Delayed lead pulmonary emboli after a gunshot wound to the head

Case report

BETSY D. HUGHES, B.S., AND JOHN R. VENDER, M.D.
Department of Neurosurgery, Medical College of Georgia, Augusta, Georgia

Bullet fragment emboli are uncommon, and there have been only a few reports of intracranial-to-extracranial migration of these fragments. The authors present the case of an 11-year-old girl who was struck in the suboccipital region with a “soft nose” bullet fired at close range. Several months later, the patient was found to have asymptomatic pulmonary emboli. Similar cases are reviewed, and a management strategy is recommended.

KEY WORDS • gunshot wound • cranial venous sinus • mastoid bone • bullet embolism • pulmonary embolism • pediatric neurosurgery

Case Report

History. This 11-year-old girl sustained an injury to the right suboccipital region from a low-velocity bullet fired at close range. The bullet fragmented on impact, and most fragments lodged in the girl’s ipsilateral mastoid bone (Fig. 1).

Operations and Clinical Course. An expanding venous epidural hematoma developed during the 1st day after admission and required evacuation. During surgery, no attempt was made to remove bullet fragments from the cranial base. Although the patient initially did well after surgery, hydrocephalus developed and, ultimately, a VP shunt was implanted a few months later. Radiographs of the chest obtained after VP shunt placement revealed the presence of embolic fragments in the patient’s lung (Fig. 2), but no clinical symptoms or signs were attributable to the fragments. At her 4-year follow-up examination, the patient remains neurologically stable with only bilateral lateral gaze nystagmus and mild right dysmetria observed during finger-to-nose testing. No pulmonary symptoms are present.

Discussion

To date only four cases of bullet fragment migration from the intracranial to the extracranial space have been described in three publications.3,4,7 In 1974, Hiebert and Gregory4 reported the case of a 17-year-old boy who sustained a gunshot wound to the right mastoid region and subsequent emboli migration to the heart. In that case the fragments were removed. In 1980, Nehme7 described a 15-year-old boy who was shot in the right temple region. No exit wound was noted. In this case, the bullet fragments were initially detected in the heart and later found to have migrated to the segmental branch of the left pulmonary artery. Although a seizure disorder developed in this patient after the injury, no pulmonary symptoms were reported and no procedure was performed to retrieve the fragments. Goldman and Carmody3 added two additional cases to the literature in 1984. In the first case, a 20-year-old man was struck by a bullet in the right temporoparietal region and there was no exit wound. As a result of this injury a left hemiparesis developed. Asymptomatic embolic fragments were detected in the left pulmonary artery. In the second case, a 46-year-old man was struck in the right petrous region and again there was no exit wound. The patient displayed ipsilateral facial and auditory nerve dysfunction. Several asymptomatic embolic bullet fragments were identified in both lungs. No embolectomies were performed in either patient. In the case we present, the patient was struck in the suboccipital region with the majority of fragments lodging in the

Abbreviation used in this paper: VP = ventriculoperitoneal.
mastoid bone. Delayed migration of bullet fragments occurred and involved both lungs. No embolectomy or other therapy was required.

In all the reported cases, the patients sustained wounds from a low-velocity bullet that entered the bone and brain but did not exit. This is consistent with descriptions of emboli in other areas of the body. The presumably lower energy of these fragments predisposes them to enter, but not necessarily traverse, the structure they impact. This sets the stage for possible migration of the fragment. In three of the five cases, the injury involved the petrous or mastoid region. The highly vascular nature of the bone in this region and the proximity of the venous sinuses would increase potential access to the vascular space for these fragments. In these cases, smaller fragments were able to enter the circulatory system and migrate to the lung. Given the small size of the fragments, they would not occlude more proximal, larger vessels, but would continue to migrate into smaller-sized vessels where their presence would be less likely to cause symptoms. Controversy exists in the literature about whether embolectomy should be performed in patients harboring missile emboli in the pulmonary vessels. Nevertheless, observation of numerous cases of pulmonary missile emboli has demonstrated that small emboli can be left in place without complications. Long-term monitoring of these fragments has not identified any delayed sequelae.

Conclusions

Although the entity is uncommon, a high clinical index of suspicion for distal bullet embolism should attend presentation of patients with gunshot wounds, particularly when the fragments are adjacent to or within vascular structures. Currently, no treatment appears necessary in cases of pulmonary emboli of small fragments, although close monitoring is warranted.

References

4. Hiebert CA, Gregory FJ: Bullet embolism from the head to the heart. JAMA 229:442–443, 1974