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SHORT REPORT

Type IV Thoraco-Abdominal Aortic Aneurysm (TAAA IV) with Occlusion of Celiac and Superior Mesenteric Arteries in a High Risk Patient: Successful Treatment with a Hybrid Traditional Vascular and Endovascular Procedure

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We describe a novel hybrid open and endovascular repair for a dumbbell shaped lower thoracic and abdominal aortic aneurysm (AAA) in a high risk patient, with celiac trunk and superior mesenteric artery occlusions. We used a two-staged approach consisting of an open infrarenal AAA repair with a by-pass to superior mesenteric artery and reimplantation of inferior mesenteric artery. This was followed by an antegrade insertion of a thoracic endograft via a PFTE graft on the thoracic aorta to allow precise deployment of the stent graft above the renal arteries.

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Case Report

A 70 year-old Iranian man was sent to our Division of Vascular Surgery for evaluation. He had a medical history of ischaemic heart disease, reduced left ventricular function (30% of ejection fraction), hypertension, angina abdominis, mild renal failure (P-creatinine 1.98 mmol/l), and CPOD. He was classified as ASA IV risk.

CT scan and a DSA of thoraco-abdominal aorta (TAA) showed a lower thoracic aorta aneurysm (diameter 70 mm) with infradiaphragmatic extension (diameter 50 mm). Aortic size and wall returned normal (diameter 20 mm) 10 mm above origin of renal arteries (Fig. 1). The celiac trunk and superior mesenteric artery were occluded. A huge infrarenal abdominal aortic aneurysm was associated with a right common iliac artery occlusion. The risk of a type IV TAAA IV repair, with visceral arteries by-pass, was considered too high for this patient. We chose a hybrid surgical treatment in two steps: first a traditional vascular repair of the infrarenal aortic aneurysm and second an endovascular sealing of the thoracic aneurysm. Endovascular approach for the thoracic aneurysm would avoid the risks of a thoraco-freno-laparotomy but not neurological complications due to the covering of several intercostal arteries and decreases of the renal function due to probable migration of the endograft.

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Treatment

Open procedure

Infrarenal abdominal aortic aneurysm repair with aorto-left common iliac artery-right common femoral artery bypass (16×8 mm precloted Dacron graft-intervascular®) associated with a 6 mm PTFE (Gore®) end to side by-pass to superior mesenteric artery and reimplantation of inferior mesenteric artery into body of the graft. Left subclavian and carotid arteries (diameter 7 mm) were not suitable in size to introduce the sheath to perform endovascular step (diameter 9 mm) so it was decided to postpone the procedure.

Endovascular procedure

On the ninth post-operative day the patient had a third

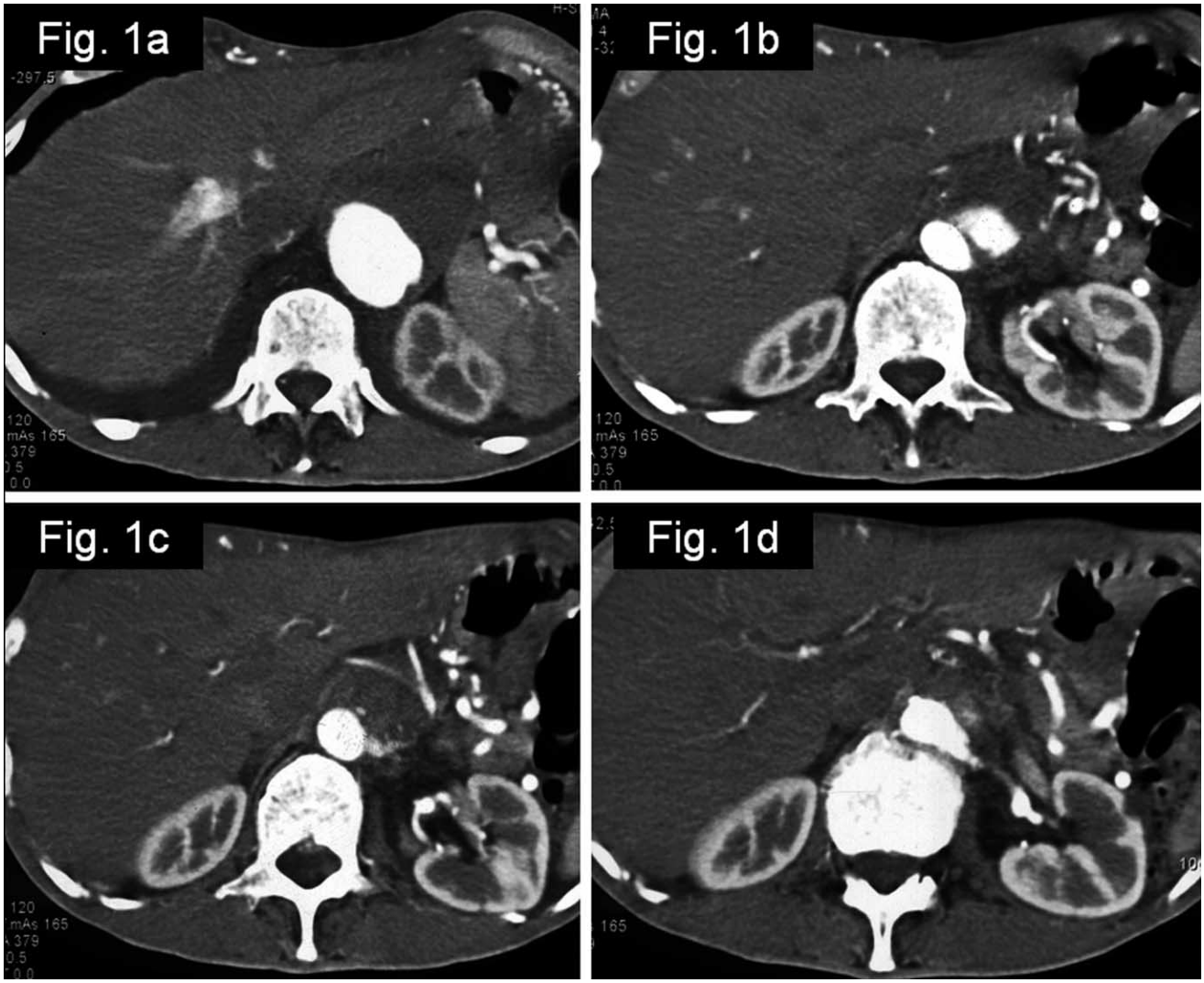


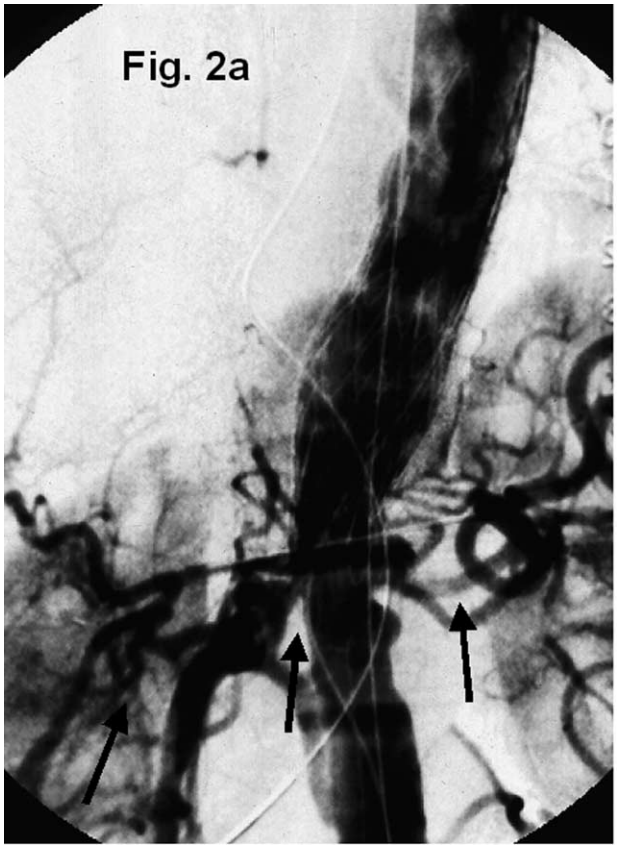
Fig. 1. Pre-operative CT scan of the thoraco abdominal aorta showing the short sovrarenal aortic neck (1 cm) and the 'cul de sac' (b) of the lower thoracic aorta aneurysm over the renal arteries.

intercostal space mini toracotomy. A Satinsky tangential clamp at proximal descending thoracic aorta permitted a end -to -side anastomosis of a 10 mm PTFE graft, to the aorta used to insert devices. It is mandatory to obtain absolute precision of the supra-renal landing, to achieve the sealing of the whole length of the short (10 mm) supra-renal aortic neck without obliteration of the renal arteries. Since, it is well known to observe small 'jumps' of tract of endovascular graft as it is released at the end of procedure, it became clear that it was necessary to obtain juxtarenal opening of endovascular graft first. This suggested an anterograde introduction of device. A tubular conical custom-made endofit graft (diameter 24×34 mm; length 10 cm) with unilateral free webs (to avoid entrapment into the infrarenal aortic graft) was chosen to be introduced inverted through the PTFE graft. After introduction of device and two protection wire guides into renal arteries, through left femoral route, the first endograft was opened. Once positioned first endograft, a more proximal second endofit graft (diameter 32×34 mm; length 50 mm) overlapping first one by 30 mm, obtained best anchorage and sealing permitting meanwhile landing just below some important intercostal arteries (Fig. 2).

Periprocedural angiography showed good sealing of the TAAA, and patency of renal arteries. There were no neurological complications.

Follow up

A CT scan of TAA on sixth post-operative day showed a poor perfusion of left kidney and occlusion of left



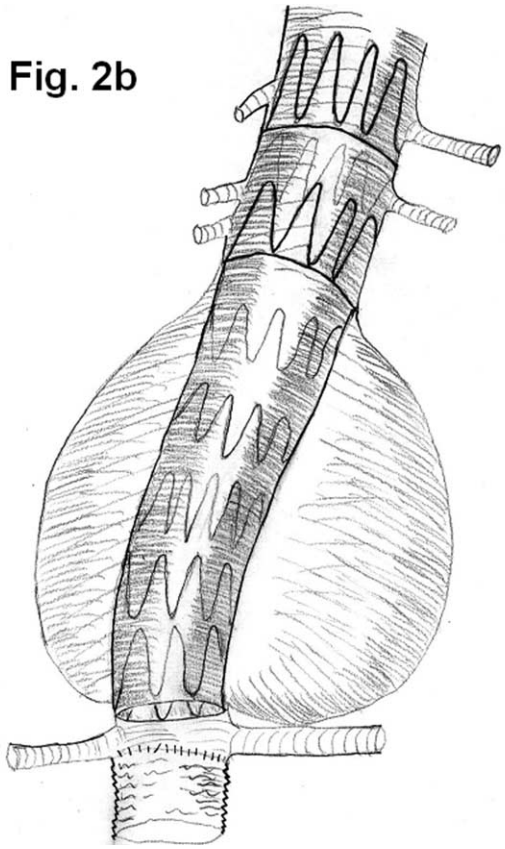


Fig. 2. Intraoperative DSA (a) and illustration (b) of the complete endovascular exclusion of the lower thoracic aneurysm using two custom made endofit graft (overlapping 30 mm) with the precise sovrarenal landing and preservation of a couple of intercostal artery. Arrows in (a) indicate left and right renal arteries with bilateral kidney perfusion.

renal artery due to migration of the endograft. This was probably related to the tortuosity of infradiaphragmatic aorta.[1]

Post-operative follow up was clinically normal without deterioration of the renal function (P-creatinine 2.10 mmol/l). The patient was discharged to Iran on the seventh post-operative day. He came back to Italy 1 year later to have a medical check-up; he had no mesenteric angina, nor a deterioration of his renal function (P-creatinine 2.00 mmol/l). A CT scan of TAA did not show migration of endograft.

Conclusion

Patient's comorbidities, such as cardiac, respiratory and renal disease, increase risk of an open surgical approach for TAAA IV.[2] Endovascular treatment, that is less invasive, will be an alternative for TAAA repair.[3] Nowadays a hybrid procedure[4] is sometimes possible by the anatomical appearance of TAAA, using the experience we have gained in the endovascular approach to the classical abdominal and thoracic aortic aneurysms.

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