The Use of Computed Tomography in the Diagnosis and Management of Aorto-caval Fistula

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Abdominal aorto-caval fistula is an unusual complication of abdominal aortic aneurysm. Pre-operative diagnosis is advantageous, enabling a carefully planned repair. We report three cases of aorto-caval fistula in which pre-operative computed tomography (CT) enabled precise diagnosis before repair.

Key Words: Aorto-caval fistula; Computed tomography.

Introduction

We report three cases of aorto-caval fistula that presented over an 18 month period. The clinical presentations and CT scan findings are all described. The accuracy and importance of CT in the diagnosis of aorto-caval fistula along with other imaging modalities is discussed.

Case 1

A 72-year-old male presented with a four day history of lower abdominal pain. He had not passed urine for 24 h. He was haemodynamically stable. Abdominal examination revealed a tender pulsatile aorta. He was noted to have left sided varicose veins and a pulsatile saphena varix. His renal profile revealed marked impairment.

To confirm the diagnosis of an aorto-caval fistula associated with the abdominal aortic aneurysm (AAA), a CT scan was performed (Fig. 1). This revealed a large infra-renal aortic aneurysm with a maximum transverse diameter of 10 cm. A contained retroperitoneal leak and an aorto-caval fistula were seen. The patient underwent uncomplicated surgery and made a full post-operative recovery.

Case 2

An 82-year-old woman presented with severe, colicky right loin pain. She was known to have an AAA. She did show evidence of haemodynamic compromise initially but responded well to fluid resuscitation and continued to remain stable. Abdominal examination revealed a non-tender pulsatile-expansile aorta.

Due to uncertainty about the diagnosis and the patient’s apprehension about surgery, an urgent CT scan was requested which revealed an infra-renal aortic aneurysm measuring 8 cm in transverse diameter extending to the aortic bifurcation. There was an extensive retroperitoneal haematoma causing the right kidney to be displaced anteriorly. In addition there was evidence of an aorto-caval fistula (Fig. 2). Surgery was uncomplicated but following a difficult post-operative course, the patient died on day 10 of multi-organ failure.

Case 3

A 68-year-old gentleman presented with a history of fatigue, dyspnoea and a vague history of back pain. Examination revealed markedly oedematous legs and pulmonary venous congestion on the chest X-ray. There was no clinical evidence of an acute abdomen. Blood tests revealed acute renal failure.

An ultrasound scan of the abdomen demonstrated normal kidneys and an 8 cm AAA. An urgent CT scan
demonstrated an infra-renal aneurysm with an aorto-caval fistula. There was no extra-luminal leakage of contrast (Fig. 3).

Operative repair was successful but the patient’s post-operative course was complicated by difficulty weaning him off mechanical ventilation and C. difficile sepsis and he died on day 21.

Discussion

Aorto-caval fistula is an uncommon complication of abdominal aortic aneurysm. The literature reports an incidence ranging from 0.2 to 1.3% at elective surgical intervention. This figure rises to 3–4% of ruptured abdominal aneurysms. Aorto-caval fistula was first described by James Syme in 1831, but it was not until 1955 that the first successful repair was reported by Denton Cooley.

Clinical diagnosis of aorto-caval fistula is still imperfect. A review of nine series showed that aorto-caval fistula was diagnosed pre-operatively in only 34% of patients.

At surgery considerable blood loss can occur from an undiagnosed aorto-caval fistula. There is also risk of embolism to the pulmonary circulation. The gold standard investigation for diagnosis is angiography, but this invasive procedure is less practical in the acute setting. Other imaging modalities reported include CT, Doppler ultrasound and magnetic resonance imaging. Doppler imaging may detect a fistula if there is dilatation or turbulence of the IVC. Magnetic resonance imaging does not require contrast injection but logistically remains an impractical undertaking in many centres.

The diagnosis of an aorto-caval fistula with CT was first described in the 1980s. In our series all three cases of aorto-caval fistula were demonstrated on a preoperative CT scan. The findings include early enhancement of the venous system, which is isodense to the associated abdominal aortic aneurysm. Spiral CT cannot only confirm the presence of an aorto-caval fistula but can also show the actual site using arterial phase image acquisition.

The morbidity and mortality of major abdominal arteriovenous fistulae is significant. The literature suggests that early mortality can range from 27 to
61%.\textsuperscript{10} A previous series suggests 85% survival when diagnosis is made before surgery, but 100% mortality without correct pre-operative diagnosis.\textsuperscript{1,5} In our centre, over the 18 month period in which these cases presented, we typically encounter 50 leaking AAAs. We only obtain a CT scan if there is any doubt about the diagnosis. No post-processing of the films was needed pre-operatively to help with the diagnosis. CT helped identify the fistula in each of our three cases allowed a planned repair and a single positive outcome.

**Conclusion**

In patients with relative haemodynamic stability, imaging is increasingly used to confirm a diagnosis of ruptured aortic aneurysm. We report three cases where CT has not only confirmed the clinical suspicion but has been of sufficient sensitivity and quality to enable the diagnosis of a significant complication, thus allowing a planned repair.

**Contributors**

Dr S. Venketraman, Dr N. Kotnis and Dr D. Rose realised that the cases merited reporting. Dr J. Holt and Dr M. DeNunzio contributed radiological expertise as well as assisting in editing. Mr K.G. Callum edited the paper and operated on the patient in case one. All authors contributed to writing the case report.

**References**


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