

Fig. 2. Section of lung obtained at autopsy showing numerous ova of *S. haematobium* (arrow) with granuloma formation and diffuse interstitial fibrosis.

tion. They suggested that pulmonary fibrosis 'can be considered to be a form peculiar to Portuguese East Africa' and that in these cases pulmonary hypertension, usually attributable in bilharziasis to extensive vascular changes, may be related, at least in part, to interstitial fibrosis.

The association of spontaneous pneumothorax due to honeycomb lung with bilharzial parenchymal fibrosis has, to our knowledge, not been previously reported.

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Low-velocity gunshot injury of the abdominal aorta managed by debridement and re-anastomosis

A case report

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Summary

Penetrating injuries to the abdominal aorta are highly lethal despite increasing numbers of reports of successful treatment. A case of survival after a 0,25-calibre gunshot wound of the abdominal aorta is presented. The patient, a young male, also had associated injuries to the liver, stomach and jejunum. He was managed by vigorous resuscitation, emergency laparotomy, aortic debridement and end-to-end re-anastomosis. He was discharged from hospital on the 12th postoperative day.

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Although experience gained on the battlefield has traditionally provided the guidelines for the treatment of civilian trauma, most experience in the management of abdominal aortic injuries comes from civilian trauma centres.¹⁻⁸ Improved emergency transport of injured patients and the provision of regional trauma centres have resulted in significant numbers of patients with major vascular injuries now surviving to reach hospital. During the past decade, substantial progress has been made in dealing with major vascular injuries and the overall reported mortality of aortic injuries varies from 30% to 70%. One of the earliest patients to survive an aortic injury during World War II was reported by Dubinskiy² in 1944.

Survival after a gunshot wound of the liver, stomach, jejunum and abdominal aorta is reported.

Case report

A 30-year-old white man was admitted to Tygerberg Hospital after being shot in the epigastrium with a 0,25-calibre handgun fired from a distance of 5 m. The bullet first entered the abdominal cavity below the right costal margin and there was no exit wound. A delay from the time of injury to operation of a few hours was

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unavoidable as he had been transported 100 km by ambulance from a district hospital.

On examination the patient was unconscious, with a blood pressure of 80/0 mmHg and a thready pulse of 120/min.

After a brief period of resuscitation with crystalloids and blood he was subjected to emergency laparotomy. At this stage an aortic injury was not suspected. A generous midline incision revealed through and through lacerations of the right lobe of the liver, stomach and jejunum. Apart from free blood in the peritoneal cavity, a tense central retroperitoneal haematoma was observed, which extended from the pelvis to the diaphragm. Opening the retroperitoneal haematoma revealed an obvious abdominal aortic injury with 1,0 cm anterior and 1,5 cm posterior entry and exit wounds. Bleeding was profuse but was adequately controlled by clamping the aorta below the diaphragm at the level of the oesophageal hiatus together with digital compression of the aortic lacerations (Fig. 1). A thoracotomy and cross-clamping of the descending thoracic aorta was not necessary. The aortic injury was managed by debridement which amounted to near-total transection, and re-anastomosis with 2/0 Dacron. Mobilization of the aorta enabled end-to-end anastomosis to be carried out and insertion of a prosthetic graft of Dacron tubing was not necessary. The associated abdominal injuries were debrided and sutured. The abdomen was closed after insertion of a sump drain sited in the subhepatic space.

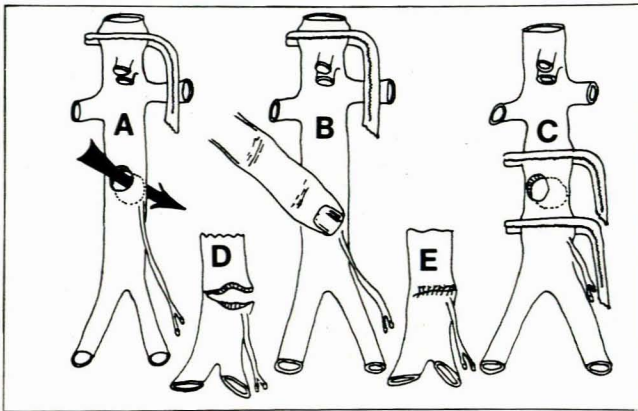


Fig. 1. Operative diagram showing site of injury and initial proximal subdiaphragmatic aortic control (A), proximal control and digital tamponade (B), definitive clamp control (C), debridement (D) and anastomotic repair of the aortic injury (E).

The patient required 24 units of blood (12000 ml) during the operation apart from balanced solutions to maintain his blood pressure above 50 mmHg. Intravenous cefoxitin was administered during and after the operation. Bilateral dorsalis pedis pulses were palpable at the end of the operation.

The patient required a short period of postoperative ventilatory support in the intensive care unit, resumed oral intake of nutrition on the 6th postoperative day and was discharged from hospital 12 days after operation.

Discussion

Results from other reports indicate that rapid transportation, resuscitation, wide exposure with appropriate vascular control by a skilled surgeon, together with the suspicion of major underlying vascular injury are the *sine qua non* of a successful outcome of injury to the abdominal aorta.^{5,6}

Despite increasing numbers of reports of successful treatment of such cases, blunt and penetrating injuries to the abdominal aorta continue to be highly lethal, with an expected mortality rate of between 50% and 90%.^{3,4,8} The high mortality rate is attributed to the formidable problems of difficulties in exposure, profuse haemorrhage and associated injuries.³ Particularly dangerous are combined aortic and inferior vena cava trauma, retro- and infrahepatic injuries and suprarenal injury in association with other abdominal trauma.^{3,4,7} However, the majority of studies reveal that survival after penetrating wounds of the aorta or the vena cava is a function of the degree of exsanguination rather than the number of associated injuries. Those patients with uncontrolled, untamponaded haemorrhage into the peritoneal cavity with no means of rapid transportation to a hospital usually die at the scene of injury.

The finding of a midline retroperitoneal haematoma at laparotomy in these cases implies an aortic or inferior vena cava injury until proved otherwise.³ Myles and Yellen³ have suggested that no attempt should be made to uncover the haematoma and expose the site of aortic injury until proximal and distal aortic control has been obtained. Occasionally a thoraco-abdominal approach is indicated.^{3,4} Mattox *et al.*⁴ suggest that when a large retroperitoneal haematoma in the area of the suprarenal aorta is encountered manual control of the aorta at the oesophageal crus effectively controls haemorrhage until a clamp can be applied. However, blind clamping of the descending thoracic aorta may cause aortic or oesophageal trauma.⁷ In infrarenal aortic injuries exposure of the aorta is gained by direct dissection through the root of the small-bowel mesentery, as in our case.³

Aortic repair may be accomplished by lateral arteriorrhaphy, patch angioplasty, resection and end-to-end anastomosis, as in our patient, or by prosthetic interposition grafting.^{3,4} Experience of other workers suggests that most penetrating wounds of the aorta can be simply repaired by lateral suture. Posterior injuries may be sutured by rotating the aorta. In those cases with loss of sufficient aorta substance interposition grafting using woven Dacron grafts to bridge the defect has proved suitable.³ Despite the extent of surgery, remarkably few postoperative septic complications have been reported.³

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