Percutaneous balloon occlusion of the inferior vena cava as an adjunct for treating ruptured type IV thoracoabdominal aneurysm and aortocaval fistula

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Spontaneous aortocaval fistulas are rare and thoracoabdominal aneurysms eroding into the inferior vena cava are rarer still. We describe a patient who presented to our hospital with a fistula between a Type IV thoracoabdominal aneurysm and the inferior vena cava. Expanding endovascular capabilities of vascular surgeons enabled us to insert proximal and distal occluding balloon catheters into the vena cava which greatly minimized blood loss. (J Vasc Surg 2006;43:834-5.)

CASE REPORT

A 65-year-old white man was transferred from an outside institution to Pennsylvania Hospital for emergent management of a ruptured 8-cm type IV thoracoabdominal aneurysm with an IVC fistula. The patient had experienced abdominal and low back pain for 4 days before admission which worsened several hours before presentation. His medical history included emphysema, smoking, and hypertension. On physical examination, systolic blood pressure was 80 mm Hg with a heart rate of 100/min. Abdominal examination revealed a tender, pulsatile mass. A machine-like bruit was present. Computed tomography performed at the outside hospital showed an 8-cm aortic aneurysm extending from just proximal to the celiac artery distally to the distal aorta. A large amount of thrombus was removed. The aneurysm was then repaired with a beveled graft incorporating the celiac, superior mesenteric, and renal arteries in the proximal anastomosis. Additional interventions included the administration of intravenous mannitol, renal-dose fenoldopam, use of a cell-saving device, and injection of iced Ringer lactate through 5F occluding balloon catheters into both renal arteries. Intravenous heparin was not administered because of concern that the patient was hypocoagulable secondary to massive blood loss and hypothermia, although heparinized saline was flushed into the mesenteric vessels and into the common iliac arteries. After surgery the patient had an uneventful course, with normal renal function before and after surgery, and was discharged 10 days later.

DISCUSSION

Aortocaval fistulas are uncommon in clinical practice and can occur from erosion by an enlarged or aneurysmal atherosclerotic aorta, low-velocity trauma, connective tissue disorders, and injury during lumbar disc surgery. We believe that this is the first reported case of a fistula between a type IV thoracoabdominal aneurysm and the IVC. Necro-
sis due to pressure and tension of the posterior wall of large aortic aneurysms is thought to cause an adventitial inflammatory reaction leading to the aneurysm adhering to adjacent posterior veins and resulting in an aortocaval fistula.3

An aortocaval fistula has been shown to be associated with several clinical characteristics, including a continuous abdominal bruit in 71% of patients, low back or abdominal pain in 83%, and a pulsatile abdominal mass in 89%.1 Shunting of large amounts of blood through the fistula into a low-resistance system can result in high-output cardiac failure and pulmonary edema.

The mortality rate in cases of aortocaval fistulas is as high as 72%.1,2 The high mortality associated with open surgical management of these lesions is due to multiple medical comorbidities, associated free rupture of the aortic aneurysm, and the technical challenges associated with repair in many patients. James Syme4 first described an aortocaval fistula in 1831. Many different treatments of this disorder have been described, from quadruple ligation and packing to endovascular repair.5-7 Insertion of an aortic endograft was not possible in our patient because the proximal extent of the aneurysm involved the renal and mesenteric arteries. The technique used in this case for the isolation and repair of the inferior caval fistula involved placing proximal and distal IVC balloon catheters through the femoral veins into the IVC, and this has been previously reported.6-7 When the balloons were inflated, the patient’s blood pressure increased 30 mm Hg. Most likely this occurred because the balloons were at or near the site of the fistula and, therefore, decreased blood flow from the aorta to the IVC. Insertion of the occluding vena caval balloons greatly aided in the visualization of the fistula and enabled precise suture placement while the IVC was oversewn. Although finger-pressure occlusion of the defect and placement of sponge sticks on the inside of the aortic aneurysm wall proximal and distal to the fistula have been described and may have controlled the bleeding to some degree, these maneuvers may not have been sufficient to prevent massive, lethal hemorrhage, particularly given the large size of this defect and the approach needed to repair this type of aneurysm.

Adjunctive endovascular maneuvers that are now familiar to most vascular surgeons can facilitate repair of these challenging cases. We believe that the insertion of IVC occluding balloons should be routinely considered for open surgical repair of aortocaval fistulas.

REFERENCES

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