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Article type: Clinical vignette

Received: June 16, 2023

Accepted: July 30, 2023

Early publication date: August 1, 2023

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Complex multistage endovascular repair of dissection of the arch, thoracic and abdominal aorta in a pediatric patient

Short title: Endovascular repair of the dissection of aorta

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Aortic dissection coexisting with large pseudoaneurysm is a rare entity in pediatric patients, [1]. Usually such dissections are seen in the settings of Marfan syndrome, anatomical anomalies of aortic arch, or accompanying blunt chest injuries [1, 2]. Here we present the case of such an aortic dissection in 11-year-old girl. This patient 14 months before, due to aortic dissection of unknown non-Marfan origin, underwent surgical aortic valve replacement with St. Jude valve and Galweave aortic prosthesis. At that time aortic dissection extended from the ascending to abdominal aorta, and the diameter of false lumen was 20–32 mm. Due to coexisting dissection of the left subclavian artery, she underwent stent implantation at the level of this dissection. Still, this procedure solved the problem only partially, and made future reconstructions even more challenging.

Considering progressing enlargement of the dissections and severe dysphagia resulting from compression of the esophagus, we decided to attempt endovascular repair of this complex

vascular lesion. At admission she presented with large aortic dissection, beginning about 4 cm proximally from the brachiocephalic trunk and extending to the level of celiac trunk. The dissection was the widest next to the left subclavian artery: 61 mm (**Figure 1A**); throughout the descending aorta it had diameter of 40-50 mm. Entry points to the false lumen were situated at the levels of the brachiocephalic trunk, left subclavian artery (LSA), in the upper part of descending aorta, and above the celiac trunk. LSA was also dissected, and this dissection extended to the distal part of brachial artery. In addition, this patient presented with dominant left vertebral artery, while the right vertebral artery was occluded in the V3 segment.

Due to unfavorable anatomy of the vertebral arteries, we decided to address the dissection of LSA firstly, and to close dissections and entry points to the false lumen thereafter (**Figure 1B**). In the first step, we implanted covered stent in the proximal part of the LSA, closing the dissection of this artery. Then, using the kissing-stent technique, smaller covered stents were implanted in the distal part of LSA and the left vertebral artery. In the second stage, we implanted covered stents in the brachiocephalic trunk, right subclavian and right common carotid arteries. Then, aortic dissection was closed with two covered stents, which were fixed with two self-expanding stents. Entry point to the false lumen at the level of LSA was closed with the Amplatzer Vascular Plug, and the false lumen was embolized with 5 coils. Since this endoleak was still present at follow-up (**Figure 1C**), during the next procedure it was closed with Onyx glue and several additional coils. Follow-up 12 months after the last procedure revealed complete closure of dissections and good inflow to the aortic branches (**Figure 1D**). Aortic true lumen at this 12-months follow-up had diameter of 27 mm. This case demonstrates that even very complex aortic dissections in a vulnerable pediatric patient can be successfully managed, if the procedure is staged and different endovascular devices are used.

Article information

Conflict of interest: None declared.

Funding: None.

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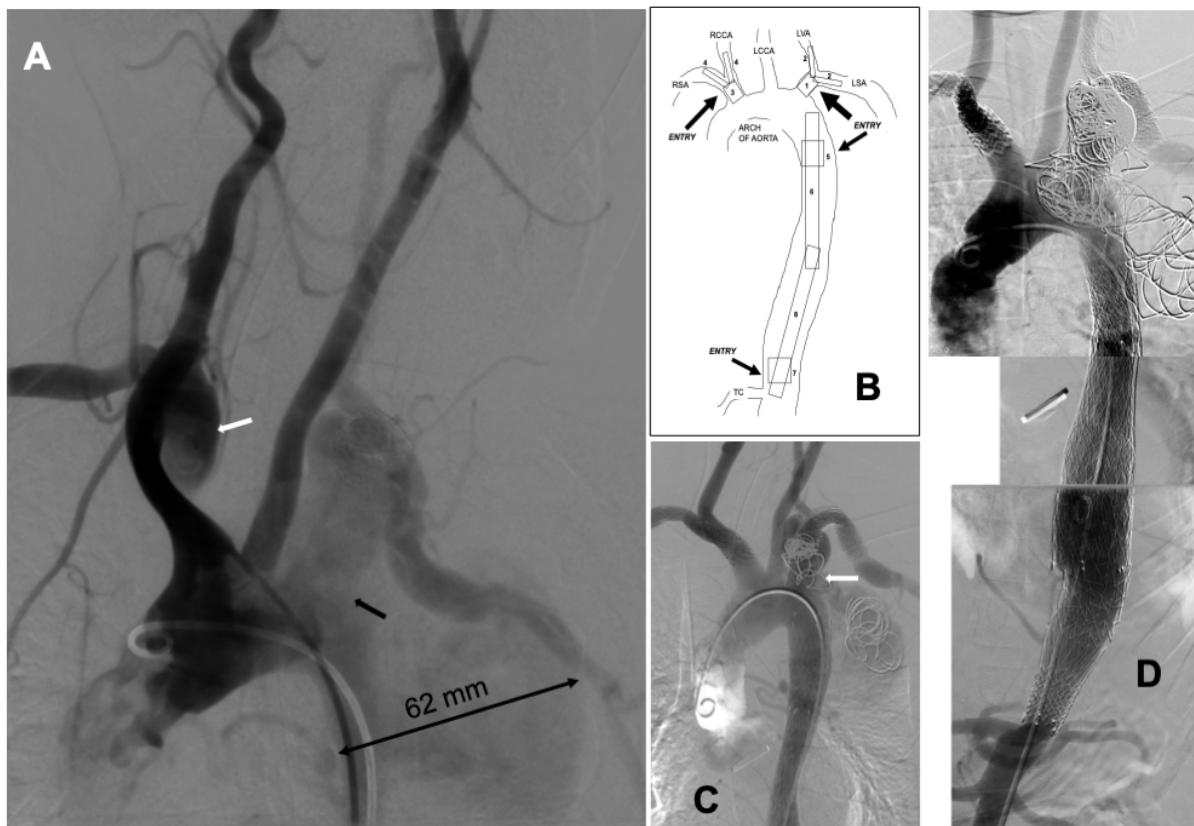


Figure 1. **A.** Procedural aortography: white arrow points to the endoleak to false lumen at the level of left subclavian artery; black arrow points endoleak to the false lumen at the level of brachiocephalic trunk. **B.** Scheme of endovascular repair: 1: stent in left subclavian artery, 2: stents in left subclavian artery and left vertebral artery, 3: covered stent in brachiocephalic trunk, 4: covered stents in right common carotid artery and right subclavian artery, 6 and 8: covered stents in aorta, 5 and 7: self-expanding stents in aorta. **C.** Residual endoleak at the level of left subclavian artery (arrow), coils in the false lumen. **F.** Final result of the repair

Abbreviations: LCCA, left common carotid artery; LSA, left subclavian artery; RCCA, right common carotid artery; RSA, right subclavian artery; TC, celiac trunk