



**HAL**  
open science

## Type B Aortic Dissection Treated With a Branched Aortic Arch Stent Graft and the STABILISE Technique

Pierre-Antoine Barral, Alexis Jacquier, Virgile Omnes, Philippe Piquet,  
Marine Gaudry

### ► To cite this version:

Pierre-Antoine Barral, Alexis Jacquier, Virgile Omnes, Philippe Piquet, Marine Gaudry. Type B Aortic Dissection Treated With a Branched Aortic Arch Stent Graft and the STABILISE Technique. *Annals of Vascular Surgery*, 2021, 75, pp.531.e19-531.e22. 10.1016/j.avsg.2021.03.028 . hal-03591707

**HAL Id: hal-03591707**

**<https://amu.hal.science/hal-03591707v1>**

Submitted on 22 Aug 2023

**HAL** is a multi-disciplinary open access archive for the deposit and dissemination of scientific research documents, whether they are published or not. The documents may come from teaching and research institutions in France or abroad, or from public or private research centers.

L'archive ouverte pluridisciplinaire **HAL**, est destinée au dépôt et à la diffusion de documents scientifiques de niveau recherche, publiés ou non, émanant des établissements d'enseignement et de recherche français ou étrangers, des laboratoires publics ou privés.



Distributed under a Creative Commons Attribution - NonCommercial 4.0 International License

1 Type B aortic dissection treated with a branched aortic arch stent graft and the STABILISE technique

2 Pierre-Antoine Barral<sup>1</sup>, MD, Alexis Jacquier<sup>1</sup>, MD PhD, MD, Virgile Omnes<sup>2</sup>, MD, Philippe Piquet<sup>2</sup>, MD,  
3 Marine Gaudry<sup>2</sup>, MD

4 1. APHM, Timone Hospital, Department of Radiology, 13005, Marseille, France.

5 2. APHM, Timone Hospital, Department of Vascular Surgery, 13005, Marseille, France.

6 Corresponding author: Pierre-Antoine Barral

7 Phone: +33413429056 Email: pierre-antoine.barral@ap-hm.fr

8

9 We report the case of a 57-year-old woman diagnosed with an asymptomatic chronic type B aortic dissection.

10 The maximum aortic diameter was 70 mm in the proximal descending thoracic aorta. The entry tear was located  
11 at the aortic isthmus, and the proximal neck included all of the supra-aortic trunks. The targeted proximal neck  
12 was  $\geq 25$  mm. The dissection extended to the infrarenal aorta. The patient was treated with a custom branched  
13 aortic graft with two branches, one for the innominate trunk and one for the left common carotid artery,  
14 combined with the stent-assisted balloon-induced intimal disruption and relamination technique. This combined  
15 technique seemed to provide a proximal seal zone in the arch and allow remodeling of the distal aorta in this  
16 patient with aneurysmal type B aortic dissection.

17 Keywords: Aortic dissection; branched stent graft; STABILISE

18 Introduction

19 Endovascular treatment is a minimally invasive, potentially curative approach for type B aortic dissection. The  
20 first-line endovascular technique is thoracic endovascular aortic repair (TEVAR). However, TEVAR alone  
21 results in total occlusion of the false lumen in 13-30% of cases, with a mortality rate of approximately 36% at 3  
22 years(1,2). Extensive residual dissection involving the aortic arch and abdominal aorta is still a major concern  
23 and a therapeutic challenge. Branched arch grafts have shown promising results in this particular indication in  
24 terms of achieving proximal sealing (3). The stent-assisted balloon-induced intimal disruption and relamination  
25 (STABILISE) technique has also shown good results in the treatment of acute and chronic aortic dissection(4,5)  
26 by achieving distal sealing of the false lumen in the descending thoracoabdominal aorta. Here, we report a  
27 combined treatment for type B aortic dissection consisting of a branched aortic arch graft and the STABILISE  
28 technique.

29 Case report

30 A 57-year-old woman presented with an asymptomatic type B aortic dissection diagnosed during examination  
31 for central facial paralysis. She had a history of ischemic stroke, which resulted in cognitive sequelae as well as  
32 left hemiparesis. Her cardiovascular risk factors included high blood pressure and insulin-requiring diabetes  
33 mellitus. She was first treated surgically for abdominal aortic rupture, occurring 3 days after diagnosis of the  
34 dissection, via conventional infrarenal abdominal aortic repair. There was a rapid increase in the size of the  
35 proximal descending thoracic aorta, with a maximal diameter of 70 mm 4 months later (Figure a, video 1). The  
36 dissection extended to the infrarenal aorta and to the proximal anastomosis of the aortic tube. The ascending  
37 aorta was 38 mm in diameter. The entry tear was 27 mm long and located at the aortic isthmus, and the proximal  
38 neck included all of the supra-aortic trunks. The targeted proximal neck was  $\geq 25$  mm. A multidisciplinary aortic  
39 team including a vascular surgeon, a cardiac surgeon, a radiologist, a cardiologist and an anesthesiologist  
40 decided to perform endovascular treatment with a custom branched aortic graft with two branches, one for the  
41 innominate trunk (IT) and one for the left common carotid artery (LCCA), combined with the STABILISE  
42 technique under general anesthesia in a multimodal angiography suite (Discovery IGS 730, GE Healthcare,  
43 Chicago, USA). Cerebrospinal fluid (CSF) drainage was used to prevent medullary ischemic injury(6). The left  
44 subclavian artery was reimplanted directly into the LCCA during the same procedure.

45 Bilateral transverse supraclavicular cervicotomy was performed to control the CCAs. Rapid pacing was used to  
46 ensure precise, atraumatic landing and to avoid retrograde dissection(7). Using a percutaneous approach, a  
47 tapered aortic endoprosthesis of 42x26x255 mm (RELAY®, Terumo Aortic) was deployed under 2D/3D fusion  
48 imaging and transesophageal US to ensure localization in the true lumen. Orthogonal rings were used to  
49 precisely deploy the branched graft one centimeter above the IT and the LCCA(8). A 10-F introducer sheath was  
50 inserted into the LCCA, and we catheterized the LCCA branch. To ensure localization in the stent graft branch  
51 and not between the aorta and the stent graft, we inflated a balloon in the stent graft branch, and we then  
52 deployed the tapered branch (13x8x90 mm). A 10-F introducer sheath was placed into the right common carotid  
53 artery (RCCA), and we catheterized and deployed the tapered IT branch (13x17x80 mm) using the same  
54 technique (Figure b). We deployed a second stent graft in the descending aorta, ending 3 cm above the celiac  
55 trunk (40x40x15 mm) (W. L. Gore & Assoc, Flagstaff, AZ). We deployed a bare stent 46 mm in diameter x 185  
56 mm in length (ZDES; Cook Medical, Bloomington, IN) up to the aortic bifurcation, and we ruptured the intimal  
57 flap using a Tri-Lobe balloon catheter and an inflation device. We used the aortic mask to determine when the  
58 balloon reached the size of the false lumen. The patient was extubated at the end of the intervention in the  
59 operating room. The duration of the procedure was 190 min. The duration of fluoroscopy was 58 min 47 s. The

60 dose area product was 146.11 Gy.cm<sup>2</sup>. The volume of contrast media used was 90 cc. Postoperatively, the patient  
61 received treatment with pressor amines, with an average blood pressure target of 100 mmHg. Two days after the  
62 procedure, she presented with paraparesis, which required extension of the CSF drainage up to 4 days, with a  
63 pressure target of 10 mmHg(9). She achieved complete recovery at 3 days. The hospitalization duration was 17  
64 days, with a length of stay in the intensive care unit of 5 days. Angio-CT performed 8 days after the intervention  
65 showed complete thrombosis of the false lumen and patency of the IT, LCCA branches, celiac trunk, superior  
66 mesenteric artery and renal arteries (Figure c, video 2).

#### 67 Discussion/Conclusion

68 Postdissection aortic aneurysms result from elevated pressure in the false lumen. Fenestrated and branched stent  
69 grafts in the aortic arch have been used in some expert centers to treat postdissection aortic arch aneurysms in  
70 patients unfit for open repair, with an in-hospital death rate of 5.3%; possible complications include early type 1  
71 endoleakage (5.3%) and cerebrovascular events (10.5%), with the absence of late aorta-related mortality(3). The  
72 STABILISE technique allows aortic remodeling in cases of acute and chronic type B dissection while not  
73 compromising the patency of collateral branches arising from the true lumen(4,5). One point that must be  
74 anticipated is the shortening and possible displacement of the stent graft during aortoplasty.

75 One of the limitations of the STABILISE technique is that the distal part of the stent graft should end up in an  
76 area where the maximal aortic diameter (combining the true and false lumen) does not exceed 42 mm over a  
77 length of at least 20 mm(5). This novel combined technique seems to provide a proximal seal zone and allow  
78 both thrombosis of the thoracic aortic false lumen and remodeling of the distal aorta in patients with type B  
79 aortic dissection without a proximal neck.

- 80 1. Kang WC, Greenberg RK, Mastracci TM, Eagleton MJ, Hernandez AV, Pujara AC, et al. Endovascular  
81 repair of complicated chronic distal aortic dissections: Intermediate outcomes and complications. *J Thorac*  
82 *Cardiovasc Surg.* nov 2011;142(5):1074-83.
- 83 2. Marques de Marino P, Oikonomou K, Verhoeven EL, Katsargyris A. Techniques and outcomes of  
84 secondary endovascular repair for postdissection TAA/TAAA. *J Cardiovasc Surg (Torino)* [Internet]. nov  
85 2018 [cité 27 mars 2020];59(6). Disponible sur:  
86 <https://www.minervamedica.it/index2.php?show=R37Y2018N06A0767>
- 87 3. Spear R, Hertault A, Van Calster K, Settembre N, Delloye M, Azzaoui R, et al. Complex endovascular  
88 repair of postdissection arch and thoracoabdominal aneurysms. *J Vasc Surg.* mars 2018;67(3):685-93.
- 89 4. Faure EM, El Batti S, Abou Rjeili M, Julia P, Alsac J-M. Mid-term Outcomes of Stent Assisted Balloon  
90 Induced Intimal Disruption and Relamination in Aortic Dissection Repair (STABILISE) in Acute Type B  
91 Aortic Dissection. *Eur J Vasc Endovasc Surg.* août 2018;56(2):209-15.

- 92 5. Faure EM, El Batti S, Sutter W, Bel A, Julia P, Achouh P, et al. Stent-assisted balloon dilatation of chronic  
93 aortic dissection. *J Thorac Cardiovasc Surg* [Internet]. févr 2020 [cité 15 avr 2020]; Disponible sur:  
94 <https://linkinghub.elsevier.com/retrieve/pii/S002252232030430X>
- 95 6. Epstein N. Cerebrospinal fluid drains reduce risk of spinal cord injury for thoracic/thoracoabdominal  
96 aneurysm surgery: A review. *Surg Neurol Int.* 2018;9(1):48.
- 97 7. Bokoch MP, Hiramoto JS, Lobo EP, Shalabi A. Rapid Ventricular Pacing for Landing Zone Precision  
98 During Thoracic Endovascular Aortic Arch Repair: A Case Series. *J Cardiothorac Vasc Anesth.* déc  
99 2017;31(6):2141-6.
- 100 8. Koutouzi G, Sandström C, Roos H, Henrikson O, Leonhardt H, Falkenberg M. Orthogonal Rings, Fiducial  
101 Markers, and Overlay Accuracy When Image Fusion is Used for EVAR Guidance. *Eur J Vasc Endovasc*  
102 *Surg.* nov 2016;52(5):604-11.
- 103 9. Rizvi AZ, Sullivan TM. Incidence, prevention, and management in spinal cord protection during TEVAR. *J*  
104 *Vasc Surg.* oct 2010;52(4):86S-90S.

105

106

107 Figure 1. Angio-CT before the intervention showing the entry tear at the aortic isthmus (white arrow), the true  
108 lumen (white arrowhead), and the false lumen (white dotted arrow), and aortic diameters

109 Figure 2. DSA run showing the IT branch (white arrow), the LCCA branch (white dotted arrow), and the  
110 subclavian-carotid transposition (white arrowhead)

111 Figure 3. Angio-CT after the intervention showing the IT and CCA branches (white dotted arrows), the  
112 subclavian-carotid transposition (white arrow), the TEVAR (star), and the bare stent (white arrowhead)





