

Stent-assisted balloon-induced intimal disruption and relamination in complicated chronic residual type B aortic dissection after frozen elephant trunk treatment



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Stent-assisted balloon-induced intimal disruption and relamination in complicated chronic residual type B aortic dissection after frozen elephant trunk treatment.

CASE REPORT: a 77-year-old man presented to our Emergency Department for worsening dyspnea. A chest CT scan showed a type A aortic dissection with a dilatation of the ascending and descending aorta. After evaluating the case with cardiac surgeons, it was decided to perform an aortic arch replacement through the frozen elephant trunk technique. Three months after cardiac surgery, a TC scan showed a residual 58 mm dissecting aneurysm of the descending thoracic aorta and a collapse of the true lumen so we decided to perform an endovascular treatment of the thoraco-abdominal aorta according to the STABILISE technique. Due to the impossibility of cannulating the left renal artery (originating from the false lumen), a partial dilation of the dissecting stent was performed at the origin of the renal arteries, maintaining the communication between true and false lumen at the level of the aortic bifurcation.

DISCUSSION: the STABILISE technique can be applied safely and effectively even in selected cases of residual chronic aortic dissection, constituting a safe and effective alternative to open thoracoabdominal surgery.

CONCLUSIONS: the presence of a proximal artificial neck without proximal tears in the aortic arch can be a great advantage for subsequent endovascular interventions. It is therefore desirable to design a common surgical strategy within an aortic team to achieve a more favorable preoperative anatomy.

KEY WORDS: Chronic dissection, Frozen elephant trunk, STABILISE

Introduction

Good results of the “stent-assisted balloon-induced intimal disruption and relamination of aortic dissection” (STABILISE) technique are reported in literature for the treatment of acute and subacute aortic dissection, whereas reports of its use in chronic dissections are less common¹. We present a case of a STABILISE in a complicated chronic residual type B aortic dissection (TBAD) after an aortic arch replacement with frozen elephant trunk (FET) technique.

Case report

A 77-year-old man (type II diabetes, atrial fibrillation and chronic obstructive pulmonary disease) presented to our institution in June 2019 with worsening dyspnea. Computed tomography (CT) showed a type A aortic dissection with an ascending and descending aortic aneurysm (52 mm and 62 mm each). No other relevant symptoms were reported. After evaluating the case with cardiac surgeons, it was decided to treat the patient with an aortic arch replacement according to the FET technique with a Thoraflex Hybrid prosthesis (Terumo Aortic, FL, USA). After initially successful cardiac surgery, 3-month follow-up CT showed a residual dissecting aneurysm of the descending thoracic aorta (diameter 58 mm, Fig. 1) and true lumen (TL) collapse (minimum diameter 4.5 mm). The dissection extended to the origin of the common iliac arteries; the celiac trunk, the superior mesenteric and two right renal arteries origi-

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nated from the TL, but the left renal and inferior mesenteric arteries were perfused from the false. In addition to a large distal tear immediately before the aortic bifurcation, a small anterior tear was visible near the origin of the celiac trunk.

After placement of a cerebrospinal fluid drainage ², under general anesthesia and through bilateral femoral surgical access, we performed thoracic endovascular aortic repair (TEVAR) with two Relay Pro (Terumo Aortic, FL, USA) devices: a 34×200 mm extended with a 34-30×150 mm distally and landing about 3 cm above the celiac trunk (Fig. 2). The proximal stent-graft was deployed in the endoprosthesis portion of the Thoraflex as proximal landing zone with an overlap of 60 mm. A 46×120 mm Zenith dissection endovascular stent (ZDES; Cook Medical, Bloomington, Ind) was then released at the visceral aorta and dilated with a Coda balloon (Cook Medical, Bloomington, Ind) under transesophageal echocardiography and fluoroscopic guidance. All the endovascular devices aligned correctly with good apposition and sealing (Fig. 3).

It was not possible to cannulate the left renal artery (adequately perfused by the false lumen-FL), so we performed

a minor dilation at the level of the renal arteries and maintained communication between TL and FL at the level of the aortic bifurcation. CT at 1 and 6 months showed a decrease of more than 7 mm in the total diameter of the thoracic aorta, an aortic remodeling with an increase in the TL area and total scarring of the FL in the visceral aorta and the absence of dilation of the infra-renal and iliac tracts (Fig. 4). There was no spinal cord ischemia or other neurological deficits and no patency issues, no compromise of renal function, no endoleaks or other complications associated with the multiple endovascular devices overlap.



Fig 1: CT scan showing FET prosthesis and the residual thoracic aortic dissecting aneurysm.

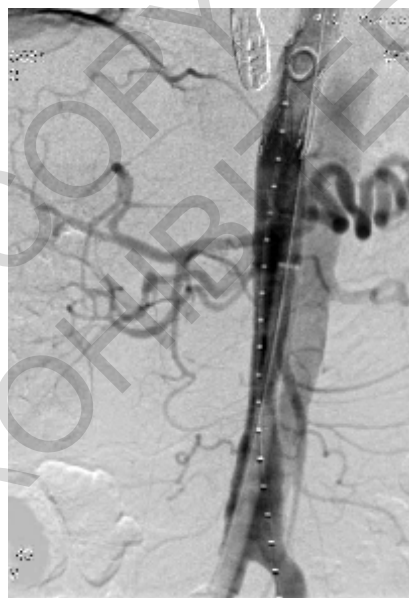


Fig 2: After TEVAR the false lumen remains largely perfused.



Fig 3: After STABILISE the false lumen at the level of the thoracic and visceral aorta disappeared.



Fig 4: 6 months follow-up CT scan: total scarring of the false lumen in the thoracic and visceral aorta without dilation of the infra-renal and iliac tracts.

Discussion

This case report demonstrates how the STABILISE technique can be applied safely and effectively even in selected cases of chronic residual TBAD. Previous aortic surgery with FET provides an excellent platform for subsequent endovascular interventions, ensuring a proximal artificial neck without proximal tears in the aortic arch³. In recent years, a multidisciplinary aortic team in our institution has developed a common strategy to prepare a suitable anatomy for subsequent treatments.

We treated 46 patients with complicated TBAD (34 subacute and 12 chronic) from January 2017 to December 2020 including 8 residual TBAD after FET, in which we performed a total of 4 Distal Extended EndoVascular Aortic Repair (DEEVAR)⁽⁴⁾ and 4 STABILISE (2 subacute and 2 chronic in each group). Despite the presence of large tears in the infrarenal aorta, in this case we did not perform an extensive endovascular treatment because of the impossibility of cannulating the left renal artery, allowing its perfusion from the FL.

Conclusions

Previous FET simplifies staged endovascular treatment for chronic TBAD by providing a suitable proximal artificial neck; however, surgical planning for the entire aorta within an aortic team is essential. In selected cases, performing a STABILISE within a FET can be a safe and effective alternative to open thoracoabdominal surgery.

Riassunto

Un uomo di 77 anni affetto da diabete mellito, fibrillazione atriale e broncopneumopatia cronica ostruttiva si è presentato a giugno del 2019 presso il pronto soccorso del nostro Istituto per peggioramento della nota dispnea. Una TC del torace ha mostrato una dissezione aortica di tipo A estesa sino alle arterie iliache comuni bilateralmente, con dilatazione aneurismatica dell'aorta ascendente e discendente (rispettivamente di 52 mm e 62 mm di diametro). Non sono stati riportati altri sintomi di rilievo. Dopo una attenta valutazione collegiale con i colleghi cardiocirurghi, si è deciso di eseguire una sostituzione dell'arco aortico secondo tecnica frozen elephant trunk. La TC di controllo dopo 3 mesi dall'intervento cardiocirurgico ha mostrato la presenza di un aneurisma dissecante residuo dell'aorta toracica discendente di 58 mm di diametro e un collasso del vero lume (diametro minimo 4,5 mm).

Previo posizionamento di catetere per deliquorazione, in anestesia generale e tramite accesso chirurgico femorale bilaterale, il trattamento della dissezione aortica è stato quindi completato posizionando due moduli endoprotesici retti in aorta toracica discendente (atterrando a circa 3 cm dal tripode celiaco) e uno stent da dissezione in corrispondenza dell'aorta viscerale. Sotto guida fluoroscopica ed ecografica trans-esofagea è stata eseguita la dilatazione dei dispositivi secondo tecnica STABILISE con corretto risultato angiografico finale. Per l'impossibilità di cannulare l'arteria renale di sinistra (con origine dal falso lume), è stata eseguita una dilatazione parziale dello stent da dissezione in corrispondenza dell'origine delle arterie renali, mantenendo la comunicazione tra vero e falso lume a livello della biforcazione aortica. Le TC di controllo a 1 e 6 mesi hanno dimostrato una diminuzione del diametro totale dell'aorta toracica e un rimodellamento aortico (aumento del diametro del vero lume e cicatrizzazione del falso) in corrispondenza del tratto viscerale, in assenza di dilatazioni di quello sottorenale ed iliaco.

La tecnica STABILISE può essere applicata in modo sicuro ed efficace anche in casi selezionati di dissezioni aortiche croniche residue, costituendo una alternativa notevolmente meno invasiva rispetto all'approccio chirurgico toraco-addominale open; un pregresso trattamento con frozen elephant trunk fornisce un'eccellente piattaforma per i successivi interventi endovascolari, garantendo un colletto prossimale senza tear nell'arco aortico.

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