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Case Report

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Percutaneous Closure of Giant PDA with Ducts Occluders in a 4-Years-Old Child with Low Body Weight

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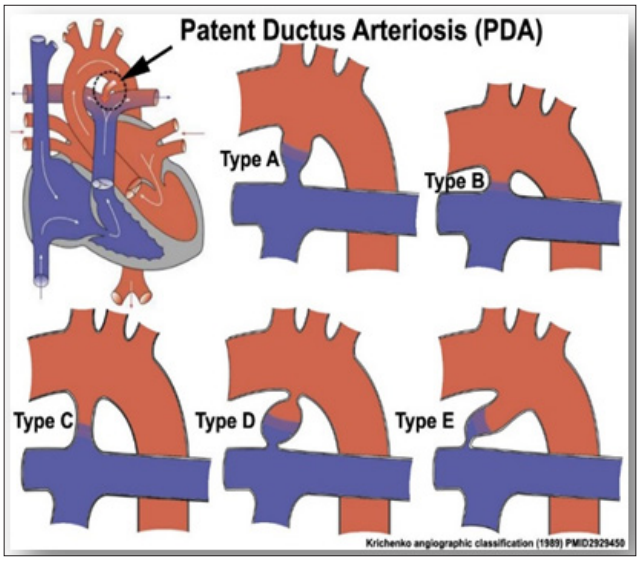
Our review of the literature using PubMed identified limited cases of percutaneous closure for PDAs of this size, highlighting the unique nature of this case.

Classification of patent ductus arteriosus. In Krichenko. Angiographically classified pdas based on the lumen of the duct at the aortic and pulmonary ends.



Clinical Characteristics

The patient is 4 years old, and admitted to our center with progressive dyspnea, cyanosis of the nasolabial triangle, complaints of frequent nosebleeds according to parents, and periodic acute respiratory infections. Sat 92 %; With light physical exertion, Sat up to 88%). ECHO - END diastolic volume -LV 127 ml END sistololic volume-LV 44 ml, systolic-diastolic discharge into the pulmonary artery through PDA. The diameter of the PDA is about 14 mm. AR and TR moderate. P max - 81 mmHg. CT - a large PDA of aortic stenosis in the isthmus, hypoplasia in the aortic arch and CoAo were revealed. ECG is a sinus rhythm. Signs of hypertrophy of both ventricles. MEDICATION: Tab. Bosentan 32.5 mg 2 times a day.Tab. Sildenafil 1 mg/kg 3 times daily. Tab. Spironolactone 6.25 mg 2 times daily. HEART TEAM DECISION. After a discussion with the HEART TEAM, we decided to close with an occluder, taking into account the high risk of post-open heart surgery complications. INTERVENTIONAL CLOSURE TECHNIQUE: Fluoroscopic Guidance: The procedure was performed under fluoroscopic guidance, which uses real-time X-rays to visualize the anatomy and guide the instruments.

Sizing Balloon: A 24 mm sizing balloon was temporarily inflated across the PDA to assess hemodynamic response (changes in blood pressure) and confirm the feasibility of permanent closure with the occluder device. Sizing balloon 24 mm inflation time 10 min.

Hemodynamics	Before (mmHg)	*After 10 min (mmHg)
Pulmonary artery	75/39/55	48/32/50
Aorta	90/60/78	98/33/66

Vascular Access

Percutaneous access was obtained via the right femoral artery and vein using 5 French (Fr) sheaths. (French size refers to the catheter diameter). Catheters: Diagnostic catheters, such as a right Judkins catheter (5 Fr) and a pigtail catheter (5 Fr), were used for angiography (imaging blood vessels with contrast dye) to visualize the anatomy of the heart and vessels. Sizing Balloon : A 24 mm sizing balloon was inflated across the PDA to assess hemodynamic response (blood pressure changes) and confirm the feasibility of closure with the occluder device. Delivery Sheath: A larger 10-French delivery sheath was then introduced to deploy the PDA occluder device. Occluder size: A 22 mm PDA occluder device was deployed to permanently close the PDA.

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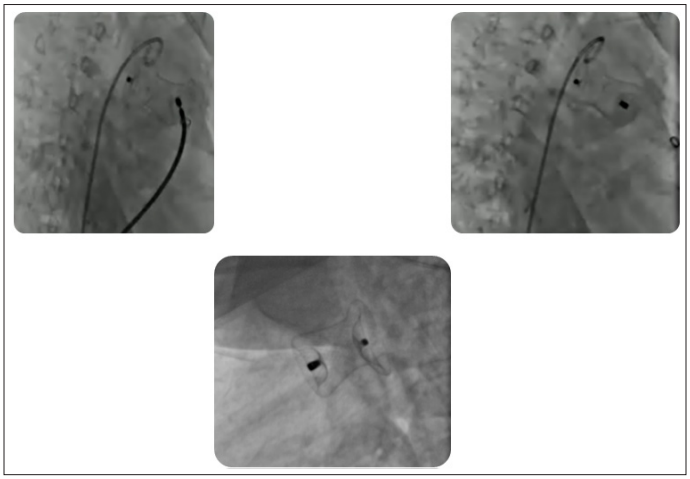


Following successful balloon sizing and hemodynamic evaluation, a specific brand and size of PDA occluder (e.g., MemoPart PDA WBFDQ II 22 mm) was then deployed to permanently close the PDA.

Hemodynamic Parameters

Pre-procedural hemodynamic data: Include pressures in the right atrium (RAP), pulmonary artery (PAP), and ascending and descending aorta.

Post-procedural hemodynamic data: Include pressures in right atrium (RAP), pulmonary artery (PAP), and ascending and descending aorta.

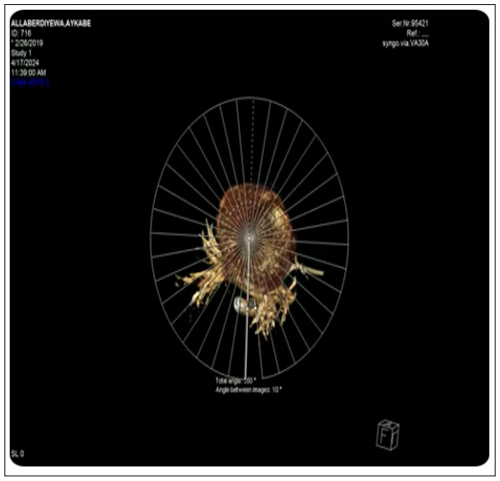
Hemodynamics	Up to (mmHg)	*After (mmHg)
Non-Invasive AD	90\60\78	99\33\78
Ascending Aorta Invasive	81\47\65	96\45\75
Descending Aorta Invasive	78\42\58	92\38\55
Pulmonary artery invasive	78\39\55	57\32\50

How Echo Indicators Have Changed in Long-Term Outcome

ECHO	1*	2*	3*	4*
END Diastolic Volume LV	127 ml	101 ml	75 ml	35 ml
END Sistololic Volume LV	44 ml	32 ml	35 ml	11 ml
P Max (mmHg)	81 mmHg	57 mm HG	32 mm HG	28mmHG
TR	Moderate	Moderate	Mild	N
AR	Moderate	Moderate	mild	mild
MR	Moderate	Mild	mild	N
LV EF	64%	65%	66%	69%

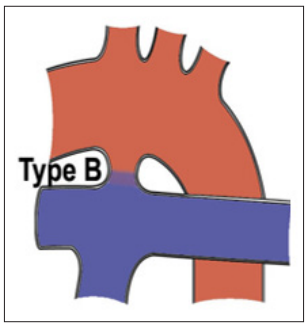
Long-term outcome, after 9 months, CT aortography was performed, there was no compression of the occluder on the left subclavian arteries, and there was no iatrogenic creation of coarctation of the aorta. Patients have a blood pressure difference of 10 (mmHg) between the legs and arms. Patient makes regular visits to our clinic for observation (3 months, 6 months, 9 months will follow soon) .Patient shows positive clinical dynamics, no symptoms of heart failure, is gaining weight, frequent infection is absent.No further medicational treatment of pulmonary hypertension. It is possible for all patients, regardless of the level of PAH, to check the safety of PDA closure, by performing temporary PDA closure with, for example, a sizing balloon and observing the pulmonary arterial pressure. In the case of an appropriate and sufficient decrease in pulmonary arterial pressure, there is a diagnostic indication for safe PDA closure. In some cases, this is a sufficient diagnostic indicator for making further treatment decisions.

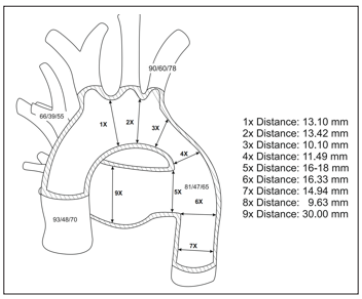
CE after 9 months- Long-term outcome, after 9 months, CT aortography was performed, there was no compression of the occluder on the left subclavian arteries, and there was no iatrogenic creation of coarctation of the aorta. Patients have a blood pressure difference of 10 (mmHg) between the legs and arms.



Conclusion

Giant PDA closure is an effective treatment in patients with a PDA and high pulmonary hypertension. In the long term, in the process of following up (3 months after closure) Bosentan and Seldenafil were discontinued.





Transcatheter closure of the patent ductus arteriosus (PDA) has been accepted over the past 20 years as an alternative to surgery in more than 90% of cases, so the safety and effectiveness of transcatheter closure of the PDA was assessed by studying different experiences from different centers. in developing countries.

The purpose is to report our experience with PDA transcatheter closure in a small, low-birth-weight child, with particular attention to adverse events and complications encountered during the procedure.

Background

Patent ductus arteriosus (PDA) accounts for 5–10% of all congenital heart defects and is estimated to occur in approximately 1 in 2000 births [1,2,8]. In full-term babies, the duct usually closes within 72 hours of birth. In contrast, the duct remains patent in approximately 70% of extremely preterm infants (<28 weeks' gestation) within one month of birth. [1,8]. The natural history and clinical presentation of PDA varies widely and is largely dependent on the size of the PDA, the extent of shunting, and pulmonary vascular resistance (PVR). Patients with a small PDA are usually asymptomatic, while patients with a medium to large PDA may complain of symptoms of volume overload, left ventricular heart failure, growth retardation, and recurrent chest infection [3,7,8]. If a patient with a large PDA has not been corrected and is left without protective measures, persistent pulmonary hypertension (PH) and subsequent Eisenmenger syndrome develop [3,6]. In rare cases, complications such as ductal aneurysm, ductal calcification, and endarteritis may occur, so transcatheter closure of the PDA is often required, preferably at an earlier age [3,8]. Surgical ligation of the ducts via thoracotomy has been the traditional method of procedural closure after failed pharmacological treatment. [5,7]. Over the past decade, associations between surgical PDA ligation and vocal cord paralysis, chylothorax, postligation syndrome, and neurodevelopmental delay have been reported. These observations have led to increased interest among healthcare providers in alternative methods of definitive ductal closure in extremely preterm infants after the failure of pharmacological therapy [8,10].

After Portmann described the first successful transcatheter PDA closure in 1971, the procedure became widespread in the 1980s [3,4]. Transcatheter closure of the PDA has become the standard of care in most cases, with surgical options remaining in only a very few cases. Thanks to great technical advances in devices used for pediatric cardiac surgery, even large PDAs can now be used for transcatheter closure [5,6,11].

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