Aortocaval fistula due to ruptured abdominal aortic aneurysm

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Introduction

The rupture of an abdominal aortic aneurysm (AAA) is a devastating surgical condition associated with a very high morbidity and mortality. An aortocaval fistula (ACF) is an unusual, rare complication of ruptured AAA, involving less than 3–6% of all ruptured cases. The clinical manifestations are vague, depending on the degree of haemodynamic instability. A preoperative diagnosis can be made with thorough clinical assessment and timely imaging. This report tells us about the surgical treatment of a patient presented to the emergency department with an aortocaval fistula due to ruptured AAA. Furthermore, it will highlight the need for the high index of suspicion for early diagnosis and treatment of this often lethal condition.

Case report

A 70 year old male, hypertensive (poorly controlled) with chronic bronchitis and a heavy smoker presented with a sudden onset of central abdominal pain, backache and bilateral leg swelling for 2 days. The peripheries were warm and the pulse was well felt. Blood pressure was 110/80 mmHg and the pulse rate was 120 beats per minute. On general examination, the patient was dyspnoeic and not pale. Abdominal examinations revealed a pulsatile abdominal lump and thrill in the right hypochondrium; on auscultation there was a bruit.

An ultrasound abdomen revealed a large abdominal sacular aortic aneurysm extending in to the left common iliac artery, and a small amount of free fluid was found in the hepatorenal pouch that was suggestive of a rupture.

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An urgent contrast enhanced computed tomography (CT) of the abdomen confirmed a leaking fusiform aneurysm of 9 cm in maximal diameter, with 4cm in the left common iliac artery and contrast in the inferior vena cava which suggested the presence of an aortocaval fistula (Figure 1 and 2).

A two dimensional echocardiogram revealed an ejection fraction of 60%, mild concentric left ventricular hypertrophy and grade 1 diastolic dysfunction with a conclusion of moderate cardiovascular risk to undergo general anaesthesia. A chest x-ray revealed features of

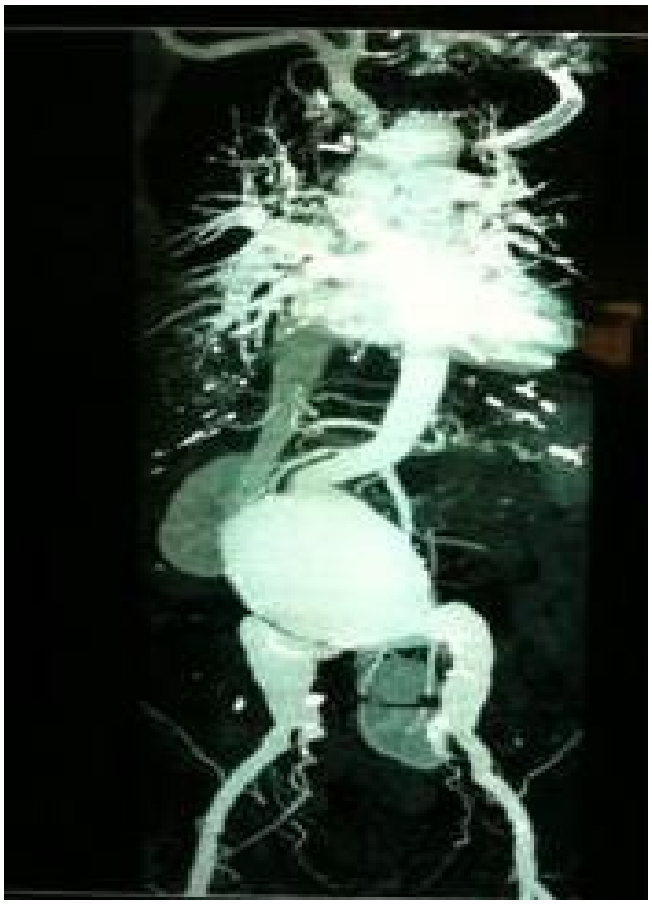

Figure 1. Coronal section of contrast enhanced computed tomography (CECT) showing an aortocaval fistula

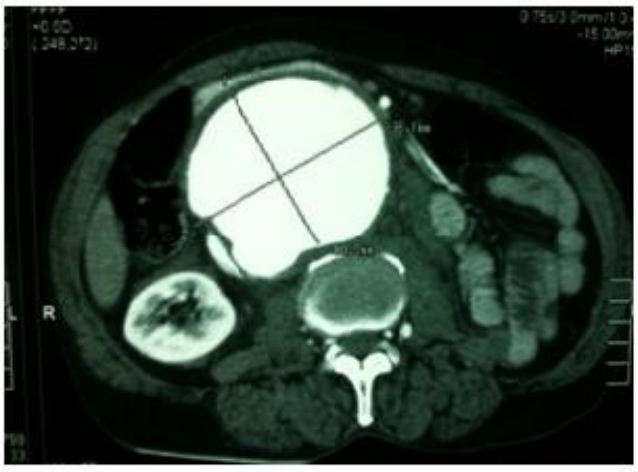

Figure 2. Cross section CECT scan of the abdomen showing the abdominal aortic aneurysm.

chronic obstructive pulmonary disease (COPD), his haemoglobin was 13.2 g/dL and serum creatinine was 120 µmol/L.

An emergency abdominal aortic aneurysm repair was performed through a midline laparotomy incision. A ruptured infrarenal abdominal aortic aneurysm was noted retroperitoneally which communicated with the inferior vena cava (IVC).

The abdominal aortic aneurysm was carefully opened and IVC bleeding was halted with digital control. The AAA was repaired with a 16x8mm bifurcated Dacron graft and the defect in the IVC also repaired. The aortic cross clamp time was 1 hour and 15 minutes.

The patient was managed in intensive care initially and the high dependancy units, in the first 3 post-operative days, and subsequently in the vascular ward. He developed an exacerbation of his COPD with lower respiratory tract infection on post-operative day 2. Eventually he recovered by the 10th post-operative day and was discharged. He was commenced on lifelong antiplatelet and statin therapy in addition to his antihypertensive medication. Furthermore, his lifestyle modifications including cessation of smoking were addressed.

Discussion

The rupture of an AAA into the inferior vena cava is a relatively rare event (<3%). The majority (>80%) of aortocaval fistulas are due to spontaneous rupture of aortic aneurysms. Penetrating trauma (war injuries), Takayasu's arteritis, mycotic aneurysms and connective tissue diseases are other causes [1]. It was first reported by Syme in 1831 [2] and the first successful repair was done by Cooley et al. in 1954 [3]. Without intervention, death will result in less than 2 months, in the natural progress of events [4].

Depending on the degree of confinement of blood following rupture, haemodynamic instability will vary, resulting in a spectrum of clinical presentations from an asymptomatic state to a collapsed state. Predominant challenges faced by the surgeon during operation include control of back bleeding by the IVC, prevention of thrombus migrating into the IVC and paradoxical thromboembolism. A preoperative diagnosis will help to plan the operation in order to minimize blood loss and avoid possible intraoperative pulmonary embolism [5,6].

Unusual clinical features of ruptured AAA include sudden onset of abdominal pain followed by shortness of breath, bilateral leg oedema, an audible machinery-like bruit and / or a thrill in the abdomen [7-8]. The abrupt rise of IVC flow by an aortocaval fistula leads to a rise in right atrial pressure and right heart failure. This is why these patients develop tachycardia, elevated jugular venous pressure and bilateral leg swelling.

An ultrasound scan will show the possible rupture but is inaccurate for detecting the fistula as in this case. Contrast enhanced CT of the abdomen forms the cornerstone of the diagnosis. Classic findings include indentation and fistula line in the vena cava, disappearance of the fatty planes between the vena cava and aorta, and rapid simultaneous contrast passage into the vena cava from the aorta [9].

Timely corrective emergency surgery has to be performed. Outcome determinants are the patient`s co-morbid status, degree of haemodynamic instability as well as rapidity of operative correction. During operation, a standard midline laparotomy is performed and transperitoneal aortic inflow and outflow control is first required. The aortic sac is opened and the fistulous opening into the IVC is controlled with digital or

balloon occlusion before repair. At this point, there is a possible risk of dislodging a clot into the IVC and embolism. In extreme situations, there are case reports of IVC ligation without significant ill effects.

A minimal invasive technique of managing AAA and fistula is by endovascular stenting with reduced morbidity and mortality compared with open operation. It is likely the way forward in modern vascular surgery. An "endoleak" (type 11) is a problem associated with graft malfunction [10-14].

If an AAA ruptures into the inferior vena cava, the clinical manifestations will vary depending on concomitant blood loss into extravascular compartments. If there is minimal apparent blood loss, the patient will present with symptoms of right heart failure instead of cardiovascular collapse. What is unusual, however, is the presence of a thrill and bruit in the right hypochondrium, in addition to a pulsatile lump in the epigastrium. Timely intervention will reduce morbidity and mortality. Endovascular stenting is the way forward minimizing morbidity and resulting in a short hospital stay.

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Key points:

- Rupture of an abdominal aortic aneurysm into the inferior vena cava may be suspected if a pulsatile abdominal mass is present in association with features of right heart failure and / or a right hypochondrial thrill or bruit.
- Contrast enhanced computerised tomography is the investigation of choice.
- Paradoxical embolism is a complication.
- Endovascular stenting is emerging as the treatment of choice.