

# A large basal left ventricular pseudoaneurysm following pediatric cardiac surgery

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## ABSTRACT

Left ventricular pseudoaneurysm (LV-PSA) is a rare complication in children, usually developing after cardiac surgery, percutaneous procedures, infections, or trauma. Herein, we report a case of large basal submitral LV-PSA in a 36-day-old baby, detected 26 days after cardiac operation for hypoplastic arch, aortic coarctation, and small ventricular septal defect. No complications occurred in the first postoperative course, and early postoperative echocardiograms were normal. Despite large dimension of pseudoaneurysm, the baby presented with only mild tachypnea. The baby was successfully operated. Pseudoaneurysm, besides rare, could have an extremely broad and insidious clinical presentation and had to be considered in post-cardiac surgery follow-up echocardiogram at any time lapse.

**Keywords:** Complications, computerized tomography, congenital heart disease, echocardiography

## INTRODUCTION

Left ventricular pseudoaneurysm (LV-PSA) is a rare complication in an infant that could occur after cardiac surgery, percutaneous procedures, systemic or localized infections, and trauma.<sup>[1-7]</sup>

Prompt diagnosis and treatment are needed to avoid fatal complications such as rupture with sudden death, embolization, compression of adjacent structures with dyspnea, heart failure, myocardial infarction, and shock.<sup>[8,9]</sup>

## CASE REPORT

A term female newborn with suspected fetal diagnosis of aortic coarctation was started on prostaglandin E1 in a peripheral hospital. She was then referred to our

pediatric cardiac center. Echocardiogram performed (in day of life 3) confirmed aortic coarctation and revealed transverse arch hypoplasia and a small ventricular septal defect (VSD) (3 mm). On day of life 10 (weight 2.6 kg), she underwent cardiac operation; aorta and aortic arch enlargement plasty with pericardial patch (interdigitating technique<sup>[10]</sup>) was performed using cardiopulmonary bypass with moderate hypothermia, circulatory arrest, and antegrade cerebral perfusion; the small (3 mm) subaortic VSD was closed with 3 polypropylene 6/0 sutures.

No complications occurred in the postoperative course, except for a brief episode of paroxysmal supraventricular tachycardia with no hemodynamic impairment treated with amiodarone. Postoperative echocardiogram performed on the postoperative day (POD) 7 did not reveal pathological findings [Video 1, online resource],

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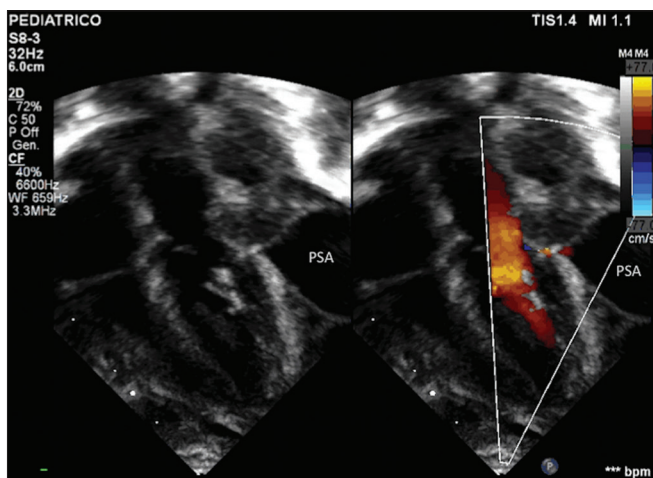
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and the baby was transferred to the neonatal intensive care unit for feeding problems that progressively improved. Follow-up echocardiogram performed on POD 26 revealed a large basal LV-PSA [3.0 cm × 6.0 cm, Figure 1 and Video 2, online resource] with internal clots, multiple internal fibrin strands, and a 2 mm communication with left ventricle on the basal wall in proximity to the atrioventricular junction. Computerized tomography (CT) scan [Figure 2] confirmed the large pseudoaneurysm (internal dimension: 2.5 cm × 5.0 cm) with a 2 mm communication located underneath posterior mitral leaflet; left ventricle, left atrium, pulmonary veins, and left main bronchus were partially dislodged and compressed by LV-PSA. The baby, at 38 days of life (weight 3.0 kg), underwent redo cardiac operation for LV-PSA resection and closure of the communication with cardiopulmonary bypass and cardioplegic arrest. No clinical or laboratory findings suggestive of infections were found, and blood cultures were negative. After chest opening, no macroscopic signs of infection were detected and local swabs were negative. After left atriotomy, left ventricular endocardium was inspected through mitral valve, but no lesions were found, also after the mobilization of posterior mitral leaflet. The epicardial neck of the LV-PSA was identified (3 mm) on the lateral ventricular wall and closed using 3 polypropylene 6/0 sutures with pericardial pledgets; with the aim to strengthen this area, biological glue was applied and a pericardial patch was anchored to the epicardium with a 6/0 polypropylene-interrupted sutures avoiding the course of circumflex coronary artery. Postoperative course was uneventful, and echocardiogram performed on POD 17 confirmed the exclusion of PSA and the closure of the communication with left ventricle [Video 3, online resource]. The baby was discharged on POD 17, and she was asymptomatic at 1-year follow-up.



**Figure 1:** Transthoracic echocardiography showing the large pseudoaneurysm and communication with left ventricle

## DISCUSSION

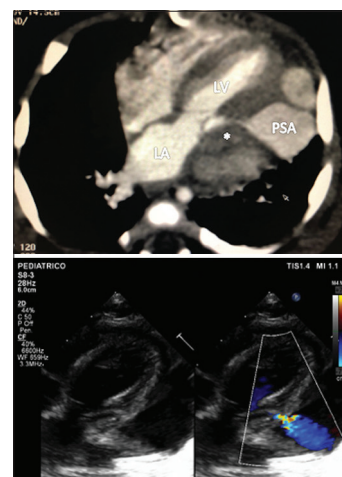
LV-PSA is a rare complication in infant that could occur after cardiac surgery, percutaneous procedures, systemic or localized infections, and trauma.<sup>[1-7]</sup>

Pseudoaneurysms anatomically differ from true aneurysms, because their wall is not constituted from endocardium and myocardium.<sup>[8]</sup> They are more prone to rupture, generating hemopericardium, hemothorax, and sudden death.<sup>[9]</sup> Other reported complications, related also to the location of LV-PSA, are embolization, compression of ventricles, atria, pulmonary veins and arteries, coronary arteries, and bronchi with possible heart failure or myocardial infarction.<sup>[9]</sup>

Infections may also lead to LV-PSA in any region of the ventricle, but an association had been reported between *Staphylococcus aureus* and location in the submitral posterior-lateral wall, probably due to the congenital weakness of this zone.<sup>[3]</sup> In our case, despite the localization, blood cultures and microbiological samples were negative, and the patient had no clinical or laboratory signs of infection.

LV-PSA can be also caused by external (chest blunt trauma) or internal (diagnostic, interventional, or surgical procedures) heart trauma.<sup>[4-6]</sup> Lesions to the inner layer of myocardium could result in a weakening of the ventricular wall and formation of localized hematoma: the hematoma could be initially contained by the pericardium, and then, it could evolve in PSA.<sup>[9]</sup>

Clinical presentation is extremely varied: most common reported symptoms are dyspnea, congestive heart failure, chest pain, cough, and dizziness, but about 12% of patients may be asymptomatic, also patients with large compressing pseudoaneurysms.<sup>[2,9]</sup>



**Figure 2:** Computed tomography scan showing anatomical relationships between left atrium, left ventricle, pseudoaneurysm, communication (\*), and superimposable echocardiographic section

Despite the large size of PSA and compression of nearby anatomical structures, in our case, the baby had only mild tachypnea with no hemodynamic impairment. The analysis of the first operation and postoperative course did not reveal maneuvers or events (as longer cross-clamp time or postoperative hemodynamic instability) that could justify the development of LV-PSA. Ikeda *et al.* reported a case similar to ours, but it was differently characterized by intraoperative defibrillation, re-institution of cardiopulmonary, and necessity to leave the chest open.<sup>[1]</sup> Anyway, we could only speculate that minimal distortion of structures or possible minimal trauma during the operation could have happened.

Accurate detection, at first through postoperative follow-up echocardiography (then confirmed with CT scan or magnetic resonance imaging) and treatment are mandatory to avoid complications. Standard treatment for LV-PSA is surgery; technical innovations progressively reduced mortality rate to about 10%–20%, in any case inferior to the reported risk of rupture of 30%–45%.<sup>[1,9]</sup> Percutaneous closure with implantable device is a good option if feasible, according to the weight of patients, anatomical, and clinical characteristics.<sup>[11]</sup>

## CONCLUSIONS

LV-PSA is a rare complication characterized by nonspecific symptoms; it could occur after cardiac surgery. It has to be considered in post-cardiac surgery follow-up echocardiography at any time lapse; once diagnosed, it must be treated surgically or interventionally to avoid fatal events.

### Informed consent

The parents of the patient gave the consent to use clinical data for publication.

### Declaration of patient consent

The authors certify that they have obtained all appropriate patient consent forms. In the form, the parents of the patient have given their consent for images and other clinical information to be reported in the journal. The parents of the patient understand that names and initials will not be published and due efforts will be made to conceal patient identity, but anonymity cannot be guaranteed.

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Nil.

### Conflicts of interest

There are no conflicts of interest.

## REFERENCES

1. Ikeda N, Stone DM, Kuriakose EM, Frost J, Haw MP, Vettukattil JJ, *et al.* Left ventricular pseudoaneurysm following surgical repair of ventricular septal defect in an infant. *Pediatr Cardiol* 2019;40:1097-100.
2. Gelehrter S, Wright G, Tamera Gless T, Ludomirsky A, Ohye R, Edward Bove E, *et al.* Left ventricular outflow tract pseudoaneurysms in congenital heart disease. *Am J Cardiol* 2002;90:806-9.
3. Desai M, Gandhi H, Mishra A. Post-infective pericarditis left ventricular pseudoaneurysm: A case report and review of literature. *Cardiol Young* 2015;25:358-61.
4. Alhuzaimi A, Hosking M, Human D. Left ventricle pseudoaneurysm after aortic valvuloplasty. *Pediatr Cardiol* 2012;33:168-71.
5. Taqatqa AS, Caputo M, Kenny DP, Daib KA. Surgical repair of left ventricular pseudoaneurysm following periventricular device closure of muscular ventricular septal defect. *J Cardiol Surg* 2016;31:697-9.
6. Vitiello R, McCrindle BW, Nykanen D, Freedom RM, Benson LN. Complications associated with pediatric cardiac catheterization. *J Am Coll Cardiol* 1998;32:1433-40.
7. Currie A, Venugopal P, Hayes N, Qureshi S, Austin C. Delayed presentation of a post-traumatic left ventricular pseudoaneurysm in a child. *Ann Thorac Surg* 2010;89:1633-5.
8. Ohlow MA. Congenital left ventricular aneurysms and diverticula: Definition, pathophysiology, clinical relevance and treatment. *Cardiology* 2006;106:63-72.
9. Frances C, Romero A, Grady D. Left ventricular pseudoaneurysm. *J Am Coll Cardiol* 1998;32:557-61.
10. Burkhart HM, Ashburn DA, Konstantinov IE, De Oliveira NC, Benson L, Williams WG, *et al.* Interdigitating arch reconstruction eliminates recurrent coarctation after the Norwood procedure. *J Thorac Cardiovasc Surg* 2005;130:61-5.
11. Gokalp S, Ugan Atik S, Saltik IL. Percutaneous closure of a left ventricular pseudoaneurysm after transcatheter ventricular septal defect closure. *Cardiol Young* 2020;30:743-5.