Successful Removal of Intracranial Air-Gun Bullet With Stereotaxic Apparatus

Case Report

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THERE have been many reports concerning the surgical treatment of an intracranial foreign body. Since the usual method of craniotomy cannot avoid some cerebral damage, deeply lodged, minimal, or asymptomatic foreign bodies have frequently been left untouched. Recently we successfully removed an intracranial air-gun bullet using a stereotaxic method through a small burr hole, without any complication.

Case Report

On December 8, 1967, a 1-year-old girl accidentally received an air-gun bullet in the back of her head from a distance of 2 meters. Plain skull x-ray films revealed a bullet deep in the left cerebral hemisphere. Three hours later, irritability, headache, vomiting, and a right-sided Jacksonian seizure appeared. The seizure was followed by loss of consciousness and progressive right hemiparesis. Anticonvulsant therapy and antibiotics were intensively administered. The impaired consciousness disappeared gradually within 1 week, and the right hemiparesis improved so that she could walk 1 month after the accident. She was admitted to our hospital on February 2, 1968.

Examination. Neurological check-up revealed traces of right hemiparesis. A tiny scar was found on the occipital area 15 mm from the midline to the left and 40 mm above the inion. Plain skull x-ray film revealed some small bone fragments in the occipital area and a deeply lodged bullet. The cerebrospinal fluid (CSF) was clear, and routine laboratory examinations showed no abnormality. The electroencephalogram, left carotid arteriogram, and pneumoencephalogram showed no pathological findings (Figs. 1 and 2). Films in the various head positions revealed that the bullet could move approximately 5 mm in all directions; the range and location were drawn on the atlas of Schaltenbrand-Bailey (Fig. 3).

Operation. On March 1, 1968, an operation was carried out using stereotaxic apparatus under general anesthesia. The patient's head was fixed, and anteroposterior and lateral x-ray pictures were taken to calculate the position of the bullet stereotaxically. A tracheal forceps modified for this purpose was inserted through a frontal burr hole close to the bullet while anteroposterior and lateral x-ray pictures were taken to verify its proximity (Fig. 4). Then, under continuous observation of the image intensifier in the lateral projection, the forceps was advanced with its tip open. Although further advancement of the forceps pushed the bullet about 5 mm in the direction of forceps insertion, the bullet could be clamped and successfully removed (Fig. 5).

Before the procedure of clamping with the forceps, we tried to suck up the bullet with a metallic tube, 4 mm in diameter, inserted toward the bullet stereotaxically. Its tip was covered with a rubber tube so as to fit snugly around the bullet. The bullet was attached to the tip of the tube with negative pressure of 50 mm Hg, and then the tube was gently pulled out. The bullet could be dragged approximately 10 mm; then it detached and snapped back to the previous position. The negative pressure 50 mm Hg delivered to the tube was sufficient to suck up a mass of 30 gm weight in a preliminary trial. During the procedure neither brain tissue nor pus was sucked out. We assume the attempted suction produced no extra damage.
to the brain because the subsequent route of insertion for the forceps was the same as that for the suction tube.

Postoperative Course. The postoperative course was uneventful. Antibiotic and anticonvulsant therapy was continued for 1 week. Two weeks after the operation the patient was discharged from the hospital. By then the right hemiparesis had almost cleared except for minimal right-sided facial paresis. A visual field examination was of course impossible because of her age. The evoked potential of photic stimulation on the EEG was observed symmetrically in both occipital areas. Four weeks postoperatively the patient was completely normal.

Comment
The treatment of penetrating cranial wounds was highly developed during World War II. A relatively large fresh intracranial foreign body is usually removed by craniotomy, with complete debridement of wounded brain tissue. It is generally agreed that the surgical removal of small or asymptomatic intracranial foreign bodies should