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Journal of Clinical Cardiology and Cardiovascular Interventions
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Case Report

Successful Retrieval of a Dislodged Ductal Stent in a Neonate with type I Pulmonary Atresia with intact Ventricular Septum

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Received Date: October 13, 2023; **Accepted Date:** October 23, 2023; **Published Date:** October 30, 2023

Citation: M. Abdelbaki, A.Boureghda (2023), Physical Activity for Hypertensives. *J. Clinical Cardiology and Cardiovascular Interventions*, 6(7); **DOI:10.31579/2641-0419/336**

Abstract

We report a unique case of a one-day-old neonate diagnosed with pulmonary atresia type I and a hypoplastic right ventricle accompanied by a coronary cameral fistula alimented by the right ventricle cavity. An attempt was made to stent the ductus arteriosus following intolerance to Prostine perfusion and paroxysmal desaturation events. The stent unfortunately embolized into the aorta but was successfully retrieved without incident, and a subsequent stenting attempt proved successful.

Keywords: Hypertension; hypertensives; left ventricular hypertrophy

Introduction

Pulmonary atresia type I with a hypoplastic right ventricle is a complex congenital heart defect that poses significant challenges for medical and surgical management. Stenting the ductus arteriosus can be crucial in managing patients with this condition, ensuring adequate blood flow.

We report a unique case of a one-day- old neonate diagnosed with pulmonary atresia type I and a hypoplastic right ventricle accompanied by a coronary cameral fistula alimented by the right ventricle cavity An attempt was made to stent the ductus arteriosus following intolerance to Prostine perfusion and paroxysmal desaturation events. The stent unfortunately embolized into the aorta but was successfully retrieved without incident, and a subsequent stenting attempt proved successful.

Membranous pulmonary atresia

Case Presentation:

A one-day-old male neonate was diagnosed with pulmonary atresia type I and a hypoplastic right ventricle. the saturation was 40-55 %

Diagnostic Assessment:

Echocardiography revealed :

Atretic Pulmonary Valve: There will be no identifiable pulmonary valve orifice. Instead, there were a membranous obstruction at the location of the pulmonary valve. Color Doppler would show no flow across this region.

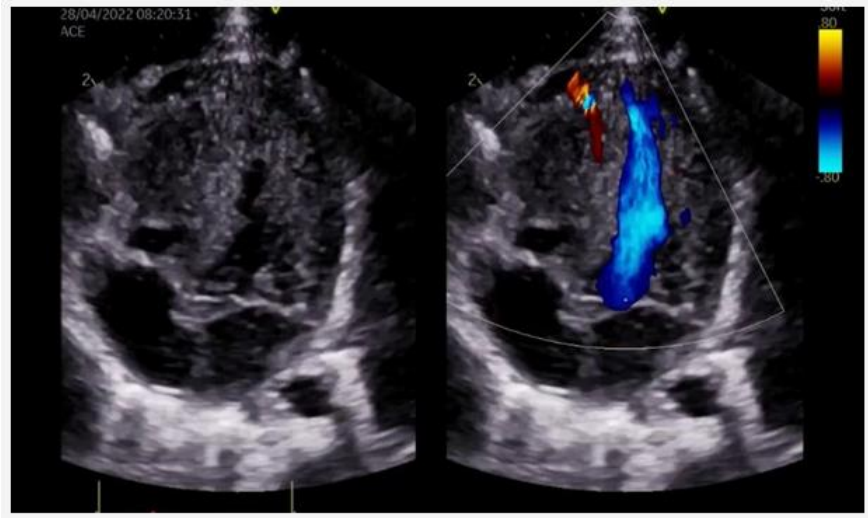
Hypoplastic Right Ventricle (RV): The RV appeared smaller in size. with a diminished apicale chamber. There were an increased myocardial thickness compared to the left ventricle.

Coronary Cameral Fistula: Abnormal communication visualized between the coronary arteries and the right ventricle. Color Doppler would highlight the flow through this abnormal connection.

Intact Ventricular Septum: The interventricular septum would appear intact, distinguishing this form of pulmonary atresia from others where a large ventricular septal defect might be present.

Hypoplastic right ventricle

Ductus Arteriosus: The patent ductus arteriosus (PDA) visualized connecting the pulmonary artery to the aorta. the ductus was oblic. Tricuspid Valve Evaluation: hypoplastic tricuspid annulus, no tricuspid regurgitation was noticed. Atrial Septum: forced patent foramen ovale. Pulmonary Arteries: hypoplastic confluent pûlmonary artery branches.



T4 chambers views, coronary cameral fistula

Aoretic angiography:

Visualization of the Ductus Arteriosus: The oblique spastic ductus arteriosus seen originating from the descending aorta and connecting to the pulmonary artery. Due to its spastic nature, the ductus showed intermittent and varied constriction throughout its length, and its caliber did not remain consistent throughout the procedure.

Retrograde Flow in the Ductus Arteriosus: Given the pulmonary atresia, the primary source of pulmonary blood flow was via the ductus arteriosus. The angiogram showed a retrograde flow of contrast from the descending aorta, through the ductus arteriosus, and into the pulmonary arteries.

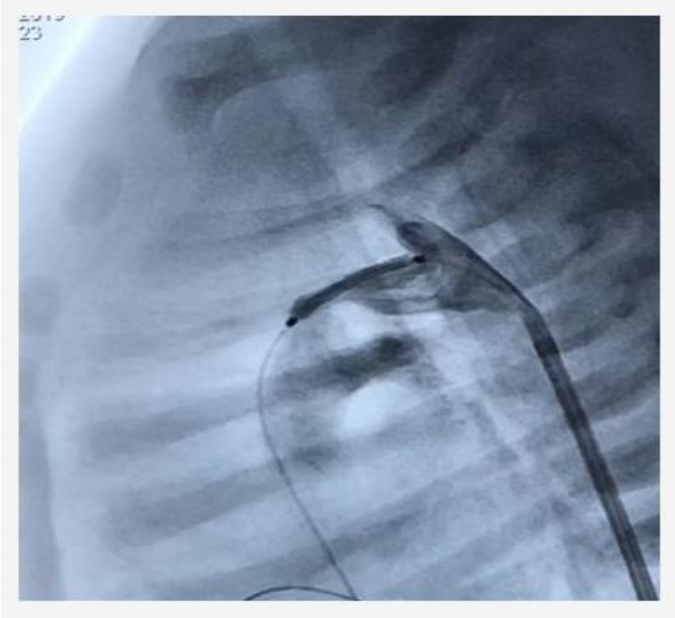
Aortic angiography showing retrograde blood flow into the pulmonary artery throw the ductus arteriosus Ductus stenting procedure

. Preparation:

Patient Positioning: The patient is placed in a supine position on the fluoroscopy table.

Access: Sterile preparation and draping are performed, and vascular access is typically obtained via the femoral artery.

Anesthesia: deep sedation is administered, without tracheal intubation.

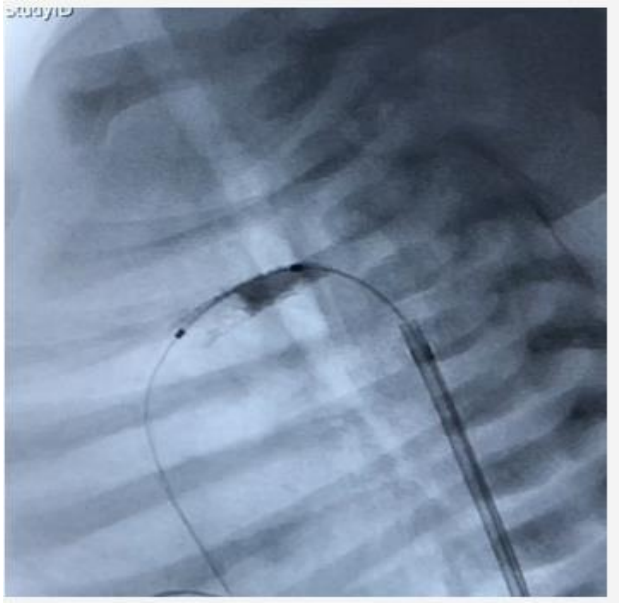


Positioning of the stent

- Stent Selection: Based on the angiographic findings: a coronary stent 4/15 mm was selected

4. Stent Delivery:

- Guidewire Placement: A guidewire is advanced through the diagnostic catheter and maneuvered across the PDA into the pulmonary artery.
- Exchange for Stent Delivery System: The diagnostic catheter is exchanged for a JR guiding catheter 5F.
- Positioning the Stent: Under fluoroscopic guidance, the stent is carefully positioned across the PDA.



Stent inflation

Stent Deployment: Once in the correct position, the stent is deployed by inflating the balloon. The balloon is then deflated, and the delivery system is removed, leaving the stent in place.

Post-deployment Angiography:

An angiogram is performed to ensure the stent is appropriately positioned, fully covering the PDA without impinging on nearby structures. It also confirms improved flow through the stent.

The stent unfortunately embolized into the aorta.

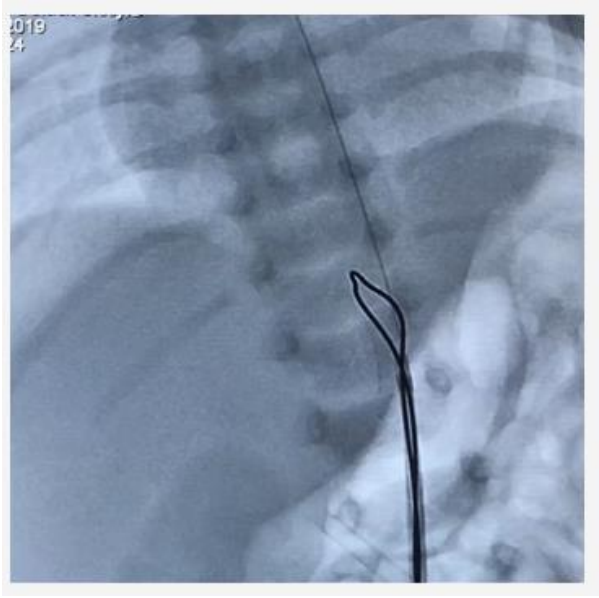
Embolised Stent retrievement

Here is a step-by-step guide for the retrieval procedure:

Vascular Access: we used the same vascular access.

Secure the Aorta (or other relevant vessels):

Guidewire Placement: In this case, a hydrophilic 0.014" guidewire was introduced to secure the aorta. This step ensures that in the event of any complications (like aortic dissection), the operator has secured access to the vessel.



Position of the snare around the embolized stent

Under fluoroscopic guidance, position the a 5F, 10 mm snare around the dislodged stent. Once the stent is engaged, carefully tighten or close the snare to securely grasp the stent. With the stent secured, slowly and gently withdraw to the 5F JR guiding catheter. Care is taken to ensure no vascular injury occurs during the process. Once the stent is believed to be captured and withdrawn from the body, confirm its presence on the catheter outside the patient.

- The ductus was stented 3 days later with success.

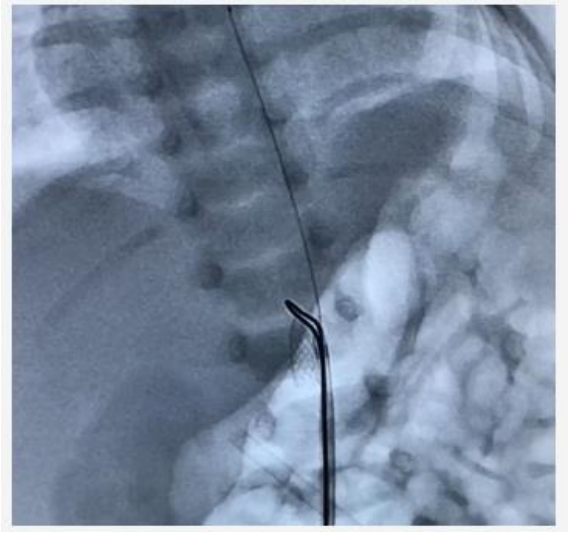
Discussion :

Pulmonary atresia (PA) with intact ventricular septum is a complex congenital heart defect where the pulmonary valve doesn't form properly, resulting in the absence of communication from the right ventricle (RV) to the pulmonary arteries. Given the clinical and anatomical variability in patients with this condition, management strategies need to be tailored to each individual case. Here's a discussion on the therapeutic choices:

1.Prostaglandin Infusion: One of the initial management strategies in neonates with PA and intact ventricular septum is the infusion of prostaglandin E1 (PGE1). This keeps the ductus arteriosus open, ensuring blood flow to the lungs. However, long- term reliance on PGE1 isn't feasible, and side effects or intolerance, like in the presented case, can necessitate a transition to a more definitive strategy.

2.Ductus Stenting: Stenting of the patent ductus arteriosus (PDA) is a catheter- based intervention aimed at keeping the ductus open and ensuring a reliable source of pulmonary blood flow. This can be an option when:

- The patient doesn't tolerate PGE1.
- The PDA is becoming restrictive or is at risk of closing.
- Surgical risk is deemed high in the early neonatal period

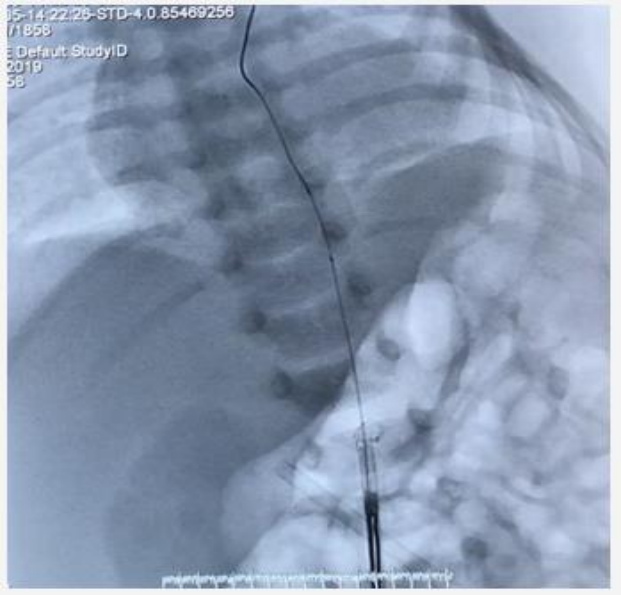


the snare around the stent

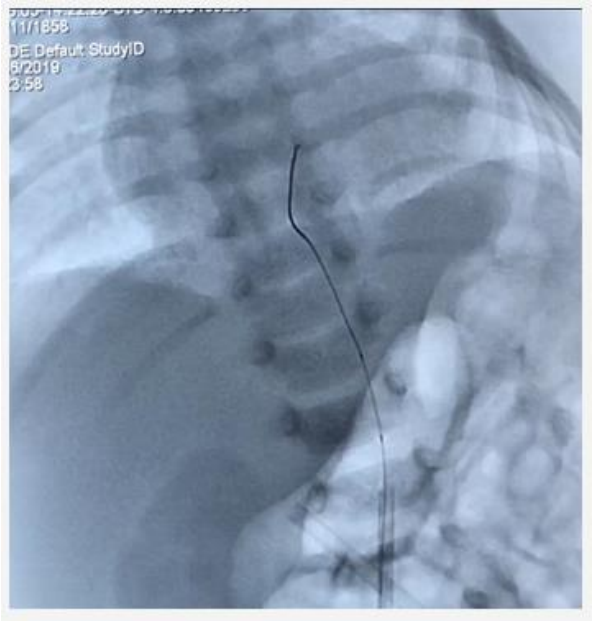
- The main advantage of ductal stenting over surgical methods is its minimally invasive nature, reducing recovery times and potential complications.

3.Right Ventricle to Pulmonary repermeabilisation and balloon valvuloplasty after valve perforation: In some patients, especially those with a reasonably sized RV, a surgical creation of a shunt or conduit from the RV to the PA can be considered. This establishes a direct route for blood flow from the RV to the lungs. In our case this option was not discussed because of a coronary fistula and the hypoplastic right ventricle.

4.Modified Blalock-Taussig (BT) Shunt: This involves a surgical connection between a branch of the aorta (usually the subclavian artery) and the pulmonary artery. It provides a source of pulmonary blood flow but doesn't utilize the RV.



Gentle retrievement of the stent inside the guiding catheter



Complete retrivement of the disloged stent

Conclusion:

Ductus arteriosus stenting is a valuable therapeutic intervention in specific neonatal populations, especially for maintaining pulmonary blood flow in conditions such as pulmonary atresia with intact ventricular septum. The procedure provides a minimally invasive alternative to surgery, facilitating a bridge to more definitive interventions as the neonate grows and their clinical condition stabilizes.

In the presented case, the challenge of stent embolization underscored the intricacies and potential complications associated with the procedure. Stent embolization, although rare, can be a life-threatening complication. It mandates prompt recognition and intervention to ensure patient safety

Resources and References :

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DOI:10.31579/2641-0419/336