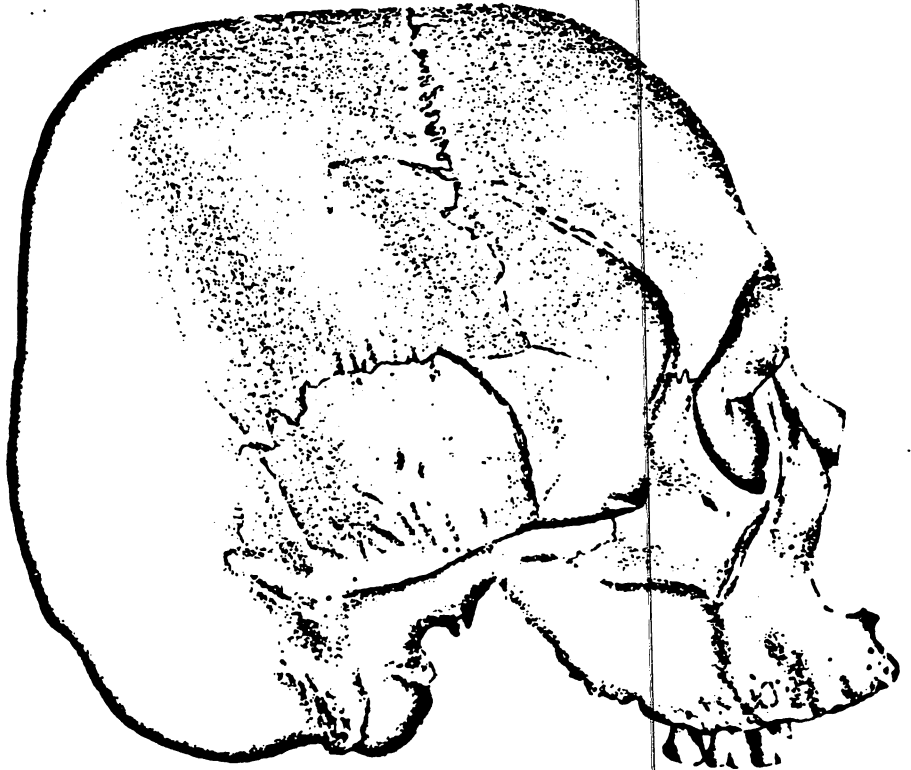
A female skull showing fronto-occipital deformation from a precolumbian cemetery in Mississippi.



Desiccated remains of a child from Moquegua on the south coast of Peru. The head has been tightly wrapped to produce fronto-occipital deformation.

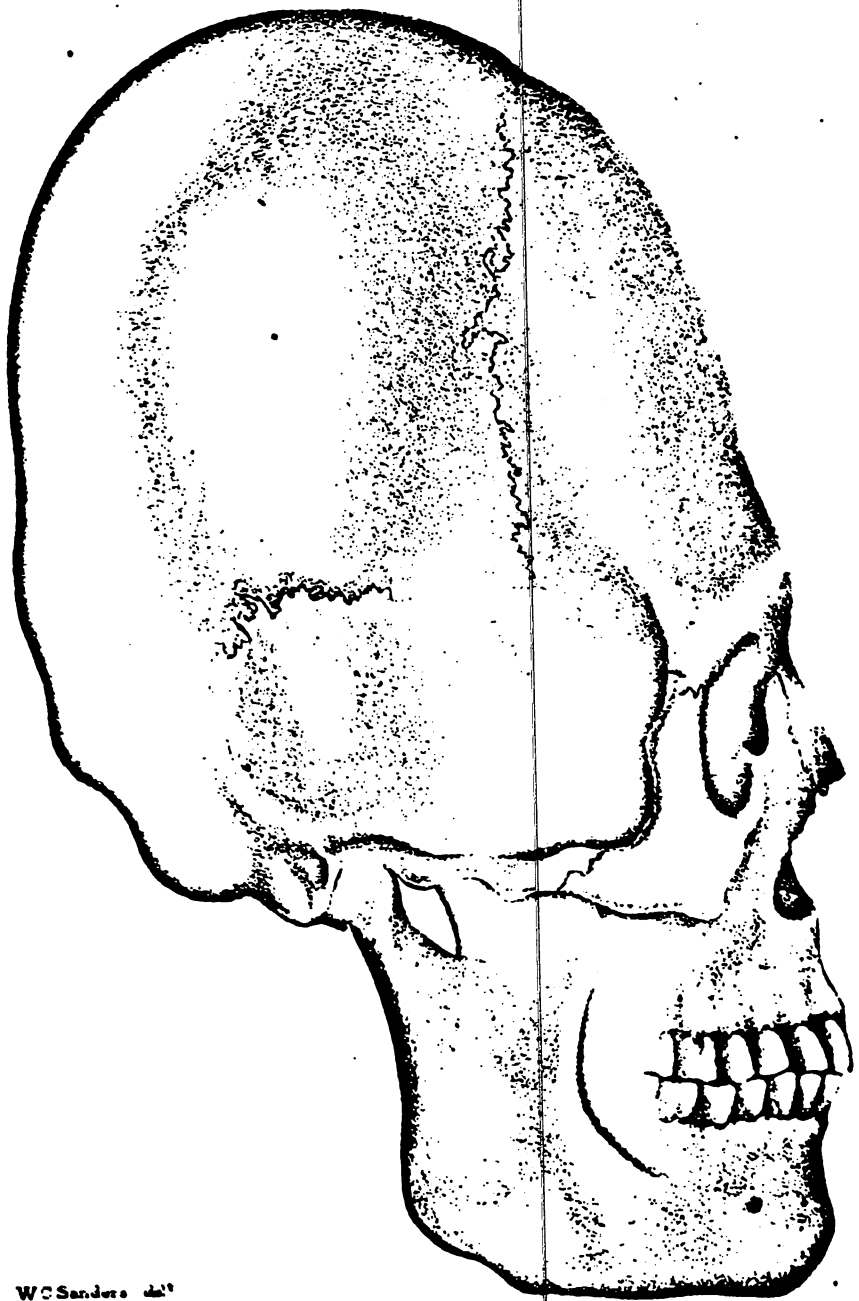
Morton's Crania Americana.

PL. 1.



**PERUVIAN.**  
FROM THE TEMPLE OF THE SUN.

Lith. of John Collins, No 79 S Third St Phila.



W.C. Sanders del.

**NATURAL.**

**PROFILE VIEW.**

Lith of John Collins No 795 Third St Phila





**Fig. 87.** A skull showing vertico-occipital deformation from a cemetery in the Chicama Valley of Peru.



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

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