HISTOLOGIC STUDIES OF THE BRAIN FOLLOWING HEAD TRAUMA

II. POST-TRAUMATIC PETECHIAL AND MASSIVE INTRACEREBRAL HEMORRHAGE

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The cut brain as seen at the autopsy table following severe head trauma raises a two-fold question: "What is the mechanism of formation of the various types of hemorrhage seen?", and secondly, "What are the anatomic and physiologic end results of similar, but less severe changes in the brain of the patient who survives injury?"

There are several different types of hemorrhage resulting from trauma to the head. The first is that due to cortical laceration, occurring, according to Martland and Beling, in about 82 per cent of cases. A second type, deep massive hemorrhage, was designated by Kolisko as the large intramedullary type (Markblutung). A third consists of multiple minute punctate hemorrhages distributed chiefly in the white matter, especially in the centrum semi-ovale. This last type assumes two forms: (a) petechial hemorrhages filling the Virchow-Robin spaces, and (b) "ring hemorrhages" with hemorrhagic infiltration of the perivascular adjacent tissue. Finally, there is a fourth type consisting of perivenous extravasations in the midbrain.

Our knowledge of the precipitating mechanism of these hemorrhages, with the exception of the first, which is satisfactorily explained by tearing of the blood vessels, and of the fourth, is very limited. It is the purpose of this paper to help clarify the pathologic physiology underlying the changes seen in the other forms of traumatic hemorrhage, and hence, to seek an answer to the first question proposed in the introduction. The answers to the second question have been sought in another study.

Jakob demonstrated experimentally that hammer blows over the parietal bone resulted in mild parietal lesions and much more severe remote changes in the midbrain, brain stem, and even the upper cervical cord. Scaglioni has made similar observations, as had also Pfeifer in his study of experimental puncture wounds. These observations serve to emphasize the importance of changes in areas remote from the site of initial injury.

Massive hemorrhage deep in the cerebral hemispheres has been described by Kolisko, Schwarzacher, and by Reuter. Similar observations have been made by Marburg, Friedman, Fey, Renoux, Stenvers, Wilson and Winkelman, Caló, Crouzon, and by many others.

Petechial hemorrhages have been studied by Schmaus, Jakob, Ricker, Berner, Cassasa, Osnato and Giliberti, Martland and Beling, Winkel-
MATERIAL

The conclusions drawn in this paper are based on a study of eight cases presenting varying grades of post-traumatic hemorrhage, not directly related to the area of coup or contrecoup injury. Only three of these cases will be presented in detail, though brief notes of the others will be given.

PRESENTATION OF CASES


Necropsy. Cortical and subcortical hemorrhage. Periventricular ball hemorrhages and multiple midbrain hemorrhages.

History. J. A., a 53-year-old white male, was admitted to the hospital about 18 hours after receiving a blow on the back of his head.

Examination and Course. On admission he was unconscious, showed signs of decerebrate rigidity, and a fixed dilated pupil on the right. The decerebration had been present for some 8 hours previously. Blood pressure was 135/80, the pulse 80, respirations 18.

A right subtemporal burr opening was placed without delay, revealing a small extradural and a massive subdural accumulation of blood. Bilateral frontal and right occipital openings were also made. There was no blood found over the left hemisphere. During the procedure the patient lightened somewhat for a brief period, but thereafter his postoperative course was steadily downhill, all efforts designed to relieve the intracranial pressure failing. The respirations ceased about 24 hours after the injury, though with the maintenance of artificial respiration the heart was sustained for another 4 hours.

Necropsy was performed 5 hours postmortem. There were fractures of the greater wing of the right sphenoid bone and of the parietal and temporal bones. Small residual accumulations