A 4-month-old child weighing 5 kg was admitted to our hospital with features of heart failure. Clinical examination of the child revealed a small pulsating lump in the epigastrium. Chest roentgenography suggested dextrocardia and cardiomegaly with pulmonary plethora. Echocardiography revealed situs solitus, dextrocardia, bilateral superior vena cava, large inlet ventricular septal defect, amounting to single ventricle, and severe pulmonary artery hypertension. There was a right ventricular diverticulum which passed through the foramina of Morgagni to give rise to a pulsating lump in the epigastrium. Right ventricular diverticulum presenting with a pulsating mass in the abdomen is a rare entity. The confirmation of diverticulum was made with histopathology.

Keywords: Cardiac anatomy, myocardial morphology, pathology, right ventricle

We decided to do PA banding and excise any diverticulum, if found intraoperatively. Decision of banding was backed by very large ventricular septal defect amounting to single ventricle and low body weight.

Operation was done through midline sternotomy without cardiopulmonary bypass. There was a pulsating outgrowth from the anterior surface of the RV traversing through the foramina of Morgagni into abdomen [Figure 2a and b]. The ventricular end of the diverticulum was clamped and divided, without cardiopulmonary bypass. The RV was repaired by continuous 4-0 prolene mattress sutures over Teflon felt [Figure 3]. The diaphragmatic opening was closed with 4-0 prolene by continuous technique. PA banding followed thereafter.

Histopathological examination of the specimen showed a central lumen lined by all three layers of cardiac tissue, i.e., endocardium, myocardium, and epicardium [Figure 4a, ×20, H and E, stain]. In addition, there were some feeding vessels in myocardium with intraluminal...
thrombus [Figure 4b, ×4, H and E, stain] and lined by the endothelium. Immunohistochemistry revealed CD34 cells lining the feeding vessels [Figure 4c IHC]. The presence of intramural thrombus and CD34 cells is pathognomonic of hemangiomatous changes in the wall of diverticulum.

The child made an uneventful recovery after the surgery and is doing well on follow-up.

**DISCUSSION**

Congenital ventricular diverticulum is a very rare anomaly. They are characterized by outgrowth of the full-thickness ventricular wall and corresponding finger-like projection from the internal cavity. The true incidence remains unknown partly because of rarity and asymptomatic nature of the pathology. A prevalence of 0.05/10,000 live births has been reported in very old papers.\(^1\)

In Ohlow’s series,\(^2\) 60% of patients were without symptoms. The most common presentations were syncope and rhythm disturbances, followed by chest pain and embolic events. A vast majority of patients are incidentally diagnosed when subjected to cardiac imaging for associated heart defects. Magrassi et al. found an interesting association between right ventricular diverticulum and tetralogy of Fallot though any heart defect is possible.\(^3\) Sherman et al.\(^4\) also found conotruncal anomalies to be the most common associated lesions.

Ventricular diverticulum is importantly differentiated from ventricular aneurysm by having all three layers of myocardium. In fact, it shows a contractile function synchronous with the ventricle. Contrastingly, aneurysms are always akinetic or dyskinetic.\(^5\)

Ventricular diverticula are either apical or nonapical in origin. Apical diverticula are contractile projections extending into the abdomen through a defect in the diaphragm. There may be midline thoracoabdominal defects, as described by Cantrell et al.\(^6\) These apical projections are very commonly associated with other congenital heart defects and malpositions of the heart. Nonapical diverticula are generally isolated without any midline defects. Our experience was completely opposite in this case. The child had nonapical diverticulum (arising from the anterior surface of the RV) but with all the associated features of apical ventricular diverticula, namely dextrocardia, heart defects, and pulsating epigastric hernia.

Histopathological examination of the diverticular tissue was also uncharacteristic in having typical hemangiomatous changes in the myocardium. The intramural thrombus inside the feeding vessels and abundance of CD34 cells were very typical of hemangiomas.

Natural course of these diverticula is decided by associated heart defects. Isolated diverticula can be put
on close follow-up as complications are very rare. As the world literature of this entity is scanty, it is not surprising to encounter atypical presentations.

Consent

Consent for publication was granted by the patient’s parents.

Declaration of patient consent

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

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Conflicts of interest

There are no conflicts of interest.

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