MECHANICS OF AN UNUSUAL BASILAR FRACTURE
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Several years ago, while affiliated with the National Institutes of Health in Bethesda, Maryland, the author was engaged in the production of a head model comprising several transverse sections. In an effort to delineate accurate relationships, a cadaver head was obtained from the University of Maryland, Department of Anatomy.** Plans called for sectioning this embalmed head transversely on one side only, and to retain the unsectioned half for future use in another project.

A mid-sagittal cut was made of the embalmed (and frozen) specimen and the right half was sectioned transversely. Transparent sheets of acetate were placed upon the upper surfaces of each slide and the contours of the structures drawn on the acetate with a fine pen. It became apparent after a short while that identifying the cut muscles was a confusing experience when it should not have been. Bony landmarks were all well defined and many muscle masses were in appropriate locations. However, the presence of large expanses of unidentifiable substance (appearing to be muscle) prompted closer inspection to the boundaries of the known structures, especially the known muscle sections. So bizarre were the relationships that the uncut half of the head was examined to see what these unidentified areas looked like on the mid-sagittal plane.

An examination of this surface (Fig. 1) showed a 4 centimeter space between the basilar process and the atlas. The cervical vertebrae were in proper alignment and the altanto-occipital ligaments were intact beneath the body of the atlas and a portion of the anterior lip of the foramen magnum. The "unidentifiable" areas were obviously extravasated blood.

It was suspected that the condyles and other lateral structures would also be found displaced downward; this was confirmed by an x-ray and laminography (Fig. 2).

Other significant relationships seen in the sagittal section were (Fig. 3)

1. Cord transected and constricted below the section, as though the victim's head had dropped forward after the initial violent hyperextension.
2. The hypophysis was severed at its stalk; the tentorium was still intact.
3. The optic chiasma was displaced backward.
4. The superior margin of the corpus callosum presented extremely unusual contours along the posterior one-half.

Condyles, hypoglossal canals, transverse processes and a lip of clivis were all broken loose as a unit from the base of the skull; (Fig. 4) the atlanto-occipital and

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atlan-to-epistropheal ligaments (as well as the other cervical structures) were properly related.

In view of these findings, it is interesting to ponder the various degrees of intra-cranial damage that could be associated with cervical fractures and/or dislocations.

Figure 1
Basilar process and atlas. (a) Transection of cord. (b) Severed hypophysis. (c) Displaced optic chiasm.
Basilar Fracture

Figure 2
Downward displacement of condyles.
Figure 3
Tracing on glass of mid-sagittal surface. The heavy arrow indicates interval of displacement. (H) hypophysis. (o.c.) Optic chiasm. (T.C.) Transected cord.

Figure 4
Condyles, hypoglossal canals, transverse processes and lip of clivis broken loose.