TANGENTIAL WOUNDS OF SCALP AND SKULL*

CAPTAIN PHILIP R. DODGE, M.C., U.S.A.,† AND LT. COL. ARNOLD M. MEIROWSKY, M.C., U.S.A.R.

Tokyo Army Hospital, Tokyo, Japan

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As a result of clinical experience during World Wars I and II, the literature contains many excellent monographs and papers on the subject of cranioencephalic trauma from missile-inflicted wounds. The majority of articles have been devoted to the problems of penetrating brain injuries and much less has been written about tangential or glancing wounds of the scalp and skull where the missiles have not penetrated bone and dura. Although seemingly less dramatic than penetrating injuries, tangential wounds present distinct clinical problems; often an apparently simple scalp laceration is associated with considerable disturbance of function of the central nervous system and significant focal pathologic changes. It is the purpose of this report to present observations on a series of patients who sustained tangential injuries, and to describe the method and early results of treatment.

SELECTION OF PATIENTS

During a seven-month period in the Korean conflict, from September 1950 through March 1951, the admissions to Tokyo Army Hospital included 31 patients with nonpenetrating, tangential (grazing, glancing) scalp and skull injuries. These are the case material of this report. Cases demonstrating the penetrating complications of tangential injury with comminuted skull fracture, lacerated dura mater and intracerebral bone fragments, are not included.

OBSERVATIONS

Each patient was examined by one or both of the authors. Skull roentgenograms were taken in all but 1 case. Lumbar punctures, electroencephalograms, and pneumoencephalograms were performed when indicated and technically possible. The average time from injury until the patient was examined by the authors was 14 days, the extremes being 1 and 112 days. Operation, when performed, followed the initial examination by an average of 5 days with extremes of 1 and 30 days. In 2 patients the date of injury was unknown.

ANALYSIS OF DATA

Missile Type.‡ Eight patients reported injury from metallic fragments and 15 from high velocity missiles. There was no correlation between the

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† Present address: Neurological Unit, Boston City Hospital, Boston, Massachusetts.
‡ High velocity missile refers to bullets from rifles, carbines, machine guns and other automatic weapons. Metallic fragment refers to fragments from grenades, mortars and high explosive shells.
results of injury and the type of missile. We could not estimate the speed of the missile at impact. The remaining patients were unable to identify the nature of the missile.

Location of Scalp Injury and Focal Neurologic Signs and Symptoms. Each general region of the scalp was lacerated at least once in the series. Seventeen wounds of the parietal area, 5 wounds of the frontal region, 4 occipital wounds, 3 temporal wounds and 2 combined wounds were seen.

Of the 31 patients, 22 (70 per cent) had focal neurologic signs or symptoms. In 21 of these 22 patients the scalp laceration overlay the region of the cerebrum, damage to which was capable of producing the observed focal findings. A striking feature of these findings was their frequently highly selective nature, such as isolated quadrantopsias and motor and sensory defects confined to a limb or part of a limb. Such findings suggested the superficial nature of the cerebral damage, and the 13 patients with focal signs or symptoms who subsequently came to surgery showed sufficient pathology directly below the scalp lesion to explain the clinical picture just prior to operation. In 5, however, transient initial symptoms, lasting from a few minutes to several hours, had suggested an additional local concussional disturbance of adjacent cerebrum such as that postulated by Russell in a study of superficial gunshot wounds of the head.

Of 9 patients having no symptoms or signs of a focal neurologic deficit 5 had sustained anterior frontal injuries (where small lesions are notoriously hard to localize clinically), 2 had temporal lesions on the nondominant side, 1 an occipital injury, and 1 a posterior parietal injury on the dominant side.

In 17 of the 22 patients who presented evidence of a focal lesion maximal neurologic deficit apparently developed at the time of the injury, while only 2 patients demonstrated progressive focal neurologic signs. Of the latter, 1 had a large subcortical hematoma, and the other a subdural hematoma. No information on the early neurologic findings was available in 3 instances.

Seventeen patients with focal neurologic signs were operated upon and all were found to have severe contusion with either laceration or subcortical hematoma. In addition 3 had venous epidural hematomas and 1 a subdural hematoma. In all of these cases recovery appeared to be accelerated following removal of the lacerated brain and clots. In 3 instances there was no immediate improvement in the neurologic deficit following exploration. These patients had simple contusions which were not attacked surgically. No patients appeared to be made worse by surgery. In 1 case the postoperative follow-up was inadequate.

Five patients with focal neurologic symptoms and signs were not operated upon. In 3 of these recovery was rapid but in 2 recovery seemed definitely delayed as compared to patients with similar findings who were operated upon.

Alteration of Consciousness. Data on alteration of consciousness as determined by post-traumatic amnesia were available in 22 of the 31 cases. Nine (40 per cent) of the 22 patients denied any amnesia, while 13 (60 per