



A Modified Frozen Elephant Trunk for DeBakey Type I Aortic Dissection Patient: Sutureless Integrated Stented Graft

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INTRODUCTION

Implantation of frozen elephant trunk (FET) and distal aortic arch anastomosis must be done during circulatory arrest (CA); however, a long period of CA may cause adverse events.

TECHNIQUE

Ascending aorta and total arch replacement, and FET implantation was arranged for a 48 year old patient with acute type I aortic dissection (arch diameter 33 mm; descending aorta diameter 28 mm) (Fig. 1). A novel prosthesis, the Sutureless Integrated Stented (SIS) graft (Beijing Percutec Therapeutics Inc., Beijing, China), was used (Fig. 2A). A conical stent graft was selected (proximal diameter 32 mm; distal diameter 26 mm; length 200 mm).

Cardiopulmonary bypass (CPB) was instituted by cannulation of the femoral artery and right atrium. Bilateral antegrade cerebral perfusion was selected. All steps were completed at a body temperature above 28°C. During CA, the aortic arch was dissected transversely in Zone 1. The annulus

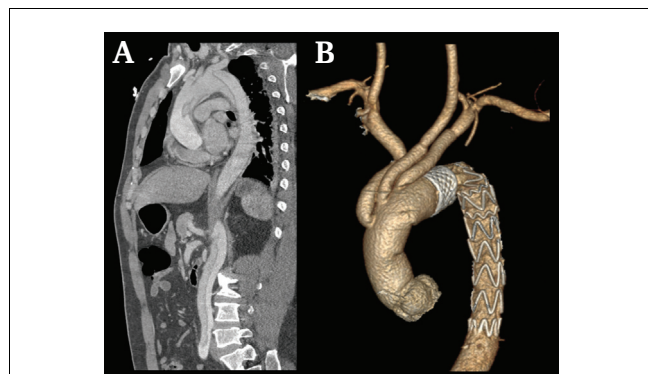


Figure 1. (A) Pre-operative oblique sagittal view of aortic computed tomography angiogram (CTA) shows DeBakey type I aortic dissection. (B) Post-operative 3D reconstruction of aortic CTA shows the appearance of the sutureless integrated stented (SIS) graft.

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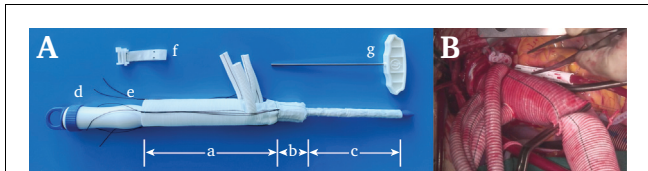


Figure 2. (A) Real product image of the sutureless integrated stented (SIS) graft before release; the sutureless elastic support annulus is designed as a grid braided structure, and four restraint sutures are evenly preset in its circumferential direction. By tightening restraint sutures, the radial diameter of the annulus increases slightly as the axial length shortens and a stronger supporting force is achieved. Torsion force increases as a sutureless belt is fastened by a wrench. To prevent excessive fastening and necrosis of the aortic wall, a maximum torsion force value is set up. When reaching that value, the ratchet just slips so the belt cannot be tightened further; (a) four branched terylene graft with screw threads; (b) nitinol sutureless elastic support annulus and (c) nitinol stent graft covered by terylene without screw threads; (d) delivery system; (e) restraint sutures; (f) sutureless belt; (g) wrench. (B) The appearance of the surgical field shows the SIS graft has been fixed by looping and fastening the sutureless belt.

and stent graft were implanted over a guidewire inserted from the femoral artery and then released. The restraint sutures were tightened and tied with another four silk sutures applied evenly on the aortic wall of the aortic arch stump to avoid migration. In the zone corresponding to the annulus, a sutureless belt was looped over the aortic adventitia and then fastened by turning a ratchet with a wrench. Finally, the prosthesis was tightly attached to the autologous aorta and the anastomosis was completed (Fig. 2B) (<https://doi.org/10.6084/m9.figshare.17088758.v2>). With this novel sutureless method, the CA time was only six minutes.

CONCLUSION

Application of the SIS graft simplified distal aortic arch anastomosis and decreased CA time. Further studies are in progress.

CONFLICT OF INTEREST AND FUNDING

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