

# Implantation of a Post-Dilatable Stent in Aortic Coarctation Via Carotid Access in a Newborn With Ebstein's Anomaly: Case Report

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## Introduction

Ebstein's anomaly is a complex congenital heart disease that occurs in one out of every 200,000 live births. Its association with left-sided obstructive lesions is rare<sup>1</sup> and poses significant challenges for both clinical and surgical management. In this case report, we present a newborn patient with Ebstein's anomaly associated with supralvalvular mitral stenosis and coarctation of the aorta (CoA), who underwent cardiac catheterization for the implantation of a post-dilatable stent in the aortic isthmus via the carotid approach.

## Case Report

A premature newborn (35 6/7 weeks of gestational age) was admitted to the service at five days of life while receiving prostaglandin.

Echocardiography revealed Ebstein's anomaly, marked dilation of the right atrium (RA), patent foramen ovale (PFO) with bidirectional flow, right ventricular outflow tract (RVOT) with low antegrade flow, mitral valve (MV) with a supralvalvular membrane and a mean gradient of 6.6 mmHg, left ventricle (LV) with moderate to severe dysfunction, tricuspid aortic valve with bicuspid opening, CoA, and a patent ductus arteriosus (Figure 1).

CT angiography demonstrated CoA, patent ductus arteriosus, and a reduced free cavity of the right ventricle (RV) (Figure 2).

The patient developed heart failure, signs of low systemic output, enterocolitis, and required antibiotic therapy and infusion of vasoactive drugs.

## Keywords

Ebstein Anomaly; Aortic Coarctation; Stents; Cardiac Catheterization; Newborn Infant

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Considering CoA as the most significant lesion and the high surgical risk, percutaneous treatment was chosen, which was performed at 28 days of life and 2.23 kg.

## Interventional Procedure

The right carotid artery was punctured under ultrasound guidance, and a 5F slender transradial introducer was positioned. Intravenous cefazolin and heparin at a dose of 100 IU/kg were administered through the introducer. Cineangiography was performed.

With the support of a 4F JR diagnostic catheter and a 0.035" hydrophilic guidewire (150 cm), the coarctation was crossed. A 0.035" standard Teflon guidewire with J-tip (260 cm) was then positioned in the descending aorta. With guidewire support, the carotid introducer was exchanged for a 7F femoral introducer.

A PALMAZ GENESIS 1910 stent, manually crimped onto a POWERFLEX 7x20 mm balloon catheter, was implanted in the aortic isthmus. Control cineangiography demonstrated the stent to be well positioned and adequately apposed to the aortic wall, with significant improvement in antegrade aortic flow and reduction of shunting through the ductus arteriosus (Figure 3).

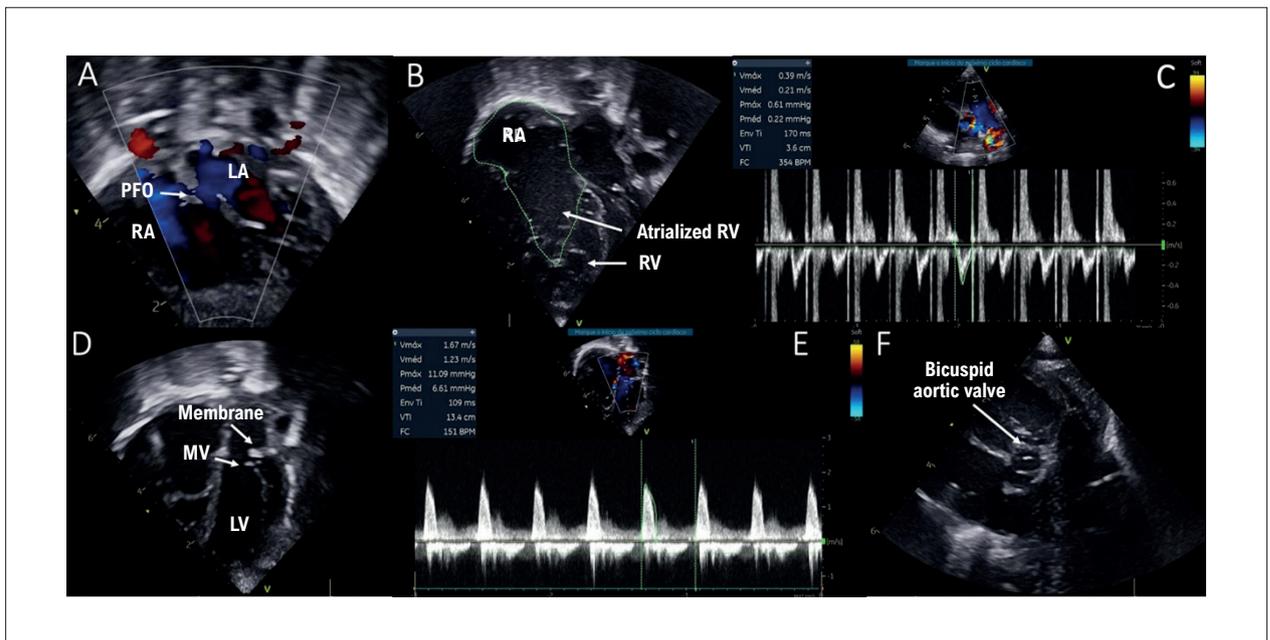
After removal of the arterial introducer, manual hemostatic compression was performed, followed by an occlusive compressive dressing. Heparin was reversed with protamine.

The patient had prolonged hospitalization, requiring 28 days of invasive mechanical ventilation, and was discharged after 85 days of hospital stay. Doppler ultrasound of the carotid arteries showed no abnormalities. The patient is currently stable and under outpatient follow-up, awaiting weight gain for the next surgical stage.

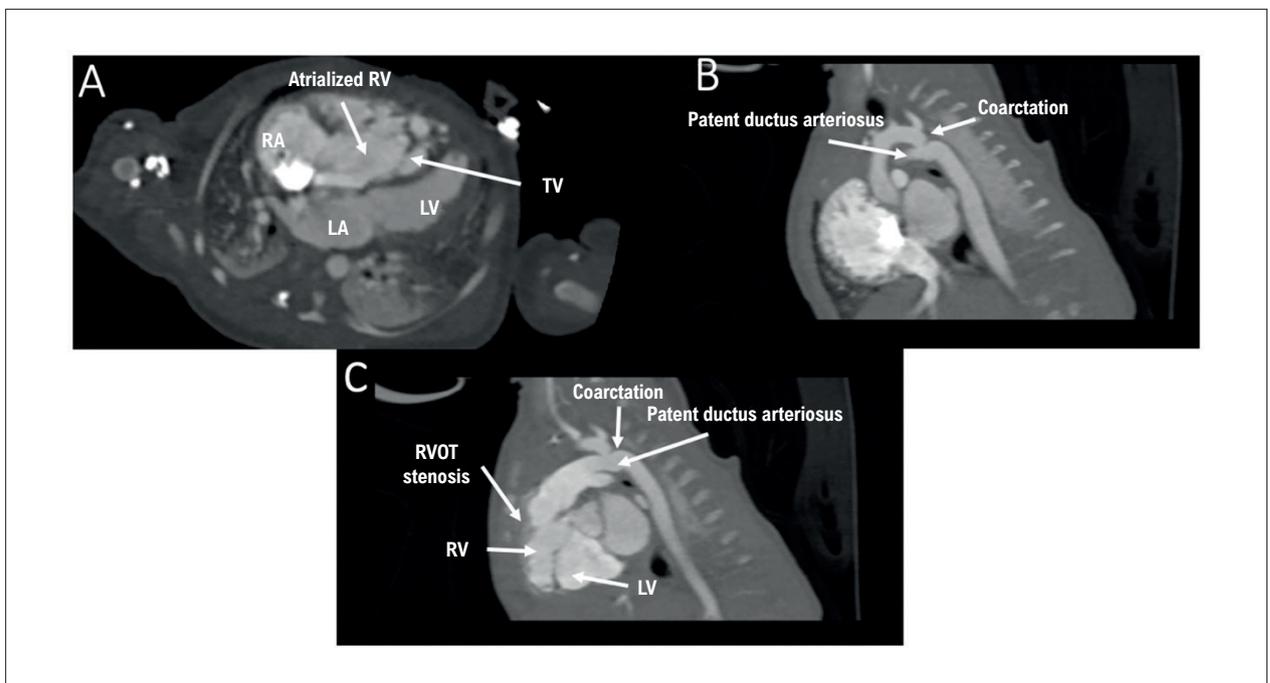
## Discussion

CoA is a congenital malformation characterized by narrowing of the aortic isthmus, with an incidence of 1:1000 live births. The treatment of CoA has advanced considerably over the past decades, both surgically<sup>2</sup> and percutaneously.<sup>3</sup>

The implantation of a post-dilatable stent up to the diameter of the adult aorta in infant patients presents a challenge: the profile of the device is large for the traditional access route, the femoral artery, which increases the risk

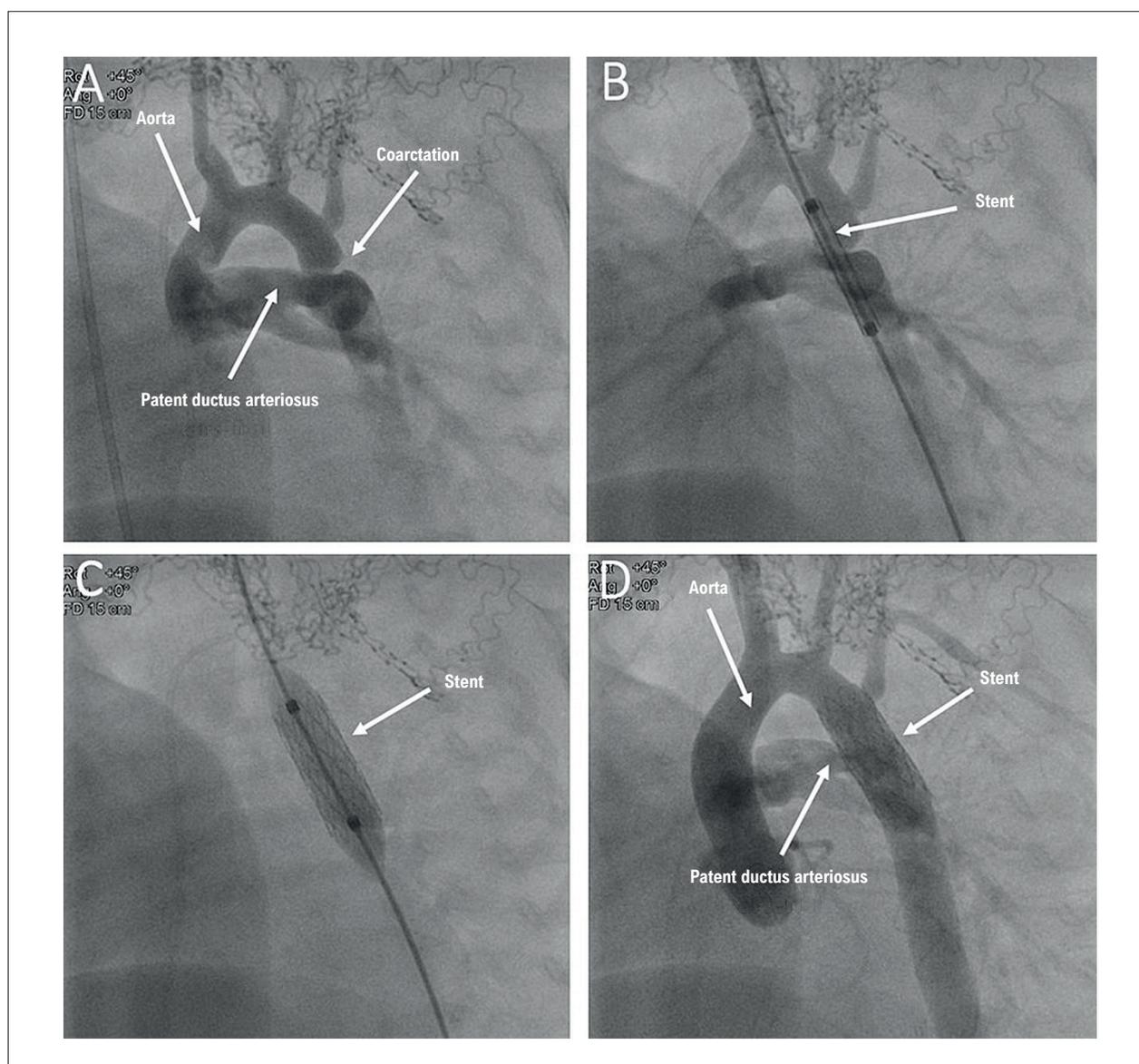


**Figure 1** – Transthoracic Doppler Echocardiogram. A) Subcostal view showing a patent foramen ovale with bidirectional flow. B) Right atrial dilation, presence of atrialized portion of the right ventricle, and a small functional right ventricle. C) Doppler in the right ventricular outflow tract plane showing low velocity–time integral (VTI). D and E) Supralvalvular mitral membrane with a mean gradient of 6.6 mmHg. F) Bicuspid aortic valve. PFO: patent foramen ovale; RA: right atrium; LA: left atrium; RV: right ventricle; MV: mitral valve; LV: left ventricle.



**Figure 2** – Computed tomography angiography of the aorta. A) Transverse section showing the atrialized portion of the right ventricle and tricuspid valve with apical displacement of the leaflets; B) Sagittal section demonstrating coarctation of the aorta; C) Right ventricular outflow tract with stenosis, large patent ductus arteriosus, and coarctation of the aorta; TV: tricuspid valve; RVOT: right ventricular outflow tract.

## Case Report



**Figure 3** – Cardiac catheterization; A) coarctation of the aorta and large patent ductus arteriosus; B) PALMAZ GENESIS 1910 stent crimped onto a POWERFLEX 7x20 mm balloon catheter being positioned in the aortic isthmus; C) stent being implanted in the aortic isthmus; D) stent implanted in the aortic isthmus with significant improvement in blood flow from the aortic arch to the descending aorta and reduction of effective flow through the ductus arteriosus via the lateral mesh of the stent.

of severe vascular complications. In patients with CoA, the carotid arteries have significantly larger calibers than the femoral arteries. Thus, carotid access represents a viable alternative for catheterization, which can be performed either by surgical dissection or by safe puncture.<sup>4</sup>

The rate of aortic wall complications in patients undergoing balloon aortoplasty is higher than in those treated surgically or with stent implantation. On the other hand, hospitalization time and the incidence of acute complications are lower in patients treated with stent implantation compared to those treated surgically.<sup>5</sup>

The literature on the treatment of CoA in infants with stent implantation is scarce, with this approach generally reserved

for patients at high surgical risk, in whom the implantation of a non-post-dilatable stent is more common.

In the case described, percutaneous treatment via carotid puncture and implantation of a post-dilatable stent in the coarctation offers the advantage of stent therapy without the drawback of failing to accommodate the patient's somatic growth, since this device can be further dilated to the diameter of the adult aorta using balloon catheters in two or three additional hemodynamic procedures over the years.<sup>6</sup>

The absence of vascular complications in the carotid artery, as assessed by Doppler ultrasound, together with the patient's favorable clinical course, demonstrates the efficacy and safety, at least in the short term, of this procedure.

## Conclusion

In the reported case, percutaneous treatment of CoA in a newborn was chosen due to the association of cardiac defects and the patient's clinical condition. We consider that treating coarctation in infants with implantation of a post-dilatable stent up to the diameter of the adult aorta combines the benefits of stent aortoplasty – lower rates of acute complications and shorter hospital stay compared to surgical treatment – with the additional advantage of adjusting the stent size to the patient's somatic growth.

This case report demonstrates the efficacy and safety of the procedure, at least in the short term. However, further studies are needed to confirm the safety and efficacy of this technique in the medium and long term.

## Author Contributions

Conception and design of the research and writing of the manuscript: Lombardi JG, Gardenghi G; acquisition of data: Lombardi JG, Calamita PC, Barbosa OC, Barreto MRP, Gardenghi G; analysis and interpretation of the data: Lombardi JG, Calamita PC, Barbosa OC; critical revision of the manuscript for intellectual content: Calamita PC, Barbosa OC, Barreto MRP, Gardenghi G.

## Potential Conflict of Interest

No potential conflict of interest relevant to this article was reported.

## References

1. Jost CHA, Connolly HM, O'Leary PW, Warnes CA, Tajik AJ, Seward JB. Left Heart Lesions in Patients with Ebstein Anomaly. *Mayo Clin Proc.* 2005;80(3):361-8. doi: 10.4065/80.3.361.
2. Vitullo DA, DeLeon SY, Graham LC, Eidem BW, Roughneen PT, Javorski JJ, et al. Extended End-to-End Repair and Enlargement of the Entire Arch in Complex Coarctation. *Ann Thorac Surg.* 1999;67(2):528-31. doi: 10.1016/s0003-4975(98)01254-5.
3. O'Laughlin MP, Slack MC, Grifka RG, Perry SB, Lock JE, Mullins CE. Implantation and Intermediate-Term Follow-Up of Stents in Congenital Heart Disease. *Circulation.* 1993;88(2):605-14. doi: 10.1161/01.cir.88.2.605.
4. Justino H, Petit CJ. Percutaneous Common Carotid Artery Access for Pediatric Interventional Cardiac Catheterization. *Circ Cardiovasc Interv.* 2016;9(4):e003003. doi: 10.1161/CIRCINTERVENTIONS.115.003003.
5. Forbes TJ, Kim DW, Du W, Turner DR, Holzer R, Amin Z, et al. Comparison of Surgical, Stent, and Balloon Angioplasty Treatment of Native Coarctation of the Aorta: An Observational Study by the CCISC (Congenital Cardiovascular Interventional Study Consortium). *J Am Coll Cardiol.* 2011;58(25):2664-74. doi: 10.1016/j.jacc.2011.08.053.
6. Boe BA, Armstrong AK, Janse SA, Loccoh EC, Stockmaster K, Holzer RJ, et al. Percutaneous Implantation of Adult Sized Stents for Coarctation of the Aorta in Children  $\leq 20$  kg: A 12-Year Experience. *Circ Cardiovasc Interv.* 2021;14(2):e009399. doi: 10.1161/CIRCINTERVENTIONS.120.009399.

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## Study Association

This study is not associated with any thesis or dissertation work.

## Ethics Approval and Consent to Participate

This study was approved by the Ethics Committee of the CEP do Hospital de Urgências de Goiás under the protocol number 85497418.2.0000.0033. All the procedures in this study were in accordance with the 1975 Helsinki Declaration, updated in 2013. Informed consent was obtained from all participants included in the study.

## Use of Artificial Intelligence

The authors did not use any artificial intelligence tools in the development of this work.

## Availability of Research Data

The data cannot be made publicly available due to legal issues related to Brazil's General Data Protection Law, as it could allow the identification of the patient in question.



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