

CASE REPORT

J. M. Glass,¹ M.S., P.A.; S. A. Zaki,² M.D., Ph.D.; and R. L. Rivers,¹ M.D.

Intracranial Missile Emboli

REFERENCE: Glass, J. M., Zaki, S. A., and Rivers, R. L., "Intracranial Missile Emboli," *Journal of Forensic Sciences*, JFSCA, Vol. 25, No. 2, April 1980, pp. 302-303.

ABSTRACT: Projectile embolization into the intracranial arterial system is an extremely rare occurrence. Vessel size restricts the entrance of foreign bodies except those of small caliber such as shotgun pellets. Several cases of cervical neck and intracranial projectile emboli resulting from penetrating wounds of the neck and head have been reported. A case of pellet embolization into the intracranial segments of both internal carotid arteries following penetrating pellet wounds of the heart and ascending aorta is presented.

KEY WORDS: pathology and biology, embolisms, cardiovascular system

Projectile embolization into the intracranial arterial system is an extremely rare occurrence. The vessel size restricts the introduction of foreign bodies except those of a small caliber, such as shotgun pellets [1-4].

Case Report

A 24-year-old black male was dead on arrival at a hospital. The decedent had a shotgun wound of the anterior mid-chest; the weapon had been fired from a distance of approximately 2.5 m (8 ft). The weapon was a single-shot shotgun with the barrel sawed off to 38 mm (1½ in.). A 19-mm (¾-in.) diameter perforation was surrounded by a pattern with 30 separate pellet perforations dispersed over a 23- by 25-cm (9- by 10-in.) area. There were multiple perforations of both lungs, the right and left ventricles of the heart, and the ascending aorta. There was a left-sided hemothorax and a 350-cm³ hemo-pericardium.

An embolized #5 shotgun pellet was firmly lodged within the intracranial segments of each internal carotid artery. Death was attributed to shock and hemorrhage.

Discussion

The rarity of projectile emboli following gunshot wounds of the heart and great vessels has been expressed in the literature [5-9]. As noted by DiMaio and DiMaio [5], the great

Presented at the 31st Annual Meeting of the American Academy of Forensic Sciences, Atlanta, Ga., February 1979. Received for publication 19 June 1979; revised manuscript received 20 Aug. 1979; accepted for publication 24 Aug. 1979.

¹ Chief medical investigator and chief coroner/medical examiner, respectively, Coroner/Medical Examiner's Office, Jefferson County, Alabama.

² Associate medical examiner, Office of the Medical Examiner, Fulton County, Georgia.

majority of the reported cases deal with embolization of projectiles into the major arteries of the lower extremities.

In reported cases where specific entry and embolization sites were documented, either in surgery or at autopsy, it was found that most projectiles found their way into the vascular system via the heart and descending aorta.

Final resting sites of the embolized projectiles were widely distributed. A preponderance appeared to be affected by gravitational force and came to rest within vessels of the lower extremities, with the distance traveled being inversely proportional to the caliber of the bullet.

In regard to cervical neck and intracranial missile emboli, Kinmonth et al [1] described a case where two birdshot pellets were found within the left carotid bifurcation area and one on the right. Although they were impacted within the mouths of the internal carotid arteries and not actually within the intracranial segments of these vessels, this was a documented case of embolization following multiple pellet wounds of the heart.

A case of occlusion by a pellet of the right middle cerebral artery a few millimetres from its origin was reported by Piazza and Gaist [2]. Wounds were noted on the neck and thorax; however, a specific site of entry into the circulatory system was not determined.

Padar [4] reported a case in which an air gun pellet entered the right common carotid artery and lodged within the right internal carotid where that vessel pierces the dura.

Barrett [9], in his encyclopedic paper on foreign bodies in the cardiovascular system, reported a case of a victim who had been wounded on the left side of the neck by shotgun pellets. Radiographs showed numerous pellets within the neck and one inside the skull. There were no head wounds and it was presumed that the pellet had entered the carotid artery and had embolized to a branch of the middle cerebral artery.

Summary

A case of aberrant projectile embolization is described in which shotgun pellets were noted to enter the heart and ascending aorta and to be embolized a relatively great distance to the intracranial segments of both internal carotid arteries. A review of the English language literature reveals this to be the only documented case of its kind.

References

- [1] Kinmonth, J. B., Burton, J. D., Longmore, O. B., and Cook, W. A., *British Medical Journal*, Vol. 2, No. 5268, Dec. 1961, pp. 1666-1668.
- [2] Piazza, G. and Gaist, G., *Journal of Neurosurgery*, Vol. 17, No. 1, Jan. 1960, pp. 172-176.
- [3] Van Gilder, J. C. and Coxe, W. S., *Journal of Neurosurgery*, Vol. 32, No. 6, June 1970, pp. 711-714.
- [4] Padar, S. C., *Journal of Neurosurgery*, Vol. 43, No. 2, Aug. 1975, pp. 222-224.
- [5] DiMaio, V. J. M. and DiMaio, D. J., *Journal of Forensic Sciences*, Vol. 17, No. 3, July 1972, pp. 394-398.
- [6] Ward, P. A. and Suzuki, A., *Journal of Thoracic and Cardiovascular Surgery*, Vol. 68, No. 3, Sept. 1974, pp. 440-446.
- [7] Symbas, P. N. and Harlaftis, N., *Annals of Surgery*, Vol. 185, No. 3, March 1977, pp. 318-320.
- [8] Martire, J. R., Bijpuria, M. L., Wilson, T. H., and Wademan, R. L., *Southern Medical Journal*, Vol. 71, No. 11, Nov. 1978, pp. 1435-1437.
- [9] Barrett, W. R., *British Journal of Surgery*, Vol. 37, No. 148, April 1950, pp. 416-443.

Address requests for reprints or additional information to
 J. M. Glass
 Coroner/Medical Examiner's Office
 1515 Sixth Ave. South
 Birmingham, Ala. 35233