Paleoneurosurgery in Colombia

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For the first time, cranial operations performed by representatives of primitive cultures in Colombia are documented by the discovery of three skulls from the era of the Chibcha civilizations of about 350 A.D., found in different regions of Colombia. Each skull had a surgical defect in the parietal bone.

KEY WORDS: history of neurosurgery, Chibcha civilization, trephination, Precolombian surgery

OBJECTIVE proof of the first surgical interventions performed by man has been found in Precolombian skulls recovered in different parts of the world. These defects in neolithic craniums have been accepted as evidence of prehistoric trephining since the works of Siquier (1865), Prunieres (1874), and Broca (1876), who found signs of scar formation in the margins of the bone defect indicating that the subject survived the operation.

Precolombian skulls from Peru have been well studied. However, up to this time, there has been no proof of this type of surgery in Colombia.

One of the reasons for the disappearance of the remains of these operations in the Colombian Andes has been the great moisture in the ground, which causes organic material to decompose rapidly. This contrasts with the desert climate of other zones, which is favorable to the preservation of archeological material.

The oldest date of Chibcha relics, as verified by carbon-14 studies, is about 350 A.D. This civilization is known to have survived until the Spanish Conquest in 1538. The finding of these skulls in Chibcha Indian territory was an important discovery in the history of medicine and native anthropology. Members of this culture established themselves as master goldsmiths, whose artistry is exhibited in the Gold Museum in Bogotá. Now it appears that their culture was further enriched by knowledge of the surgical methods reported here, emphasizing the advanced state that these people had reached. The fact that all the defects we are reporting were in the parietal region is in accordance with similar discoveries in other countries. The first instruments must have been made of quartz silica, and only later of metal.

Description of Skulls Found

Skull 1

This skull was found in a review of 130 specimens in the collection of the Colombian Institute of Anthropology. It is a dolichocephalic skull of a woman, found in Sopó, Cundinamarca, at an altitude of 2640 meters. It shows a circular defect 1.4 cm in diameter in the right parietal region, 4 cm from the interparietal suture and 2.3 cm from the frontal suture (Fig. 1 left). The
edges of the opening are clearly defined, and
the adjacent bone surfaces are smooth and
do not show alterations. It is particularly
interesting that the hole has been firmly
sealed by a dense reddish material that
protrudes slightly from the surrounding level
of bone. The sutures are slightly separated.
Radiographs confirm this analysis, and
furthermore demonstrate radiopaque den-
sity in the material used to fill the bone
defect (Fig. 1 right). The sella turcica
appears normal. Chemical analysis of the
material used for this primitive cranioplasty
identifies it as a silicon type of clay with a
high iron content. Histological study of the
bone adjacent to the defect shows normal
bone tissue.

**Skull 2**

This skull was a casual discovery by
farmers in Belén, Boyacá (altitude 3000
meters) in a tomb with the bones of a man
and numerous pieces of ceramics. In 1970 it
was acquired by anthropologists Mariane
Cardale and Ann Osburn of the University
of London and presented to the Colombian
Institute of Anthropology. It too is the skull
of an adult woman. The skull contains a
circular defect 5 cm in diameter, with
beveled margins 0.5 cm wide as in some
modern craniectomies (Fig. 2). The defect
is in the anterior portion of the left parietal
bone; the anterior margin is in contact with
the frontal suture, and shows a slightly
wedgelike irregularity. The wedge continues
toward the fronto-orbital region, with a
corrugated surface and erosion of the
external surface of the skull. The superior
margin of the osseous defect is 2 cm from
the sagittal suture. There are two other
small holes. One is an oval-shaped opening
in the frontal bone 2 cm up from the left
orbital border, which measures 1.4 × 0.9
cm. It is in close proximity to the external
erosion of the external table described

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*Fig. 1. Skull 1. Left: Skull showing right parietal bone defect filled by cranioplasty. Note suture separation. Right: Skull film showing increased density corresponding to the cranioplasty.*
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FIG. 2. Skull 2. Note the defect of the left parietal bone, with beveled margins.

Skull 3

This skull of a man was found near Nemocon, Cundinamarca (altitude 2700 meters) by a farmer named Abelardo Bautista. In the right parietal bone there is a large osseous defect with beveled edges, almost completely circular with a diameter of 8 to 9 cm. It extends from a point 2 cm from the sagittal suture to within 3 cm of the parietotemporal suture: its other dimension is from the frontoparietal suture to above. The other hole is semilunar, with the concavity anterior; it measures $1.3 \times 0.3 \times 1.9$ cm. These areas and the eroded external table we have interpreted as artifacts produced by the natural wear and tear of time on the bone.

The sutures have a normal appearance and nothing unusual can be seen on the floor of the base of the skull. The sella turcica and the clinoid processes are normal. Radiographs of the skull confirm the foregoing observations.

Discussion

The discovery of these trephined skulls in the territory of the Chibcha Indian culture is an event of considerable anthropological and scientific importance. The first skull is an excellent example of trephining by the
rasping technique, with smooth borders and cranioplasty. The second and third represent craniectomies done with the same method, but with beveled edges. The surgery was obviously performed with primitive techniques. The pallor of the bone around the craniectomy is possibly due to previous loosening of the periosteum for hemostatic purposes and is what Weiss has called "anemic halo." In the first skull, the separation of the sutures indicates a chronic process with intracranial hypertension. In the second skull, there is nothing to suggest the reason for surgery. In the third skull, the surgery was quite possibly done to treat a traumatic injury, as evidenced by the existence of a linear fracture.

It is probable that the individuals who submitted themselves to these proceedings had received hypnotic plants that alleviated pain and facilitated the surgeon's work. It is believed that the instruments used must have been of stone, bone, or an alloy of gold and copper.

The first case may have survived some time after the surgery, as is suggested by the process of scar formation. In the others, there is no such evidence.

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References

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