

Hybrid Management for Supraceliac Aortic Aneurysm in a High-Risk Patient

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To the Editor: An 84-year-old male was referred from a local clinic for an incidental thoracoabdominal aortic aneurysm (TAAA) presenting in a supraceliac aortic aneurysm (SCAA) with maximal diameter of 6.0 cm in spine magnetic resonance imaging. He had a medical history of hypertension and chronic obstructive pulmonary disease, and was a 30 pack-years' smoker. On physical examination, his vital signs were stable and abdomen was soft without pain and tenderness. Laboratory findings showed white blood cell count of 4840/ μ L, serum creatinine of 9 mg/L, erythrocyte sedimentation rate of 16 mm/h, and c-reactive protein of 13.24 mg/L. There was no growth of any microorganism in blood culture. Both tuberculosis polymerase chain reaction and serum acid-fast bacillus tests were negative. Pulmonary function test showed moderate obstructive lung disease. Computed tomography angiography (CTA) of aorta showed a saccular SCAA with maximal diameter of 6.0 cm, which arose from the posterior aspect of celiac axis level of aorta and enlarged posteriorly [Figure 1a]. The distance between the opening of SCAA and root of superior mesenteric artery (SMA) was 1.5 cm. Hence, we decided to perform a hybrid procedure with aorto-celiac axis bypass with thoracic endovascular aortic repair under general anesthesia [Figure 1b-1d]. We performed a cerebrospinal fluid (CSF) drainage perioperatively. Moreover, we performed peri-aortic dissection and peri-celiac axis dissection through a midline skin incision. After that, peri-aortic tunneling with a prosthetic graft (ring-reinforced polytetrafluoroethylene [PTFE] with diameter of 0.6 cm) through retropancreatic and retrorenal space was performed. And, a distal end of the graft was anastomosed to infrarenal aorta with Prolene #5-0 (Ethicon, Cincinnati, OH, USA) by end-to-side method, and a proximal end of the graft was anastomosed to celiac axis with CV #7-0 (Gore and Associates, Flagstaff, AZ, USA) by end-to-side method [Figure 1b]. After that, we exposed left femoral artery and inserted 6-Fr sheath through puncturing it. We inserted a guidewire (0.035 Glidewire[®]; Terumo Medical Corporation, Somerset, NJ, USA) and an angiocatheter (5-Fr pigtail; Cook Inc., Bloomington, IN, USA) into the aorta, and confirmed the opening of SCAA, root of SMA, and patent graft through an aortography [Figure 1c]. After that, we deployed a stent-graft (2.8 cm in diameter and 12.0 cm in length; Zenith TX2; Cook Inc., Bloomington, IN, USA) from above the root of SMA to thoracic aorta through a stiff wire (Lunderquist[®]; Cook Inc., Bloomington, IN, USA; Figure 1d). And, we checked patent PTFE and stent-graft without endoleak

by aortography [Figure 1d]. At one week postoperatively, CTA showed type II endoleak. Moreover, the patient had no symptom. However, at six weeks postoperatively, CTA showed persistent and mild increased type II endoleak [Figure 1e]. Hence, we performed coil embolization (Interlock, Boston Scientific, Natick, MA, USA) in the root of celiac axis through PTFE graft [Figure 1f]. After that, endoleak was improved and the patient was uneventful.

With increased incidence and mortality of TAAA, the management for TAAA has been challenging to vascular surgeons.^[1-4] Three options for the management of TAAA have been reported.^[1-5] First, open repair has been reported to be durable but with high morbidity and mortality.^[2-4] Second, total endovascular repair including fenestrated and branched endovascular aortic repair (F-BEVAR) and chimney/periscope technique (CPT), although a promising option, is not widely available.^[1,4,5] Currently, the F-BEVAR is only applicable to patients with favorable anatomy in selected countries or centers.^[2-4] Moreover, the CPT has also been tried by using parallel stent-grafts for complex aortic pathologies including TAAA,^[1,5] but the indications including limited anatomy should be strictly controlled and skillful experiences are additionally required.^[1,5] Nevertheless, several studies have demonstrated good results with low reintervention rate.^[1,5] Hence, the promising future of total endovascular repair for TAAA is suggested.^[1,4] Third, hybrid procedure, including surgical bypasses to aortic branches and subsequent aortic stent-graft deployments, is currently suggested as an available and alternative modality to improve outcomes in high-risk patients.^[2-4] Especially, hybrid procedures can be valuable in high-risk patients of countries where F-BEVAR and CPT are not available.^[2,3] Hybrid procedure has the advantages of avoiding thoracotomy and suprarenal clamping, thus reducing both overall operative time and visceral ischemia.^[2] However, several main complications can be induced during hybrid procedures.^[2-4] First, spinal cord ischemia (SCI) can occur, but protective measures such as CSF drainage and mean arterial pressure monitoring have proven

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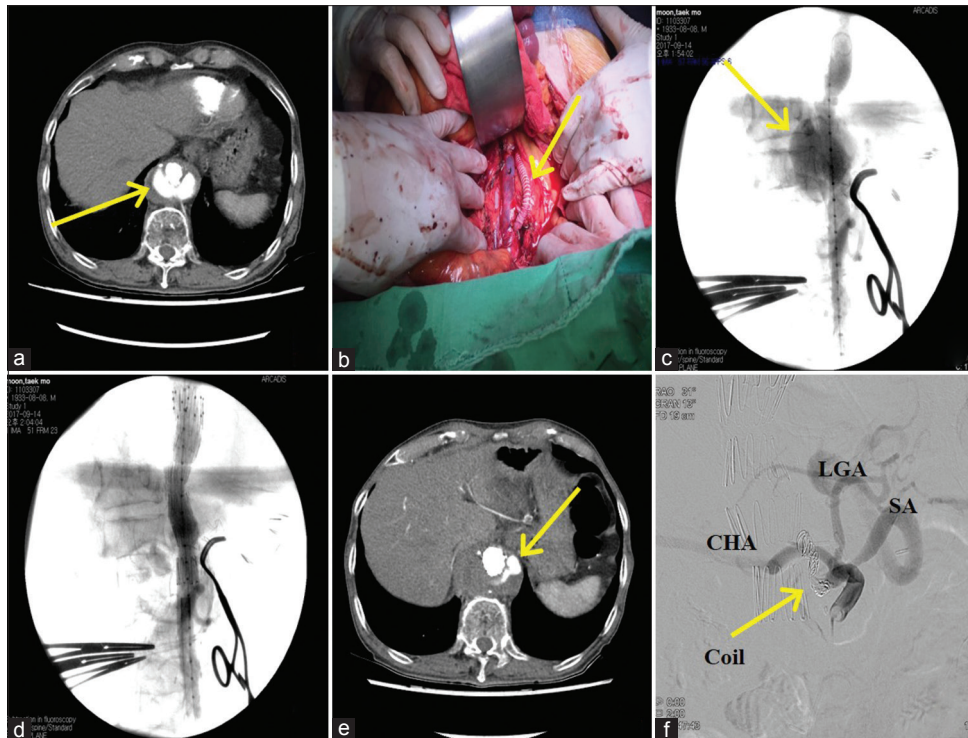


Figure 1: Hybrid management for SCAA was successfully performed in an 84-year-old high-risk male. (a) Cross-sectional view of preoperative CTA showing SCAA. Arrow indicates SCAA. (b-d) Intraoperative findings showing the hybrid procedure including aorto-celiac axis bypass with PTFE and TEVAR; arrows indicate patent PTFE (b) and aneurysm (c). (e) Postoperative CTA showed persistent endoleak at 6 weeks postoperatively. Arrow indicates endoleak. (f) Coil embolization for persistent endoleak was performed. Arrow indicates coil. SCAA: Supraceliac aortic aneurysm; CTA: Computed tomography angiography; PTFE: Ring-reinforced polytetrafluoroethylene; TEVAR: Thoracic endovascular aortic repair.

to diminish the risk of SCI.^[2,3] Second, renal insufficiency can develop.^[2,3] Although renal ischemia time is reduced during hybrid procedures, the contrast agent for endovascular procedure increases the risk of renal injury.^[2,3] Third, endoleak can also occur.^[3,4] Re-intervention rates for endoleaks were reported 12.3–22.7% and types of endoleaks were mostly types I to III.^[4] In our case, there was a persistent type II endoleak treated by coil embolization. In addition, although endovascular treatment reduces the overall operative risks, high-risk patients who were unfit for open repair are likely to have significant complications after hybrid procedures.^[3] We suggested the possibility that this is associated with the extent and number of bypass operations during hybrid procedures.

In conclusion, hybrid procedures of TAAA could be effective and alternative approaches for TAAA in high-risk patients. Especially, we suggested that hybrid procedures could be very useful and valuable managements for high-risk patients where total endovascular repairs including F-BEVAR and CPT are not available.

Declaration of patient consent

The authors certify that they have obtained all appropriate patient consent forms. In the form, the patient has given his consent for his images and other clinical information to be reported in the journal. The patient understand that his name and initials will not be published and due efforts will be made to conceal identity, but anonymity cannot be guaranteed.

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Conflicts of interest

There are no conflicts of interest.

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