Bullet within the fourth ventricle

Case report

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A woman, shot in the left parietal area with a small caliber pistol, appeared moribund upon admission to the emergency room but rapidly stabilized and became more arousable. In the fifth week following injury, a pneumoencephalogram demonstrated the bullet lying free within the fourth ventricle; it was subsequently removed from the cisterna magna without difficulty. The patient has made progressive neurological improvement. Other reports concerning intraventricular foreign bodies are reviewed and discussed.

Key Words: foreign body, bullet wound, fourth ventricle, brain injury, gunshot wound

The fact that metallic foreign bodies within the brain may move has been appreciated for many years. Jefferson described a boy shot during the Russian revolution who had a large rifle bullet imbedded in the left cerebellum. The missile was seen to move about until it was removed, whereupon the boy made an uneventful recovery. In the early 1940's there were two reports of missiles within the lateral ventricles which finally became imbedded in the occipital horn. Both of these patients recovered, with the missile being surgically removed in one case.

Furlow, et al., describe a soldier who was shot in the right parietal region. The missile initially lay in the right occipital lobe but over the next year changed position, finally coming to rest above the sella turcica. During the period of migration, the patient had recurrent attacks of meningitis, seizures, decreased mentation, and endocrine derangement. Pneumoencephalography revealed communicating hydrocephalus with the missile free within the dilated third ventricle. The bullet was removed, and the patient progressively improved.

Lang described a patient who, after initial debridement of a right parietal gunshot wound, developed rapidly increasing intracranial pressure over the next 12 hours. Ventriculography revealed that the missile had become lodged in the rostral end of the aqueduct. During the attempted removal of the bullet, the patient died.

We have been unable to find any cases reported of missiles within the fourth ventricle and we are describing one such case.

Case Report

A 29-year-old woman was shot at close range with a small caliber pistol. The missile entered the skull high in the left parietal area.

Examination. The patient was deeply comatose with regular respirations, unreactive
pinpoint pupils, extensor rigidity in the legs, and bilateral Babinski responses. Blood pressure was 160/110 and pulse, 80. Initial skull films seemed to place the missile within the pons.

The patient's neurological status and x-ray findings were interpreted as indicating a severe brain stem injury and the probability of a rapidly fatal outcome. Immediate surgery did not seem justified. Over the next 12 hours, however, vital signs remained stable and she became more reactive; the pupils remained small and nonreactive.

First Operation. The entrance wound was debrided down to the tentorium.

First Postoperative Course. Over the next several weeks, the patient became more reactive, moving all extremities spontaneously, the right side better than the left. The deep tendon reflexes were hyperactive, and bilateral Babinski responses persisted. The pupils remained small, but were now reactive to light. Occasional skew deviation was noted; however, most of the extraocular movements were conjugate. She could not swallow well, and tracheostomy and tube feedings were necessary. Skull films in the fifth week after the injury suggested that the missile was in the cerebellar hemisphere adjacent to the fourth ventricle. A pneumoencephalogram revealed the bullet lying free within the fourth ventricle (Fig. 1 left and right) where it shifted position as the brow-up and brow-down positions were assumed (Fig. 2).

There was slight dilatation of the entire ventricular system. Air passed from under the tentorium to the site of the initial craniectomy, presumably through the bullet hole in the tentorium although the missile tract itself was not visualized.

Second Operation. Several days after this study, a suboccipital craniectomy was done in the sitting position to remove the bullet which could now be seen by x-ray films to be lying in the cisterna magna. The missile was removed without difficulty.

Fig. 1. Left: Lateral tomogram demonstrating the missile lying in the most caudal part of the fourth ventricle. Right: Pneumoencephalogram, posteroanterior projection, showing the bullet in the midline within the fourth ventricle. The gas which is in the area of the initial craniectomy was originally trapped underneath the tentorium.

Fig. 2. Diagram showing the change in position of the bullet from brow up (B) to brow down (A). Note that the missile tumbled as it moved forward.
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Second Postoperative Course. In the weeks following surgery, the patient made slow but progressive improvement. The tracheostomy tube was removed, and she was able to take an oral diet. She was discharged to the care of her family during the eighth week after injury.

Discussion

Intraventricular foreign bodies may cause damage from sepsis, obstruction, chemical or mechanical irritation. The case of Furlow, et al., documents recurrent meningitis with eventual hydrocephalus. Sherman describes the removal of a brass plug from the brain stem in which the breakdown product of copper chloride had rapidly produced cystic changes. Lang's report illustrates that acute and complete obstruction of the ventricular system may occur.

The presence of a freely moving missile in the fourth ventricle was considered a hazard for potential obstruction as well as mechanical irritation. Because of the size of the bullet, it seemed unlikely that further caudal migration would occur. We elected to remove the bullet rather than wait for an acute situation to develop.

References


Received for publication May 18, 1970.

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