Case Reports

Hybrid Procedure for Celiac Trunk Aneurysm Repair

via Left Reno-Splenic Bypass and Stent-Graft Deployment

Roberto Gabrielli, MD, PhD
Maria Sofia Rosati, MD, PhD
Andrea Siani, MD, PhD
Roberto Chiappa, MD
Giovanni Caselli, MD

Celiac trunk aneurysm is one of the rarest forms of splanchnic artery aneurysm. Conventional open vascular surgery is associated with increased rates of morbidity and mortality and can require complex vascular reconstruction.

We describe the case of a 42-year-old patient with celiac trunk aneurysm whom we treated by means of a hybrid surgical-endovascular procedure. We performed a left reno-splenic bypass, after which we used a direct splenic artery approach to deploy a self-expandable 6 × 50-mm stent-graft across the splenic and hepatic arteries. One year later, the stability of the repair was confirmed. ***(Tex Heart Inst J 2012;39(3):408-11)***

Celiac trunk aneurysm is one of the rarest forms of splanchnic artery aneurysm (4% of all these). Detection tends to be incidental. Rupture occurs in approximately 5% of celiac trunk aneurysms that range from 15–22 mm in diameter and in 50% to 70% that exceed 32 mm in diameter.[1,2] If rupture occurs, the mortality rate is about 80%.[3]

We describe a case of celiac trunk aneurysm that we treated by a hybrid procedure.

Case Report

In March 2009, a 42-year-old man was admitted to our department for treatment of a celiac trunk aneurysm that had been discovered by means of abdominal ultrasonography performed during the course of investigating the patient's moderate abdominal discomfort.

A computed tomographic (CT) scan showed an aneurysm of celiac artery origin. The common hepatic and left gastric arteries were normal. Intra-arterial digital subtraction angiography showed a 2.8-cm-diameter aneurysm of the celiac axis, and the diameters of the splenic artery and hepatic artery were 5 and 4.5 mm, respectively.

We decided to treat the aneurysm because of the risk of rupture in a relatively young man. We obtained informed consent and gave the patient a detailed explanation of the indications to treat celiac aneurysms that were greater than 2 cm in diameter. A hybrid surgical-endovascular procedure was chosen.

Using a retroperitoneal approach with a renal ischemia time of 15 minutes, we performed a left reno-splenic end-to-side anastomosis between the proximal splenic artery and the left renal artery (Figs. 1A–1C). We were able to preserve the spleen by dividing the splenic vascular pedicle and maintaining the splenic blood supply via the short gastric vessels and the right gastroepiploic artery[4] (Figs. 1A, 2A, and 2B). Immediately after the reno-splenic bypass, we used a direct splenic artery approach (Figs. 1B, 2C, and 3) to pass a self-expandable 6 × 50-mm stent-graft (Viabahn® endoprosthesis, W.L. Gore & Associates; Flagstaff, Ariz) across the splenic and hepatic arteries.

Via percutaneous transbrachial access, we then completely occluded the celiac trunk, releasing 8 coils that ranged in diameter from 7 to 9 mm (Target Therapeutics, Boston Scientific Corporation; Natick, Mass) (Figs. 1C and 4).

One month later, CT angiography showed complete exclusion of the aneurysm along the spleno-hepatic stent axis (Fig. 5A), together with reno-splenic bypass patency and no signs of renal, splenic, or hepatic infarction (Fig. 5B). One year later, a new CT scan confirmed the stability of the repair (Fig. 6).

Key words: *Celiac artery/aneurysm; coil; endovascular exclusion; reno-splenic bypass; stent-graft; viscera/blood supply*

From: *Department of Vascular Surgery (Drs. Caselli, Chiappa, Gabrielli, and Siani), Policlinico Casilino of Rome, 00169 Rome; and Department of Oncology (Dr. Rosati), Policlinico Umberto I "Sapienza" University of Rome, 00161 Rome; Italy*

Address for reprints: *Roberto Gabrielli, MD, Via Don Luigi Sturzo 9, 00061 Anguillara Sabazia (Rome), Italy*

E-mail: *rogadoc@libero.it*

Discussion

The celiac trunk aneurysm was first described in 1745 by Lancissi.[5] Possible causes of this lesion are atherosclerosis, trauma, inflammation, and dissection. In most patients, atherosclerotic and medial degeneration are the pathologic changes observed. Usually, this aneurysm is asymptomatic, but the risk of rupture in cases of aneurysms that exceed 2 cm in diameter suggests elective repair. Conventional open vascular surgery for the treatment of celiac trunk aneurysms[2] is complicated, requires general anesthesia, and is associated with high rates of morbidity and mortality. The first successful resection of a visceral artery aneurysm was reported in

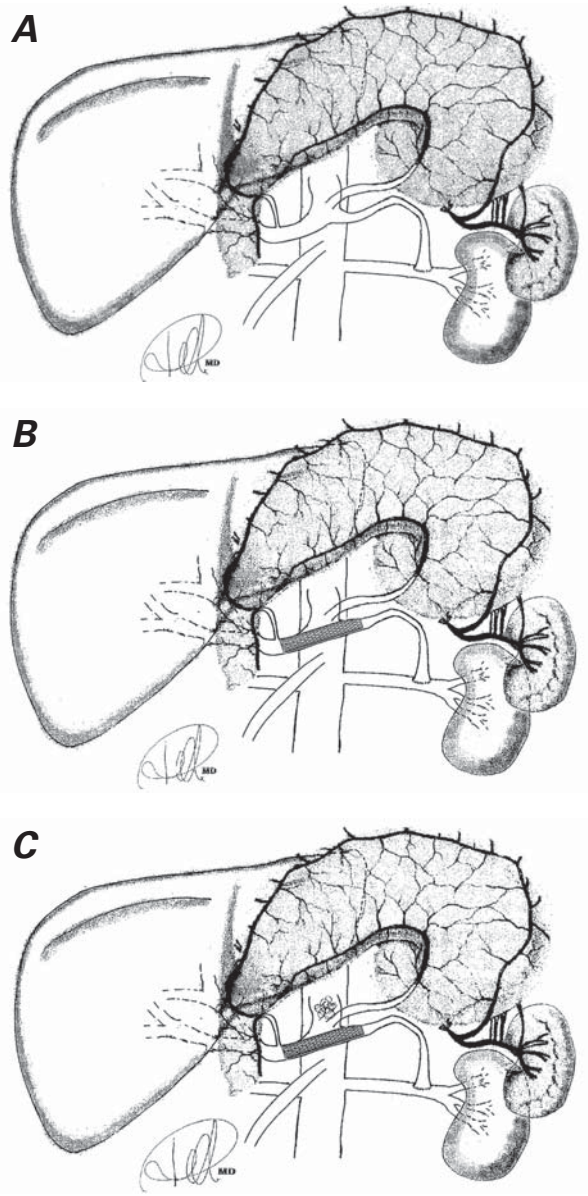


Fig. 1 *Schematic drawing of the hybrid procedure shows* ***A****) left reno-splenic side-to-end bypass with spleen preservation. The splenic blood supply is maintained by the short gastric vessels and the right gastroepiploic artery anastomosis.* ***B****) Self-expandable 6 × 50-mm stent-graft (Viabahn) deployment across the splenic and hepatic arteries; and* ***C****) complete celiac trunk embolization via percutaneous transbrachial access.*

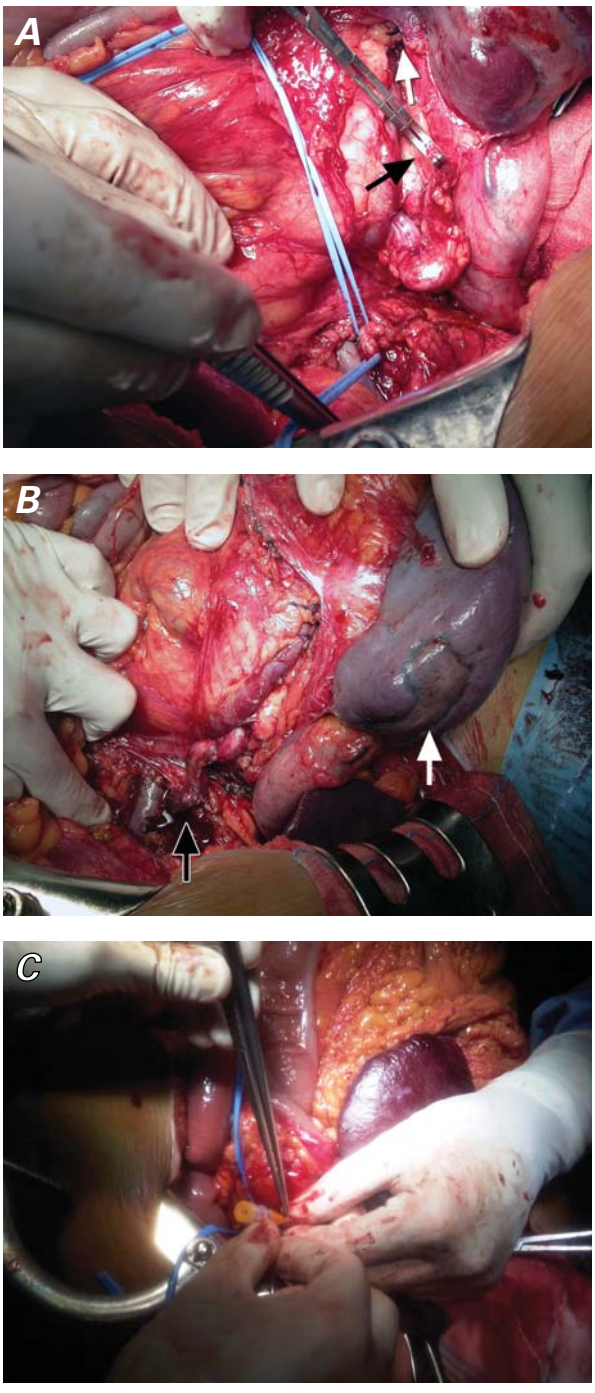


Fig. 2 *Intraoperative photographs of the left reno-splenic side-to-end bypass, performed via a retroperitoneal approach, show* ***A****) splenic artery section with suture of distal segment (white arrow) and clamping of proximal tract for bypass (black arrow);* ***B****) reno-splenic bypass (black arrow) is shown with previous splenic infarct (white arrow); and* ***C****) splenic artery cannulation for stent placement.*

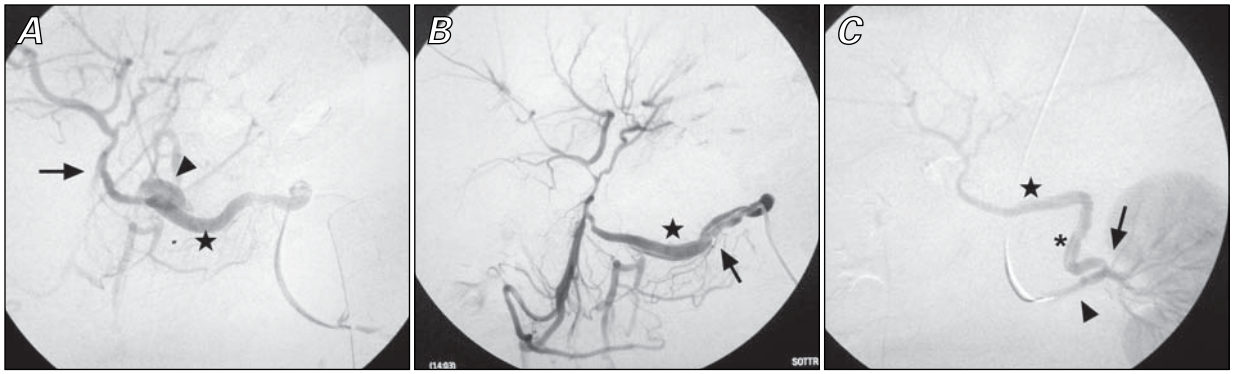


Fig. 3 *Arteriograms show deployment of the self-expandable 6 × 50-mm stent-graft (Viabahn) across the splenic and hepatic arteries via a direct splenic artery approach:* ***A****) celiac trunk (arrowhead) and hepatic artery (arrow) via splenic artery (star), and* ***B****) stent-graft deployment across the splenic and hepatic arteries (arrow) with complete exclusion of the celiac trunk (star).* ***C****) Selective arteriogram of left renal artery (arrowhead) shows the spleno-renal bypass (arrow), the splenic artery (asterisk) and the complete exclusion of the celiac trunk aneurysm with stent-graft patency (star).*

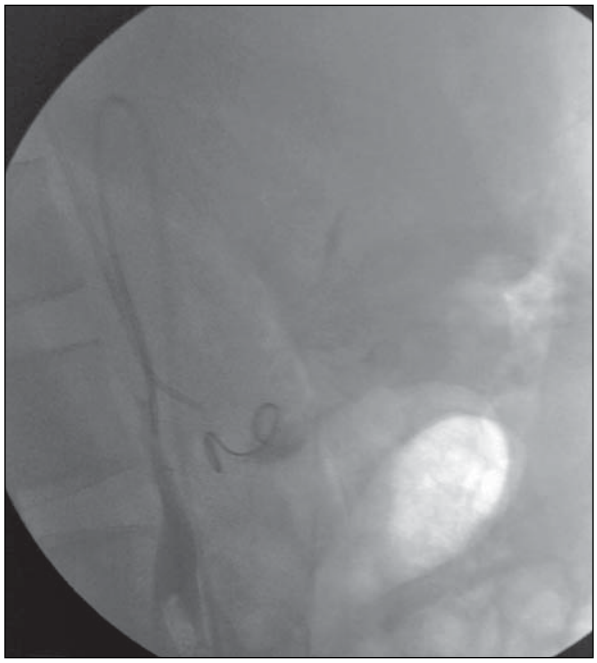
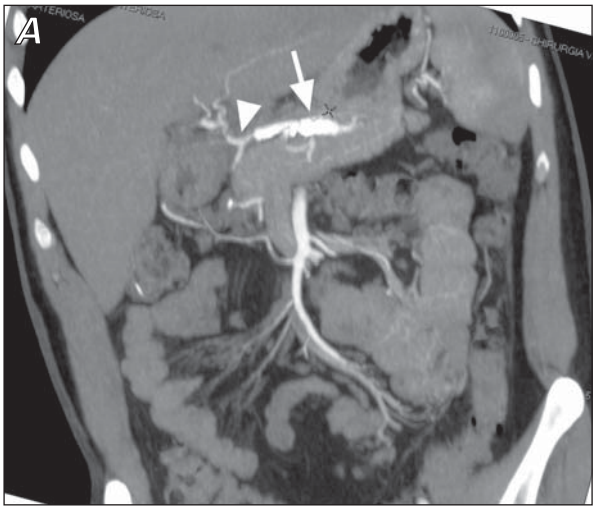


Fig. 4 *Arteriogram shows complete celiac trunk embolization via percutaneous transbrachial access.*



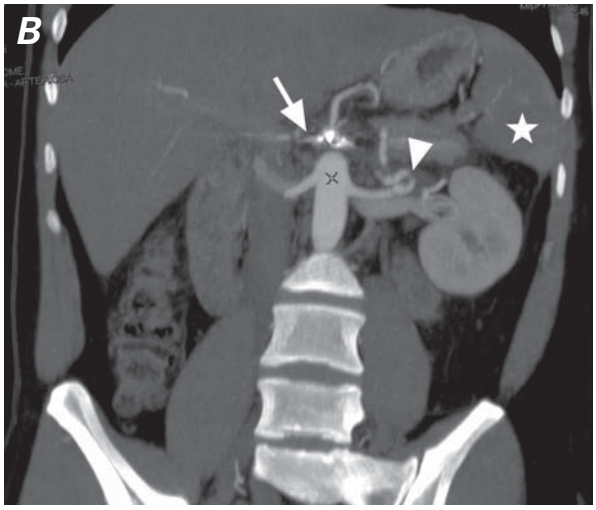


Fig. 5 *Computed tomography shows* ***A****) complete exclusion of the aneurysm with a patent spleno-hepatic stent-graft (arrow) and normal appearance of the hepatic artery (arrowhead);* ***B****) reno-splenic bypass patency (arrowhead), exclusion of the celiac trunk aneurysm (arrow), and a normal spleen without infarct (star).*

1953,[6] and the first successful surgical treatment of a celiac aneurysm occurred in 1958.[7] Increasingly, endovascular procedures are replacing surgery in the treatment of such aneurysms.[8] Some investigators have reported successful transluminal embolization[9] and branch-graft exclusion of pseudoaneurysms that involve the celiac trunk and its branches.[10]

Most often, this lesion is treated by using stent-grafts in the direction of the hepatic vasculature, together with total proximal coil embolization of the splenic artery; in fact, percutaneous embolization was not feasible in our patient because of the aneurysm's location. When the aneurysm involves the origin of the vessel, we believe that creating a reno-splenic connection with a spleno-hepat-

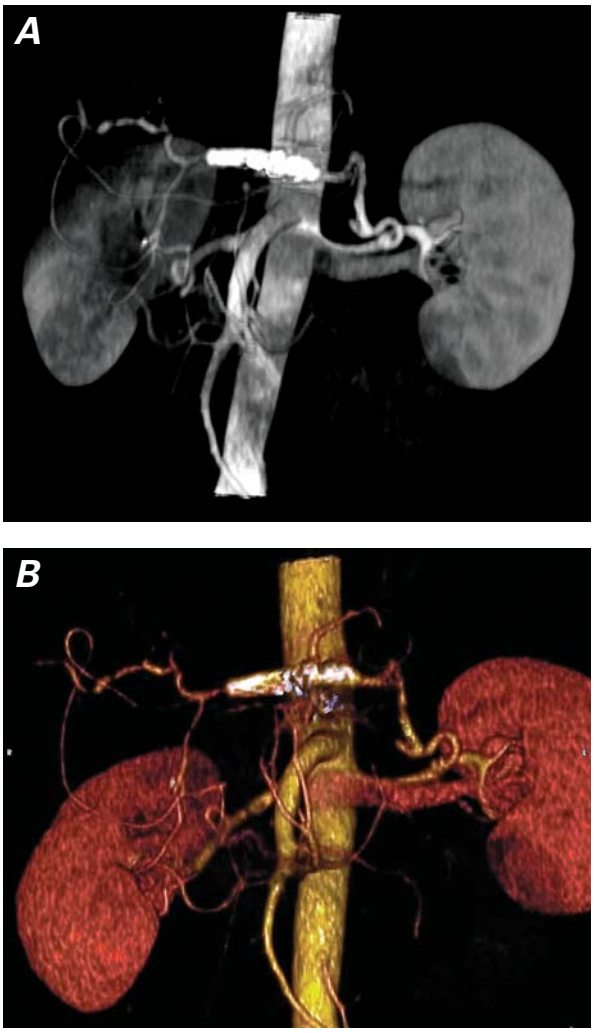


Fig. 6 *At 12 postoperative months,* ***A****) multiplanar reformation computed tomographic reconstruction shows complete exclusion of the aneurysm with a spleno-hepatic stent-graft and patency of the reno-splenic bypass.* ***B****) Three-dimensional computed tomographic reconstruction shows the new anatomy of the postoperative visceral vessels.*

ic stent-graft is actually a less traumatic procedure than just resecting and replacing the celiac axis in a traditional fashion. An easy retroperitoneal approach without aortic clamping carries a low risk of comorbid events.

Early recognition and intervention are crucial: the operative mortality rate associated with ruptured celiac artery aneurysms is 80%, compared with only 5% for nonruptured aneurysms.

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