A 63-year-old man had presented for emergency endovascular treatment of acute type B aortic dissection complicated by acute occlusion of the true lumen of the infrarenal aorta and a Crawford type III thoracoabdominal aortic aneurysm. These findings precluded the use of a conventional endovascular approach. A novel technique was developed with the insertion of guidewires through the left femoral and subclavian arteries to deliver stent grafts to cover the dissection entry tear and exclude the thoracoabdominal aortic aneurysm. A femorofemoral bypass was performed to preserve the circulation. The procedure and follow-up course were uneventful. This technique appears to be a promising tool for thoracic endovascular aortic repair in emergency setting. More experience with the method is warranted. (J Vasc Surg Cases Innov Tech 2022;8:514-9.)

Keywords: Abdominal aortic occlusion; Aortic dissection; Complicated; Endovascular repair; Thoracic aorta; Type B

A large body of scientific evidence currently supports the use of endovascular repair (thoracic endovascular aortic repair [TEVAR]) as the optimal contemporary treatment of acute complicated Stanford type B aortic dissection (TBAD).1-3 The use of TEVAR has significantly improved in-hospital survival compared with medical and open surgery, with a reported mortality rate of <10%.4,5 Total occlusion of the abdominal aorta is an extremely rare TBAD complication. Nevertheless, TEVAR is considered the reference standard treatment of TBAD complicated by malperfusion syndrome. However, aortic occlusion can impair or even prevent stent graft delivery and placement through the femoral or iliac access. Immediate surgical intervention can be necessary to prevent deadly outcomes in such cases.

In the present report, we have described a new endovascular technique, the Lobato technique (LT), to overcome the current anatomic and device constraints and expand the limits of TEVAR in a safe, easy to perform, and cost-effective manner. The LT was developed to safely address cases of acute TBAD complicated by a thoracoabdominal aortic aneurysm (TAAA) and total true lumen (TL) occlusion of the infrarenal aorta. Use of the LT allows the interventionist to successfully cover the entry tear, exclude the aortic aneurysm sac, and preserve the visceral and lower limb circulation in a single step.

TECHNICAL NOTE

A 63-year-old white man with hypertension had been admitted to a public Brazilian hospital for acute TBAD. He had been treated conservatively for ~12 days, when acute onset right lower limb malperfusion had developed. He was transferred to our high-volume aneurysm center for specialized treatment. He was complaining of pain, pallor, and poikilothermia on his right lower limb. Emergency computed tomography angiography was performed (Fig 1) at admission and revealed total collapse of the infrarenal aorta and right common iliac artery. The left iliac artery was perfused through the false lumen. Additional findings included a Crawford type III TAAA, with a maximum diameter of 59 mm × 50 mm measured at the level of the superior mesenteric artery.

The patient underwent emergency TEVAR using the LT. The LT is a novel one-step procedure that can be performed in the emergency setting in a time-sensitive manner using commercially available devices to cover the dissection entry tear, exclude a type III TAAA, and restore perfusion to the visceral arteries and lower limbs. Through exposure and cannulation of the left common femoral and subclavian arteries, we advanced a standard...
guidewire from the left subclavian artery to the distal segment of the left external iliac artery. We inserted another guidewire from the right subclavian artery to the TL of the abdominal aorta. We inserted four stent grafts. One was inserted from the right subclavian artery and advanced to the celiac trunk. A second thoracic stent was then inserted from the left subclavian artery and advanced to cross the entry tear from the TL to the false lumen trunk. The third thoracic stent was inserted from the left common femoral artery and advanced to be implanted inside the false lumen. A fourth thoracic stent graft was inserted from the left common femoral artery and advanced to be implanted in the TL located at the distal part of the left external iliac artery. We performed a femorofemoral crossover bypass to restore the blood supply to the right limb. For the present patient, the LT was performed with the patient under general anesthesia in an endovascular suite. A fully illustrated description of the technique is presented in Fig 2.

Completion intraoperative angiography demonstrated restoration of the visceral circulation, complete exclusion of the TAAA with no endoleak, and normal limb perfusion. The operation and fluoroscopy times were 125 and 26 minutes, respectively. The postoperative course was uneventful, with optimal CTA images showing aneurysm sac shrinkage and preservation of the visceral and lower limb circulation at 3 years of follow-up (Fig 3). The patient provided written informed consent for the report of his case details and imaging studies.

DISCUSSION

The present technical note has highlighted an extremely rare and challenging presentation of acute complicated TBAD with total TL occlusion of the infrarenal aorta and common iliac artery and a 59-mm Crawford type III TAAA. Similar case reports have been very scarce, and no consensus has been reached regarding the best treatment.

The natural history of the aorta after TEVAR for TBAD, as currently advocated, has clearly shown that this procedure alone will not be enough to prevent subsequent aneurysmal degeneration of either the thoracic or abdominal aorta, leaving the patient at an increased risk of reintervention and/or death. The risk of late complications and related mortality for patients with TBAD associated with aneurysm formation (aorta >40 mm in diameter) is high.6

These findings could represent an alert that it is high time for experts to rethink their recommendations for TEVAR to treat acute complicated TBAD. We believe it is necessary to customize an endovascular approach to treat complicated TBAD to meet patients’ requirements instead of focusing on only covering the entry tear and leaving additional findings for future reintervention.

Closure of the primary entry tear with a thoracic stent graft only, as recommended by the Society for Vascular Surgery and Society of Thoracic Surgeons, would, without any doubt, not have helped our patient. Performing standard TEVAR for our patient would have actually resulted in additional harm regarding his malperfusion syndrome and, ultimately, allowed for the occurrence of TAAA enlargement and rupture in the long term. Our approach to the TAAA and addressing the total vessel occlusion (infrarenal aorta and common iliac artery) were mandatory steps to provide any benefit for our patient. Therefore, we developed and performed a procedure with the aim of providing coverage of the TBAD entry tear, excluding the type III TAAA, and restoring the blood flow to the visceral and lower limb circulation in a single-step intervention. Our extensive experience in treating complex aortic aneurysms and the development of other parallel stent techniques helped us to accomplish this task.7,8

To the best of our knowledge, no study to date has addressed all three complications (ie, occlusion of the infrarenal aorta and common iliac artery, TAAA, and malperfusion syndrome) in a single-step procedure. The available case reports have focused on covering the primary entry tear and restoring lower limb perfusion. None had addressed the TAAA in the same surgery.

Historically, axillobifemoral bypass was the treatment of choice for acute TBAD complicated by total infra-renal aortic occlusion.9,10 Death from myonephropathic metabolic syndrome has also been reported as a complication.9

Akasaka et al11 reported the case of emergent TEVAR to treat acute TBAD dissection in a patient with severe TL stenosis but without an associated TAAA. The laboratory data demonstrated ischemia of multiple organs. TEVAR was successfully performed; however, the patient required continuous hemofiltration and temporary hemodialysis.

Allam et al12 described a threatening right limb ischemia due to a complicated acute TBAD (without TAAA) that was reperfused using a reversed Petticoat (provisional extension to induce complete attachment) technique to recanalize a totally collapsed infrarenal aorta TL. The false lumen, however, was kept open.

Shikata et al13 reported the case of an acute TBAD complicated by total occlusion of the abdominal aorta and a type IV TAAA. They performed successful TEVAR for acute occlusion of the abdominal aorta using a through-and-through guidewire technique between the left brachial artery and right femoral artery after conversion from the standard femoral approach. However, they had chosen not to address the TAAA at the same stage.13 Nevertheless, these investigators reported successful TEVAR. They reported the early postoperative complications, although the postoperative follow-up was short.13

Our patient reached mid-term follow-up (34 months) without complications or reinterventions. This might
Fig 1. Computed tomography angiography (CTA) images. **A,** Entry tear located at the level of the ninth thoracic vertebra with an abdominal aorta maximum diameter of 57 mm × 22 mm. **B,** Celiac trunk (CT) emerging from the true lumen (TL) with an aorta maximum diameter of 50 mm × 45 mm. **C,** Superior mesenteric artery (SMA) emerging from the TL with an aorta maximum diameter of 59 mm × 50 mm. **D,** Left renal artery (LRA) emerging from the TL with an aorta maximum diameter of 57 mm × 53 mm. **E,** Right renal artery (RRA) emerging from the TL with an aorta maximum diameter of 53 mm × 40 mm. **F,** No blood flow in the TL of the abdominal aorta and common iliac arteries was observed owing to collapse of the TL resulting from expansion of the false lumen (FL). **G,** FL extending from the abdominal aorta to the left common iliac artery (LCIA). **H,** The TL only reopened in a distal segment of the right common iliac artery (RCIA) owing to back flow from the right internal iliac artery (RIIA). **I,** Origin of the left internal iliac artery (LIIA) was occluded by FL compression. **J,** FL extending to midsegment of the left external iliac artery (LEIA). **K,** TL running alone only in the distal part of LEIA. **L,** Preoperative CTA with three-dimensional multiplanar reconstruction demonstrating total collapse of the infrarenal aorta causing right lower limb-threatening ischemia and left lower limb perfusion through the FL.
represent an initial clue that more complete treatment might be associated with better outcomes after treatment of acute complicated TBAD. Perhaps accomplished interventionists should consider expanding the endovascular procedure to combine aneurysmal sac exclusion with other endovascular procedures aimed at promoting false lumen thrombosis and/or maintaining visceral artery and lower limb perfusion in a single-step procedure.

CONCLUSIONS

The details from the present case have reinforced the need to reevaluate the current treatment recommendations for acute complicated TBAD and highlighted the...
gap in available endovascular techniques to address the entire complicated TBAD spectrum. The LT was developed to overcome current anatomic and device constraints, expanding the limits of TEVAR to bailout (catastrophic) acute complicated TBAD cases in a safe, easy to perform, and cost-effective manner. The LT appears to be a promising tool in the TEVAR armamentarium; however, more experience with the LT is warranted.

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