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Case Report

Iliac Artery Dissection After Stenting Preductal Coarctation of the Aorta Associated With Severe Pulmonary Artery Hypertension

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ABSTRACT

Preductal coarctation of the aorta associated with patent ductus arteriosus (PDA) during adulthood is very rare. We herein describe a 19-year-old female patient with this anomaly who presented with ascites and dyspnea (functional class III). A complete evaluation showed a large PDA, a large ventricular septal defect, severe coarctation of the aorta, severe pulmonary arterial hypertension, and severe biventricular dysfunction. Cardiac catheterization revealed evidence of a left-to-right shunt via the ventricular septal defect and vasoreactivity in the pulmonary artery. Staged interventions were, therefore, planned. The PDA was closed, and the coarctation was relieved with a Covered CP Stent. On the first postprocedural day, the patient complained of leg pain. Physical examination showed that she was pulseless. Once again, she was transferred to the catheterization laboratory, where dissection and thrombosis were detected in the iliac and femoral arteries. Balloon angioplasty and stenting of the iliac artery to the femoral artery were performed successfully. During the follow-up, the lower limb pulses were normal, biventricular function was improved, and pulmonary artery pressure was decreased significantly. ***(Iranian Heart Journal 2021; 22(2): 130-135)***

KEYWORDS: Coarctation of aorta, Patent ductus Arteriosus, Covered stent

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Patent ductus arteriosus (PDA) is a common congenital heart disease; nonetheless, the association between this anomaly and preductal coarctation of the aorta in adolescence and adulthood is very rare. [1] Most cases with this association undergo surgery in the neonatal period, but there are a few reports of simultaneous interventions in these cases with the aid of covered stents. [2, 3] Arterial access injury after coarctation stenting is a possible complication; still, the management of this complication is different in various studies. [4]

CASE REPORT

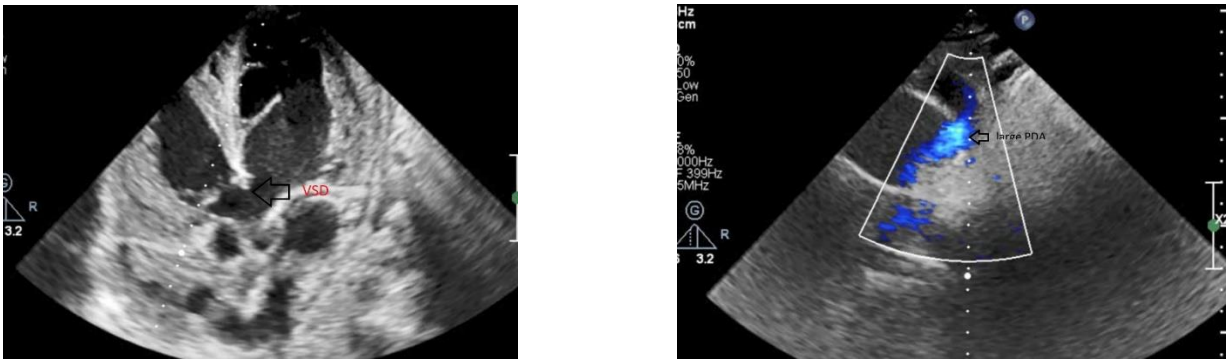
A 19-year-old female patient, a known case of congenital heart disease but on irregular follow-ups, came to our clinic with ascites

and severe dyspnea. The patient was admitted to our hospital. She had not received any drug or management before her referral to us. Physical examination showed differential cyanosis, ascites, and very weak lower limb pulses. In electrocardiography, the rhythm was atrial fibrillation with evidence of biventricular hypertrophy in the precordial leads. Chest X-ray illustrated severe cardiomegaly, and echocardiography demonstrated severe biventricular dysfunction, a large ventricular septal defect (VSD) with a left-to-right shunt, a large PDA with a right-to-left shunt, and severe narrowing in the aorta before the PDA (Fig. 1). Computed tomography angiography subsequently confirmed the echocardiographic data and the existence of significant preductal coarctation of the aorta (Fig. 2). Catheterization was performed for hemodynamic evaluations and possible interventions. The patient's hemodynamic data are presented in Table 1. Given the findings and pulmonary vasoreactivity after O_2 therapy, the patient was candidated for PDA closure and coarctation stenting in the same session.

Table 1: The patient's hemodynamic data and saturation study in left and right catheterism

Variables	Pressure (mm Hg)	Saturation (%)
Left ventricle	140/0-14	93
Right ventricle	95/0-10	62
Pulmonary artery pressure	95/65	73
Ascending aorta	140/70	93
Descending aorta	95/60	88

The eligible anatomy of the coarctation prompted us to perform a simultaneous procedure by using a covered stent to stent the coarctation and to cover the PDA. Accordingly, a Covered CP Stent (45 mm 8 zig) mounted on a BIB Catheter (22×45 mm) was chosen, and it was deployed in the coarctation site. The procedure relieved the stenotic site and covered most parts of the PDA. For this procedure, a 14-F Cook Introducer Sheath was used. The gradient through the coarctation improved completely, and the pulmonary artery pressure declined to 75/35 mm Hg. Postprocedural echocardiography showed a significant improvement in the left ventricular ejection fraction and a small residual flow through the PDA. Additionally, the position of the stent was appropriate with no significant gradient. Unfortunately, the patient complained of pain in the right lower limb. On physical examination, none of the right-side pulses was detectable. Femoral sonography showed complete occlusion in the femoral and iliac arteries at the access point by thrombosis. While surgical repair is the choice for injury and total occlusion in the iliac artery, our patient's high-risk condition led us to opt for percutaneous intervention. Once again, the patient was transferred to the catheterization laboratory, where dissection and thrombosis were detected in the iliac and femoral arteries (Fig. 3). Frequent ballooning and finally the stenting of the iliac artery to the common femoral artery with a Smart Self-Expandable Stent (7×120 mm) was performed successfully (Fig. 4).



(A) (B)

Figure 1: A: Echocardiography shows biventricular enlargement and a large VSD with a left-to-right shunt. B: Echocardiography shows a large PDA with a right-to-left shunt and severe narrowing in the aorta before the PDA.

VSD, Ventricular septal defect; PDA, Patent ductus arteriosus

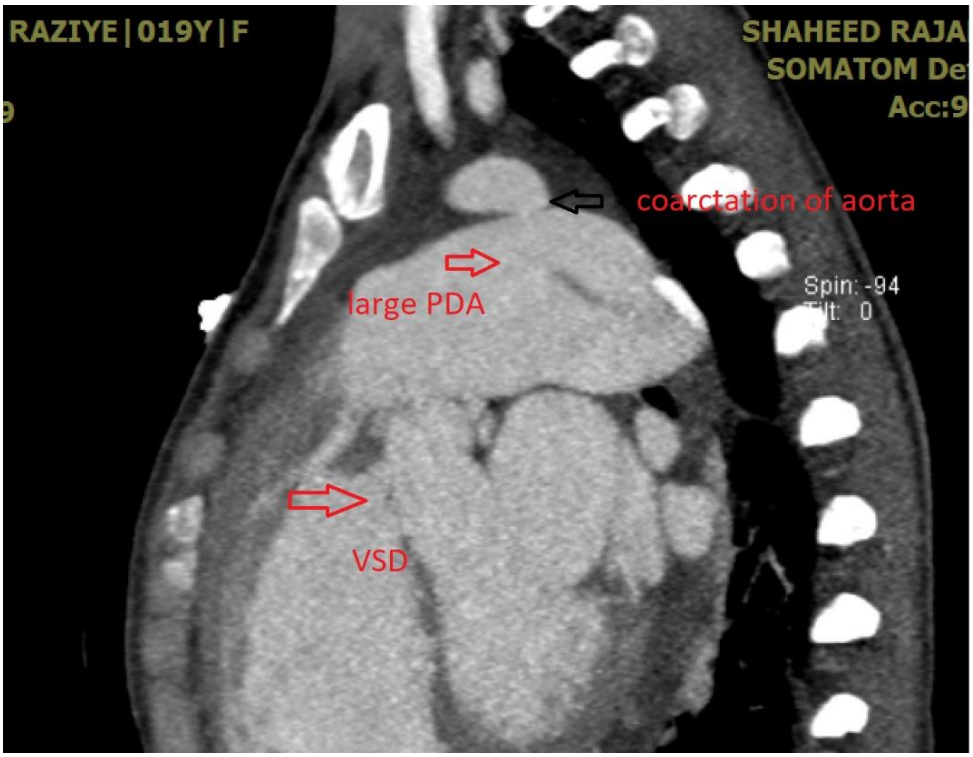


Figure 2: Computed tomography angiography shows a large PDA and significant preductal coarctation of the aorta.

VSD, Ventricular septal defect; PDA, Patent ductus arteriosus

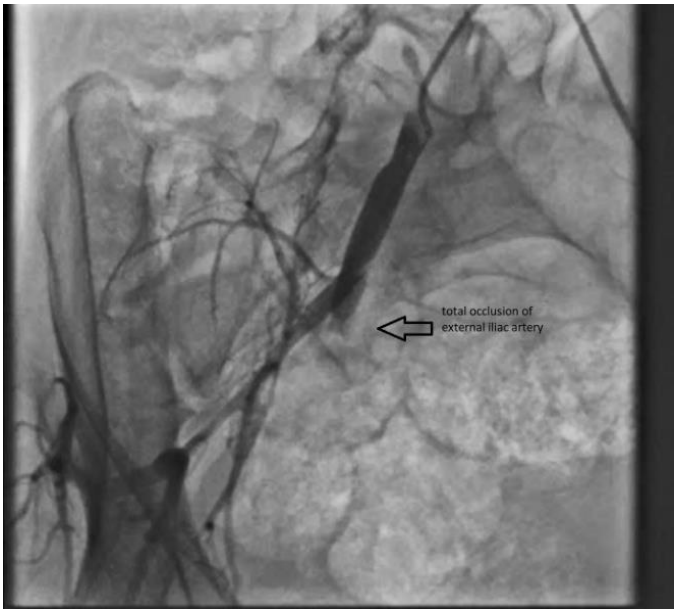


Figure 3: Femoral arteriography shows dissection and thrombosis in the iliac and femoral arteries.

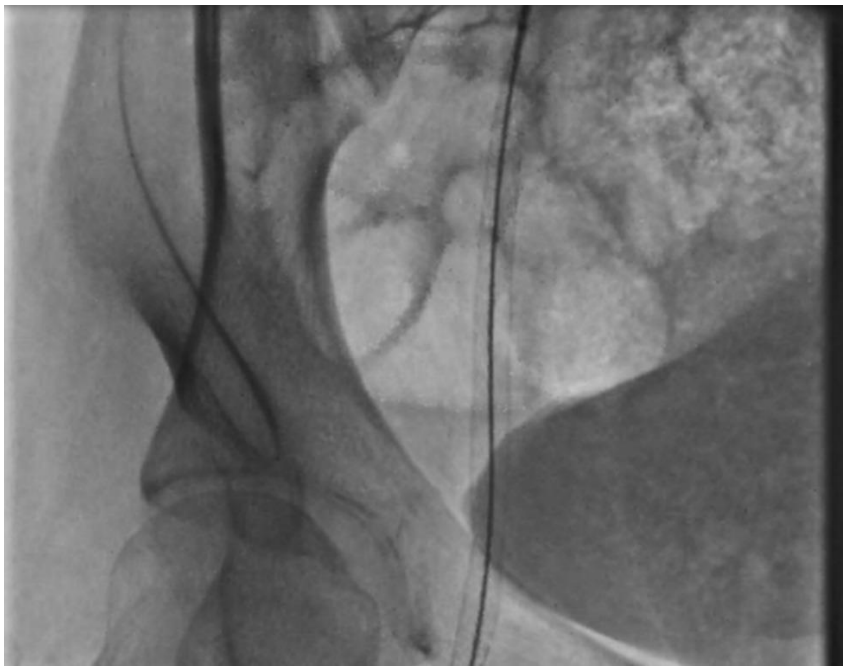


Figure 4: The image depicts the stenting of the iliac artery to the common femoral artery with a Smart Self-Expandable Stent.

DISCUSSION

PDA is a common congenital heart disease seen in 8% to 10% of congenital heart defects. This abnormality is more common in premature neonates. [5] Coarctation of the aorta is the fifth common congenital heart defect, and it is associated with bicuspid aortic valves in 40% to 50% of cases. The association between the coarctation of the aorta and PDA, especially in adults, is rare. [6-8] There are 2 types of coarctation of the

aorta in relation to the position of the duct: preductal and postductal. The preductal or infantile type is seen in neonates and infants. In this type, the coarctation site is before the duct, and the flow of the descending aorta is from the pulmonary artery via the duct. Hence, the closure of the duct could worsen the patient's condition. In this anomaly, differential cyanosis is evident, and the patient is unlikely to reach adulthood. However, in the postductal or adult type, coarctation is after the duct position, and the patient is not dependent on the ductal flow. This type is predominantly seen in adults. The management of the preductal type is more complicated, especially in adulthood, because of the size of the duct and the associated pulmonary arterial hypertension. Surgical repair is an option, and it is preferred in neonates because of the higher incidence of re-coarctation after balloon angioplasty in infants. In contrast, in adults, catheter intervention is more logical given the high risk in this patient population. The percutaneous procedure could be performed in a single stage or sequentially. [9, 10] Not only is a simultaneous procedure less time-consuming but also it reduces costs and radiation doses. There are a few reports of the application of covered stents for a simultaneous intervention on coarctation of the aorta and PDA. Nevertheless, our case is unique from the point of view of the association between PDA, preductal coarctation, severe pulmonary arterial hypertension, and severe biventricular failure. All femoral procedures, including angiography and angioplasty, could have access site arterial complications such as hematoma, retroperitoneal hemorrhage, pseudoaneurysms, arteriovenous fistulae, dissection, and thrombosis. Dissection and thrombosis are very rare complications; however, their incidence increases in tandem with an increase in the size of the sheath or the diameter of the vessel. In the stenting of coarctation of the aorta, not least in cases that require the use of larger sheaths, dissection and thrombosis are more frequent. Commonly, a large sheath should be used in covered stents by comparison with bare stents. There are different management procedures for dissection and thrombosis. For the total occlusion at this site, surgical repair is usually the preferred choice. Our patient's biventricular failure and severe pulmonary arterial hypertension rendered her very high risk for surgery, and we managed her with a self-expandable stent.

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