

Case Reports

BULLET-INDUCED FALSE ANEURYSM OF THORACIC AORTA WITH A TEN YEAR LATENCY PERIOD IN A VICTIM OF THE IRAN-IRAQ WAR: REPORT OF A CASE

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ABSTRACT

Traumatic false aneurysm of the thoracic aorta is not uncommon. But accordingly this case is unusual in its ten year delay between injury and presentation and treatment.

A victim of the Iran-Iraq war is presented with a false aneurysm of the thoracic aorta ten years after a bullet injury to the chest and thoracic spine. Penetrating chest wounds, mechanisms of injury and diagnosis are also discussed in detail.

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INTRODUCTION

Accurate anatomical descriptions of false aneurysms and the natural history of these lesions have been described following world war 1.⁹

Dichen in 1942 described a patient who developed a false aneurysm of the abdominal aorta following blunt trauma by the butt of a gun who died 27 years later when the aneurysm ruptured.⁶ Bass et al. repaired a false aneurysm of the abdominal aorta 8 years after blunt trauma of the abdomen.¹ Now, penetrating trauma has become a public epidemic¹² and recent studies suggest that hand guns are a common source of firearm induced trauma.⁶ Currently, in order to study the wound mechanism of high velocity missiles, 20% gelatin is the most appropriate representative substance available.^{2, 10}

Case report

A 27 year old man, a victim of the Iran-Iraq war, presented with a history of bullet injury to the chest and

thoracic spine ten years ago. At the time of injury he received emergency care in a "Field Hospital" and was then transported to the "Base Hospital" for further workup. According to the medical records of the patient the bullet entered from the right of the chest and exited from the left of the thoracic spine.

Clinically he has been paraplegic since then with a normal plain X-ray and myelogram. Ten years later he was admitted to the emergency room with a three-day history of back (upper thoracic) pain and dysphagia. Barium swallow revealed a mass effect on the esophagus, and CT showed a huge well defined thoracic mass lesion with bony erosion (Fig. 1).

Because of severe pain and P.T.S.D., he unfortunately refused angiography to confirm the diagnosis, so with a preliminary diagnosis of false aneurysm of the aorta, thoracotomy was performed from the right 6th intercostal space, and a huge pulsatile mass lesion was seen over the diaphragm. The aorta was exposed above the diaphragm and distal to the subclavian artery. The wall of the mass was

opened to evacuate the clots while a small hole (0.5 cm) was found over the aorta which was repaired with Dacron. No pain, renal or cardiac complications were observed during three years of follow up of the patient.

DISCUSSION

Chest trauma accounts for 25% of all trauma-related deaths and is an important factor in another 25% of deaths.¹³ Due to an improved transporting system and increased prevalence of the so-called "epidemic tragedy of firearm related injuries and deaths", penetrating chest trauma is treated in urban emergency rooms and civilian hospitals.⁸ Over 95% of traumatic aortic injuries involve the thoracic aorta at the point of fixation, which includes the base of the heart, the attachment of the lig. arteriosum and the diaphragm at the hiatus. About 90% of lacerations are at the level of the lig. arteriosum just distal to the origin of the left subclavian artery. Although the ascending aorta is involved in only 5% of cases, it is associated with lethal cardiac and pericardial lesions 80% of the time. The remaining 5% occurs in the distal descending thoracic and abdominal aorta.¹³ Penetrating chest trauma is divided into three groups:

1) Stab wounds, 2) Thoracic impalement, and 3) Gunshot wounds.

Stab wounds account for most of the penetrating chest injuries in the civilian population. Most of them are benign and treated simply by using a tube for drainage of blood or air from the pleural space.

Thoracic impalement usually follows a car accident or fall, characterized by both blunt and penetrating injuries with functionally normal vital organs unless directly damaged by the objects.

Gunshot wounds, although less common, are more serious and require emergency intervention. Charter used 20% gelatin blocks to study the wounding mechanism for high velocity missiles.² Three distinct mechanisms are recognized: crushing, cavitation and shock waves. Tissue crushing and laceration are usually seen in the bullet path of small caliber, low velocity missiles, but if the travelling speed of the bullet is more than 2500 feet/sec (high velocity) a shock wave of the body ensues. The destructive cavity of the shock wave with a velocity of 4800 feet/sec or more is still in debate.¹³

Pathologically the efficiency of energy transfer is related to the flight pattern of the bullet and tissue specific characteristics. The higher the specific gravity of the tissue, the more susceptible to blastic damage; for example, bone, liver and muscles with higher specific gravity than the lung create a better barrier and absorb more energy and are more severely damaged by the bullet. The mechanism of bullet injury to the thoracic aorta is related to direct and indirect forces with an overall more than 92% mortality rate.⁴ Direct forces may cause aortic rupture with very high mortality

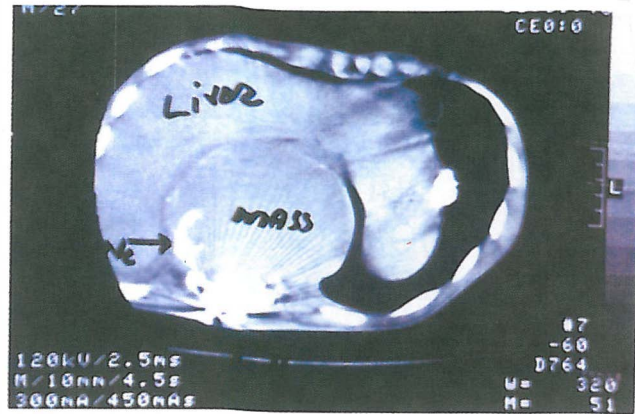


Fig. 1. False aneurysm showing erosion of the vertebral body.

rates. Indirect forces of shock wave or cavitation also may rupture the aorta from the resultant pressure against the "trapped aorta" or laceration of the vessels. The severity of atheromatous changes and the magnitude of force determine whether complete disruption of the aorta occurs or only intimal tearing with subsequent mural dissection. A great deal has been written about the value of plain chest X-ray in aortic injuries.¹³ Plain chest films are nonspecific, and although fracture of the upper ribs or an "apical cap" is not diagnostic, a shift of the trachea to the right, deviation of the nasogastric tube to the right of the T4 spinous process, widening of the right or left paraspinal line and depression of the left main bronchus more than 40° below the horizontal plane are specific (90%) but not sensitive (12-70%). Also, plain X-ray helps to exclude the possibility of an intravascular bullet embolus with an incidence of 0.33% of all gunshot related vascular injuries.¹³ A Medline search of the English literature reveals 18 documented cases of penetrating injuries to the thoracic aorta with emboli between 1960-1990.¹¹ If the patient is stable, angiography is performed before thoracotomy to confirm or exclude the diagnosis.

3-DCT imaging supplies useful information in complex trauma for the diagnosis of vertebral column trauma. Thoracic CT may be useful in cases in which plain film, history and physical examination are equivocal.³ M.R.I. is helpful as it avoids the use of intravascular contrast agents, and provides multiple plane images (coronal, sagittal, axial and oblique) and images of the entire thoracic aorta. Finally, to prevent the catastrophic complications of false aneurysm of the aorta, surgical repair of the lesion is the treatment of choice. The mortality rate for thoracic aortic surgery is less than 10% which is due to coronary artery disease or renal insufficiency. Paraplegia (5%) is the most serious complication but recurrent laryngeal nerve injury, bleeding and infection may also occur.¹⁴

REFERENCES

1. Bass A, Papa M, Adar R: Aortic false blunt trauma of the abdomen. *The Journal of Trauma* 23: 1072-1074, 1983.
2. Charter ACS, Charter AC: Wounding mechanism of very high velocity projectiles. *J Trauma* 16: 464, 1976.
3. Domenicucci M, Preite R, Ramieri A, et al: 3-D CT imaging in the diagnosis of vertebral column trauma. Experience based on 21 patients and review of the literature. *Trauma* 42: 254-259, 1997.
4. Dometiades D, Theodourou D, Murry J, et al: Mortality and prognostic factors in injuries of the aorta. *J Trauma* 40: 761-763, 1996.
5. Gulshank S, Scott SM, Takaro T: False aneurysm of the abdominal aorta due to blunt trauma. *Ann Surg* 182: 33-37, 1976.
6. Hargarten SW, Karlson TA, O'Brien M, et al: Characteristics of firearms involved in fatalities. *JAMA* 275: 42-46, 1996.
7. Luft FC, Klatte EC, et al: Cardiopulmonary effects of volume expansion in man: radiographic manifestations. *AJR* 144: 289, 1985.
8. Matto SK, Allen M: Penetrating wounds of the thorax. *Injury* 17: 313, 1986.
9. Michael WD, Gauder ER, Walkoff J, Izant RJ: Traumatic aneurysm of the suprarenal abdominal aorta. Surgical reconstruction in a 7 year old patient. *Journal of Pediatric Surgery* 17: 940-944, 1982.
10. Yoganandan N, Pintar FA: Dynamic analysis of penetrating trauma. *The Journal of Trauma* 42: 266-276, 1997.
11. Sken P, Mirzayan R, Jian T, McPherron J, Cornwell EE III: Gunshot wound of the thoracic aorta with peripheral arterial bullet embolization: case report and literature review. *The Journal of Trauma* 44: 394-397, 1998.
12. Rosenberg M, Carroll PW: Let's be clear: violence is a public health problem. *JAMA* 297: 3031-4, 1992.
13. Groskin S, Maresca M, Heitzman ER: Thoracic Trauma. In: McCort JJ, (ed.), *Trauma Radiology*. Churchill Livingstone Inc, London: pp. 75-127, 1990.
14. Wolfe WG: Aneurysms of the Thoracic Aorta, In: Sabiston DC Jr, Lyerly HK, (eds.), *Textbook of Surgery, The Biological Basis of Modern Surgical Practice*. Fifteenth edition, Philadelphia: W.B. Saunders Co., pp. 1655-1658, 1997.

