



Case Report

A Five-Year Follow-up of Left Main Coronary Artery Stenting 8 Years After Arterial Switch Operation

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ABSTRACT

The fate of coronary artery stenting in children several years after implantation is unknown. We previously reported the case of an 8-year-old child undergoing stent implantation for a total left main coronary artery occlusion after arterial switch operation. Six months later, she needed another stent implantation for in-stent restenosis. Here we report the angiographic, intravascular ultrasound and optical coherence tomography findings at 5-year follow-up. Despite nongrowth of the left main coronary artery inherent to the stents, luminal patency, adequate struts apposition, and the absence of *in situ* complications were confirmed.

RÉSUMÉ

On ne sait rien de ce qu'il advient des endoprothèses coronariennes plusieurs années après l'implantation chez les enfants. Nous avons déjà présenté le cas d'une fillette de huit ans chez qui une endoprothèse a été implantée pour corriger une occlusion totale de l'artère coronaire principale gauche après une intervention de détransposition artérielle. Six mois plus tard, la patiente avait besoin d'une autre endoprothèse en raison d'une resténose de l'endoprothèse. Nous rapportons ici les observations effectuées à l'angiographie, à l'échographie intravasculaire et à la tomographie par cohérence optique à l'évaluation de suivi à cinq ans. Malgré l'absence de croissance de l'artère coronaire principale gauche en raison de la présence des endoprothèses, la perméabilité luminale, l'apposition adéquate des entretoises et l'absence de complications *in situ* ont été confirmées.

In 5%–7% of cases of arterial switch operation (ASO) for transposition of the great arteries, there is evidence of late coronary stenosis and/or occlusion, often with serious clinical consequences.^{1–3} Medical treatment is often preferred at first and is usually followed by coronary artery bypass grafting or percutaneous coronary intervention (PCI).⁴ Indeed, we⁵ and others⁶ reported cases successfully treated by coronary stent implantation. However, the fate of such procedures with children's growth is unknown. Here we report the angiographic, intravascular ultrasound (IVUS), and optical coherence tomography (OCT) findings in a 13-year-old child, treated at the age of 8 years with stent implantation for a total left main (LM) coronary artery occlusion after ASO.

Case Report

Successful PCI performed at the age of 8 years was previously reported.³ Ten months after PCI, the child underwent repeat coronary angiography, because of recurrence of symptoms, showing an aggressive in-stent restenosis. At that time, the engagement of the LM with a 6F guiding catheter made possible to successfully implant a drug-eluting stent (Xience V 2.25 × 12 mm; Abbott Vascular, Santa Clara, CA), postdilated at high pressure (18 atm) with a 2.5 mm noncompliant balloon (Fig. 1A). Pharmacologic treatment with aspirin (100 mg/d), clopidogrel (37 mg/d), and metoprolol (100 mg/d) was started and maintained for 5 years, increasing clopidogrel dose to 75 mg/d at the age of 12 years. A multislice computed tomography performed 4 months later showed the 2 stents localized into the LM (Fig. 1B). At 6-month follow-up visit, the child remained asymptomatic, in good clinical conditions; she exhibited normal left ventricular ejection fraction (>60%) on echocardiograms and no ischemic changes on exercise electrocardiograms.

At the age of 8 years, her weight, height, and body surface area were 36 kg (94th percentile), 131 cm (70th percentile),

Received for publication November 16, 2020. Accepted December 1, 2020.

Ethics Statement: The research reported has adhered to the relevant ethical guidelines.

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See page 553 for disclosure information.

Novel Teaching Points

- Long-term results of left main stenting in paediatric age are good and only partially compromised by growth.
- PCI may be considered the first treatment strategy in children with coronary stenosis and/or occlusion after complex surgical procedures and allow us to defer as much as possible an eventual surgical revascularization.

and 1.13 m², respectively. At 5-year follow-up, her weight, height, and body surface area were 64 kg (92nd percentile), 152 cm (22nd percentile), and 1.61 m², respectively.

At the age of 13 years, despite the absence of symptoms, a control angiography along with intracoronary imaging was planned, according to the cardiovascular team for safety reasons. The left coronary angiography showed patency of the LM and absence on in-stent restenosis, with a discrete discrepancy in vessel diameter between the LM and its branches (Fig. 2A). At quantitative coronary analysis, the reference vessel diameter of the LM and of the proximal left anterior descending coronary artery was 2.6 and 3.1 mm, respectively. The LM and proximal left anterior descending were analyzed by IVUS (Eagle Eye Platinum digital IVUS catheter; Philips/Volcano Therapeutics, Rancho Cordova, CA) showing a minimum lumen area of 4.4 and 8.6 mm², respectively (Fig. 2, B and C), due to nongrowth of the LM inherent to the stents. The same vessel segments were analyzed also by OCT (Dragonfly Duo, LightLab Imaging, Inc./St. Jude Medical, Westford, MA), which showed double-layer stent struts, complete coverage of the struts with optimal

apposition, and the absence of in-stent hyperplasia (Fig. 2D). According to these findings, a pharmacologic treatment with single antiplatelet therapy (aspirin, 100 mg/d) and metoprolol (100 mg/d) was planned.

Discussion

The fate of coronary artery stenting in children several years after implantation is unknown. Our long-term observation in a child undergoing bare-metal stent implantation for a total LM coronary artery occlusion after ASO and in a few months drug-eluting stent for an early in-stent restenosis are good and only partially compromised by growth. Indeed, at the age of 13 years, IVUS and OCT findings showed an optimal apposition of the double-layer stent struts and the absence of in-stent hyperplasia. Of note, the stent-induced *constriction* of the LM during growth induced a discrete discrepancy in vessel diameter between the LM and its branches, without evidence of myocardial ischemia.

Our findings suggest that PCI may be considered the first treatment strategy in children with coronary stenosis and/or occlusion after complex surgical procedures and allow us to defer as much as possible an eventual surgical revascularization, which becomes more feasible and effective with the child's growth.

Funding Sources

The authors report no funding sources.

Disclosures

The authors have no conflicts of interest to disclose.

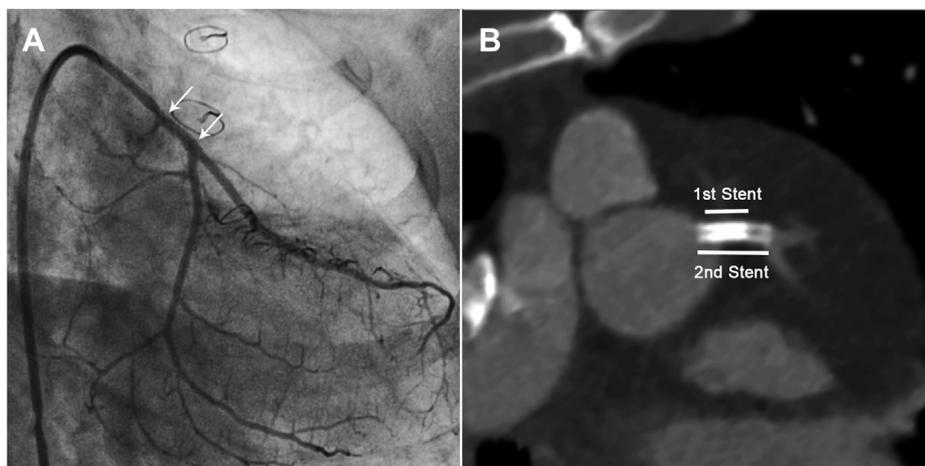


Figure 1. Coronary angiography and multislice computed tomography showing the final result of drug-eluting stent implantation (A) and the 2 stents localized into the left main (B), respectively. The lumen inside the stent is difficult to assess by multislice computed tomography, as the observed distal perfusion beyond the stents may be secondary to retrograde collateral perfusion of the left coronary artery. **Arrows** in (A) indicate stent position.

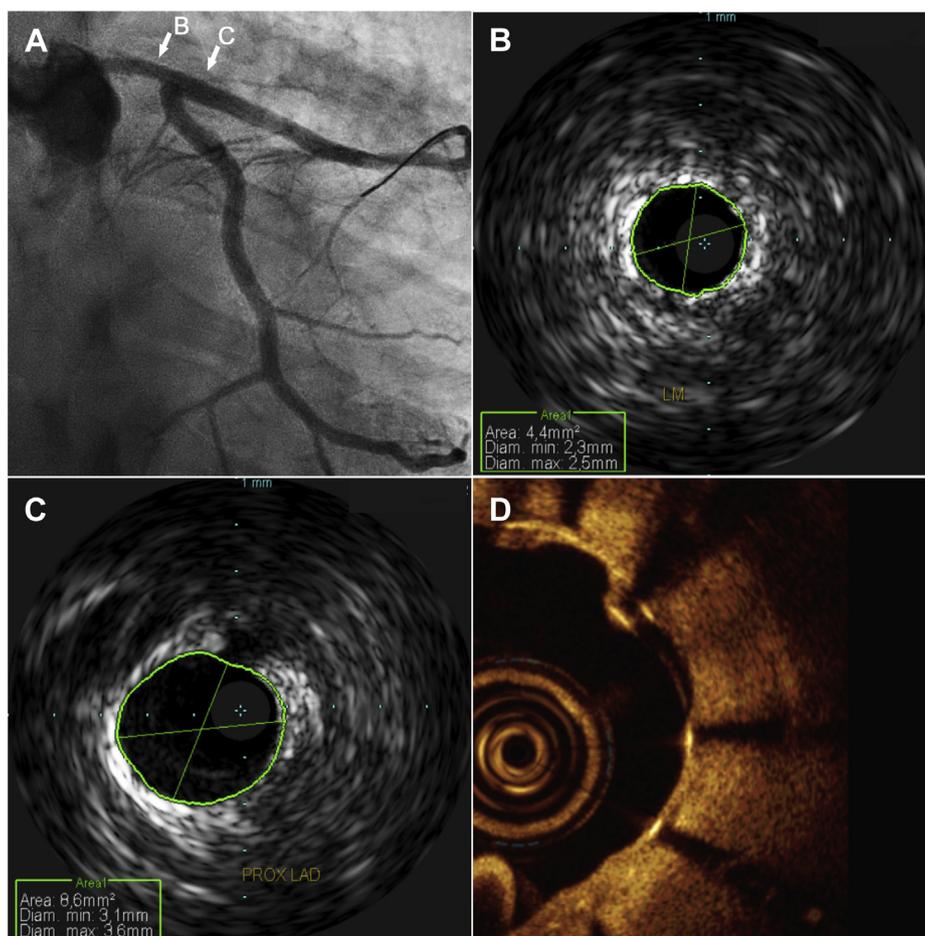


Figure 2. Coronary angiograms (A), cross-sectional areas at intravascular ultrasound of the left main (B) and of the left anterior descending (C), and a detail of optical coherence tomography of the left main (D) showing double-layer stent struts, complete coverage of the struts with optimal apposition, and the absence of in-stent hyperplasia or dissection. **Arrows** in (A) indicate cross-sectional points of (B) and (C), with a discrete discrepancy in vessel diameter between the left main and left anterior descending.

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