Spontaneous aortocaval fistula – preoperative diagnosis and management

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Summary: Spontaneous aortocaval fistula is an uncommon complication of an abdominal aortic aneurysm. This report details two cases of this condition presenting with symptoms attributable to arteriovenous shunting. Pain was not a prominent feature so that attention was not initially drawn to the abdomen. Diagnosis and management of the condition are discussed.

Introduction

Spontaneous aortocaval fistula has been reported to occur in 1% of all patients operated on for abdominal aortic aneurysm, and in 4% of those presenting with rupture.¹ The classical presentation is with abdominal or back pain, a palpable aneurysm and an associated bruit. However, as in the cases we present, the clinical picture is not always so clear and other features may predominate.

Case reports

Case 1

A 76 year old man was admitted as an emergency with a 48-hour history of palpitations and severe lethargy. During the preceding week he had noticed abdominal swelling and discomfort. Examination showed he was distressed, his pulse was 100 beats/minute and blood pressure 160/70 mmHg. Jugular venous pressure was not raised. Abdominal examination revealed a large non-tender aortic aneurysm with an associated loud continuous bruit. Haemoglobin was 11.6 g/dl, blood urea 22.2 mmol/l, chest X-ray and electrocardiogram were normal.

A spontaneous aortocaval fistula was diagnosed. He was transferred to the intensive care unit whilst preparation was made for operation the following morning. During the ensuing 14 hours, despite a systolic blood pressure greater than 120 mmHg, he passed only 125 ml of urine.

At operation an intact infrarenal abdominal aortic aneurysm was found. There was ascites and a tense

engorged liver. Following proximal and distal clamping of the aorta, the aneurysm was opened and profuse bleeding from a fistula on the right posterolateral wall of the aorta was encountered. This was controlled by balloon tamponade of the vena cava after passing two 12FG Foley catheters through the fistula proximally and distally. The fistula was closed from within the aorta with interrupted polypropylene sutures. A 'Dacron' woven bifurcation graft was sutured in place.

Postoperatively the patient made an uneventful recovery. Blood urea fell to normal after an early diuresis. The patient remains asymptomatic 28 months postoperatively.

Case 2

A 62 year old hypertensive man presented with a 3-day history of malaise. Forty eight hours before admission he had had a transient ischaemic attack. He consulted his general practitioner who noted his blood pressure to be 80/60 mmHg and stopped his antihypertensive medication. The next day, although his neurological symptoms had resolved, the intense malaise persisted. Examination revealed he was restless, his pulse was 115 beats/min, blood pressure 125/65 mmHg. There were prominent arterial pulsations visible in the neck. Abdominal examination revealed a 5 cm diameter, non-tender, aortic aneurysm with an associated continuous bruit, louder in systole. Haemoglobin was 13.7 g/dl, blood urea 32 mmol/l, electrocardiogram and chest X-ray were normal. An ultrasound examination revealed an abdominal aortic aneurysm but no evidence of retroperitoneal or intraperitoneal rupture. The vena cava was enlarged.

An aortocaval fistula was diagnosed and laparotomy performed 14 hours after admission. During this period only 165 ml of urine was passed despite a systolic blood pressure greater than

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120 mmHg throughout. His central venous pressure was 7.5 cm H₂O.

Prior to laparotomy both saphenofemoral junctions were exposed and on each side a size 7FG Fogarty venous thrombectomy catheter was inserted with the intention of controlling the common iliac veins once the balloons were inflated.

At laparotomy an intact aortic aneurysm was found. A thrill was palpable over the inferior vena cava. The aorta was clamped proximally and distally and the balloons on the Fogarty catheters inflated to 2 ml (nominal capacity 1.25 ml). On opening the aorta there was profuse bleeding from a fistula 3 cm long in the right posterolateral wall of the aorta. Two 12FG Foley catheters were passed through the fistula into the vena cava and the balloons inflated to reduce the bleeding. However the distal balloon would not inflate fully so that finger pressure had to be used to control the bleeding whilst the hole was sutured with interrupted 'Tycron' sutures (the last being tied as the Foley catheters were withdrawn). A woven 'Dacron' bifurcation graft was sutured in place.

Postoperatively, after a spontaneous diuresis, his blood urea fell to normal. Apart from a transient episode of mild jaundice, and peripheral oedema which settled on diuretic therapy, his recovery was uneventful. The patient remains asymptomatic 48 months postoperatively.

Discussion

Deaths from ruptured abdominal aortic aneurysm have increased more than threefold in the last 30 years and this trend is likely to continue.² It is therefore likely that aortocaval fistula will be encountered more frequently. In this unit, between 1976 and 1986, 84 ruptured and urgent abdominal aortic aneurysms were operated on. In addition to the 2 patients described here who were diagnosed preoperatively, one further aortocaval fistula was found at operation in a patient who also had retroperitoneal rupture. In 2 further cases operated on for rupture, fistulae were discovered only after evacuating clot from the aneurysm sac.

Spontaneous aortocaval fistula occurs in patients who have an abdominal aortic aneurysm which ruptures into the inferior vena cava. This results in a sudden reduction in peripheral vascular resistance and increased blood pressure in the inferior vena cava. The clinical picture results from the local effects of the aneurysm, or the arteriovenous shunting. Although the commonest presentation is with abdominal or back pain, a palpable aneurysm, and an associated bruit, pain may not be a prominent feature.³⁻⁵ The patient may complain of palpitations, angina, dyspnoea or malaise.

The sudden reduction in peripheral vascular resis-

tance is compensated for by an increase in the cardiac output. Initially there is tachycardia and wide pulse pressure, but if the fistula is large, or the heart unable to increase its output sufficiently, then cardiac failure or shock will ensue and there may be evidence of cerebral, renal, or peripheral ischaemia.

The increased pressure in the inferior vena cava results in regional venous hypertension. This produces peripheral oedema and venous engorgement of the pelvic organs. Frank haematuria and rectal bleeding have been described.^{3,6} The raised venous pressure appears confined to the inferior vena cava in the majority of cases and it has been suggested that proximal compression of the inferior vena cava by the aneurysm is responsible.^{3,5}

Early diagnosis profoundly alters subsequent management. In these cases intensive medical treatment of the heart failure is futile until the fistula is closed surgically.⁷ Inappropriate administration of intravenous fluid, if hypovolaemic shock is diagnosed, will result in fluid overload.^{1,8} Preoperative diagnosis enables the surgeon to take care at operation to avoid excessive blood loss on opening the aneurysm, and to avoid dislodging atheromatous debris which can embolise across the fistula causing pulmonary embolism.⁹

There are a number of methods of confirming the diagnosis preoperatively. Aortography will demonstrate a fistula but is seldom used. The diagnosis can be made at the time of Swan-Ganz catheterization via the femoral route (by showing a rise in venous pressure, oxygen saturation in the inferior vena cava).⁸ In our second patient ultrasound examination showed a distended vena cava with an intact abdominal aorta and aneurysm thus excluding haemorrhage from the aneurysm as a cause of the patient's symptoms. Other methods such as computerized tomography or radioisotope scanning offer little advantage. Some cases of aortocaval fistula will only be diagnosed at operation. The tell-tale sign is of a thrill palpable over the site of the fistula.

It is generally accepted that dissection around the vena cava to achieve control is hazardous. Control can be achieved from within the aneurysm sac by simple digital or swab-stick compression or by the use of Foley or Fogarty catheters introduced through the lumen of the fistula; the fistula can then be oversewn from inside the sac.

In our cases pain was not a prominent feature and symptoms had been present for more than 48 hours. A preoperative diagnosis was made on the findings of continuous bruit in association with a palpable abdominal aortic aneurysm.

The development of oliguria and uraemia with subsequent recovery of renal function has been described before.^{3,4,7} It is interesting that oliguria occurred in both patients despite an apparently adequate sys-

tolic blood pressure. The precise mechanism is unclear.

In our second case, an attempt was made to gain distal venous control by passing two Fogarty venous embolectomy catheters from the groins up the femoral veins prior to laparotomy. The control achieved was disappointing, probably because the balloons

available were too small. It may be that these catheters actually interfered with the correct placement of the distal Foley catheter in our attempt to prevent excessive blood loss. A recent report has described this technique using larger balloon catheters with some success.¹⁰

References

1. Baker, W.H., Sharzener, L.A. & Ehrenhaft, J.L. Aortocaval fistula as a complication of abdominal aortic aneurysms. *Surgery* 1976, **72**: 933–938.
2. Collin, J. The epidemiology of abdominal aortic aneurysm. *Br J Hosp Med* 1988, **40**: 64–67.
3. Nennhaus, H.P. & Javid, H. The distinct syndrome of spontaneous abdominal aortocaval fistula. *Am J Med* 1968, **44**: 464–472.
4. Burke, A.M. & Jamieson, G.G. Aortocaval fistula associated with ruptured aortic aneurysm. *Br J Surg* 1983, **70**: 431–433.
5. Reckless, J.P.D., McColl, I. & Taylor, G.W. Aortocaval fistula: an uncommon complication of abdominal aortic aneurysms. *Br J Surg* 1972, **59**: 461–462.
6. Livingstone, A.S., Chiu, C.J., Mulder, D.S. & Scott, H.J. Spontaneous aortocaval fistula secondary to ruptured abdominal aortic aneurysm. *Can J Surg* 1977, **20**: 33–36.
7. Gordon, J.B., Newman, K.D. & Marsh, J.D., Angina pectoris as the initial manifestation of an aortocaval fistula. *Am J Med* 1986, **80**: 514–516.
8. Kwaan, J.H.M., McCart, P.M., Jones, S.A. & Connolly, J.E. Aortocaval fistula detection using a Swan-Ganz catheter. *Surg Gynecol Obstet* 1977, **144**: 919–921.
9. Hecker, B.R. & Lynch, C. Intraoperative diagnosis and treatment of massive pulmonary embolism complicating surgery on the abdominal aorta. *Br J Anaesth* 1983, **55**: 689–691.
10. Smith, S.R.G., Mansfield, A.O. & Bradley, J.P.W. Remotely inserted venous occlusion catheters for the control of venous haemorrhage. *Ann R Coll Surg Engl* 1988, **70**: 161–162.