Case Reports
Penetrating Craniocerebral Injuries

Report of Two Unusual Cases

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Pilcher collected a group of cases from the literature in which the brain had been penetrated by a variety of objects. The list of objects included knife blades, pitchfork prongs, crochet hook, knitting needles, splinters of wood, breech pins, an umbrella rib, surgical instruments, nails, carpet tack, automobile bolt, crowbar, oil-can spout and others. Two remarkable cases of metallic foreign bodies in the 3rd ventricle were reported by Schnitker and by Greenwood. In both of these cases the patients survived with remarkable recovery, surgical removal having been conducted in one of them. Another interesting case was that of Sherman in which a brass foreign body was lodged in the brain stem and removed successfully. Askenasy et al. reported 2 cases of sewing needle in the brain after intervals of 23 and 54 years. Numerous other remarkable cases may be found in the literature.

In the 2 cases comprising the subject of the present report, the penetrating object was unusual both in nature and location. In each case, the patient was injured by impalement upon the antenna of an automobile radio. Because of the association of these injuries with automobiles, the National Safety Council was asked to review its records for any possible similar cases but none was found. The case reported by Goald and Roderos is similar to Case 1 described herein and will be discussed later.

**Case 1.** E.B., an 11-year-old boy, jumped into the air while playing basketball in his yard. He fell against an automobile parked in the driveway in such a manner that the antenna of the radio, located on the fender, penetrated his mouth. His father witnessed the injury but did not realize that it was serious until the boy was noted to be struggling vigorously. The antenna had been in the collapsed position at the time of the injury but still projected upward from the fender a distance of about 10 in. The youth straightened up in an effort to free himself but could not do so. Rushing to aid him the boy's father found that the antenna was projecting into his mouth and there was considerable bleeding. Although conscious, the boy could not speak because he could not close his jaws. Attempt to free him was unsuccessful. His father found a pair of wire-cutting pliers with which he cut the antenna. The patient was then taken to the Santa Cruz Hospital.

**Examination.** On July 8, 1962, approximately 2 hrs. after his injury, the patient was lethargic but could be aroused easily. His eyes tended to diverge when he was dozing, but convergence was quickly established on being aroused. The pupillary reflexes and optic fundi were normal. The ocular muscles were functioning well.

There was a metallic rod projecting from the angle of the mouth on the right a distance of 3 in., the other end disappearing into the depths of the oral cavity. The rod followed an oblique course from the angle of the mouth on the right posteriorly and superiorly to disappear into the soft palate to the left of the midline. His neck was not stiff, and there was no active bleeding at this time. The reflexes were markedly increased but equal in all 4 extremities. Babinski's sign was positive on the right but the remainder of the neurological findings was negative. Roentgenograms of his skull showed a metallic foreign body, on the cranial end of which was a spherical knob. The rod could be traced from the oral cavity through the palate and left side of the sphenoidal sinus. The hilt itself was lying in the cavernous sinus in the region of the carotid siphon on a level with the floor of the sella turcica and slightly anterior to the dorsum sellae. A small amount of air was noted in the prepyramidal cistern.

Because of the proximity of the knob to the carotid siphon, cerebral arteriography was indicated before attempting to remove the object. He was transferred by ambulance from the Santa Cruz Hospital to the O'Connor Hospital in San Jose. Left cerebral arteriography revealed that the knob of the metallic rod was indeed within the cavernous sinus lying in contact with the carotid siphon (Figs. 1 and 2). The carotid siphon was slightly displaced laterally by the knob but the cerebral vessels were well filled and showed no displacement.

**Operation.** The object was removed. Four pints of blood were made available and the patient was prepared so that the cervical portion of the carotid artery could be readily exposed for ligation. Examination of the nasopharynx (DMcC) revealed the rod traversed the anterior nasal chamber diagonally, penetrating the rostrum of the sphenoidal bone near its midpoint. After shrinking the nasal mucosa with a vasoconstrictor, it was possible to see a small part of the rod at its point of penetration.

Removal of the rod was then effected by traction (JWM). On the first two attempts, the rod could be felt to move slightly, but it was not until the third effort that complete removal was accomplished. Immediately a considerable amount of dark and bright red blood

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appeared in the nasal cavity and mouth. This was quickly aspirated and the nasal cavity packed with Surgicel and vaseline gauze. Within a few minutes all bleeding was stopped completely.

Postoperative course was smooth except for transient polyuria and polydipsia. Upon recovery from the anesthetic he was found to have a Horner's syndrome on the left which was not present previously. Weakness of the right lower face was also noted but was not marked and lasted for 5 days. On the 5th postoperative day, the temperature was elevated to 101°F. Spinal puncture revealed a normal pressure, cell count and protein but following this there was transient cerebrospinal-fluid rhinorrhea. He was placed on antibiotics and Dilantin. On the 5th postoperative day increased thirst and frequency of urination were noted. The intake and output were checked thereafter and averaged approximately 3000 cc. per 24 hrs. This persisted for 6 weeks after which his intake and output returned to a level normal for his age.

He was discharged from the hospital on July 25, 1962. At the time of the most recent examination, April 1, 1963, he had no complaints and the only residual finding was a Horner's syndrome on the left.

Comment. In this case the preoperative arteriogram was essential to surgical management. The presence of air in the prepontine cistern indicated that the dura mater had been pierced. The presence of an extensor plantar response on the right and central facial weakness indicated that the object had penetrated the brain to at least some extent. Reconstruction of the series of events of the injury itself lent support to this conclusion. When his head went down upon the antenna projecting upward from the automobile fender, penetration of the skull through the cavernous sinus and dura mater into the medial temporal region occurred.

When he raised upward to free himself from the object, the rod was retracted downward into the base of the skull but lodged in the cavernous sinus.

A similar type of injury was reported by Goald and Ronderos. A 46-year-old man was struck in the face by a piece of wire spring. This metallic object pierced the right maxillary sinus, traversed the sphenoidal sinus and transfixed the left internal carotid artery in the region of the cavernous sinus and extended into the left temporal lobe of the brain. Cerebral arteriography confirmed the involvement of the carotid artery. The wire was removed by a Caldwell-Luc operation, after which there was loss of 500 cc. of blood which was controlled with nasal packing. Ophthalmoplegia developed on the left 9 days later. Repeated arteriography revealed a saccular aneurysm of the carotid artery in the cavernous sinus. While awaiting operation 2 days later, the patient coughed and exsanguinated through his mouth.

Case 2. L.B., a 17-year-old boy who was celebrating his birthday, was injured at night while running in an automobile parking lot. He was being chased by other boys at high speed. He ran into the side of a parked vehicle and stopped himself by placing both hands against the fender. His head was seen to bob downward and he then slumped to the ground. When reached by his pursuers, he was found to be exceedingly agitated, uncooperative and unmanageable. Bleeding from the right orbital region was noted. He was brought promptly to the emergency room of the San Jose Hospital on Dec. 16, 1955. He was conscious but there was weakness of the left arm. He continued to be restless and difficult to manage. While roentgenograms of his skull were being made, paralysis of the left arm and leg developed, with frequent vomiting followed by coma.