

## An extremely rare complication of congenital heart surgery: interventricular septal hematoma

Zeynep Eyileten<sup>1</sup>, Anar Aliyev<sup>1</sup>, Ömer Çiftçi<sup>2</sup>, Tayfun Uçar<sup>2</sup>, Çağlar Ödek<sup>3</sup>, Tanıl Kendirli<sup>3</sup>, Ercan Tutar<sup>2</sup>, Semra Atalay<sup>2</sup>, Adnan Uysalel<sup>1</sup>

Departments of <sup>1</sup>Cardiovascular Surgery, <sup>2</sup>Pediatric Cardiology, and <sup>3</sup>Pediatric Intensive Care Unit, Ankara University Faculty of Medicine, Ankara, Turkey. E-mail: zeyileten@gmail.com

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We report a rare case of interventricular septal hematoma after patch closure of a perimembranous ventricular septal defect in a 10-month-old infant. Intraoperative transesophageal echocardiography was not performed. Routine transthoracic echocardiography at the 1<sup>st</sup> postoperative hour showed a huge intramural hematoma causing severe thickening of the ventricular septum. The patient's hemodynamics were stable and surgical revision was not required. The patient recovered well without complication.

**Key words:** myocardial injury, hematoma, ventricular septal defect, complication.

Various complications can occur in less than 5% of cases after ventricular septal defect (VSD) closure, including residual left-to-right shunt, transient arrhythmias and thrombus formation<sup>1</sup>. Hemorrhagic dissection of the interventricular septum (IVS) after patch closure of a VSD is a rare complication.

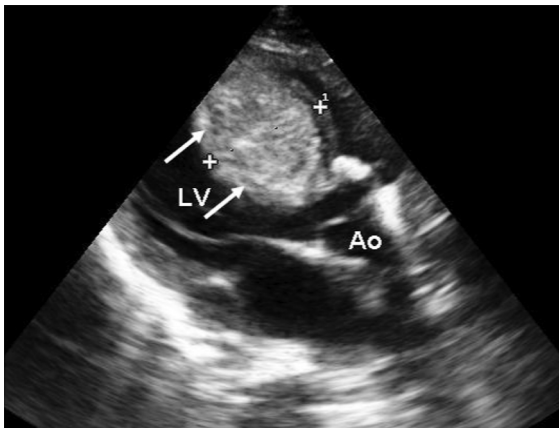
### Case Report

A 10-month-old infant was referred to the Pediatric Cardiology Department of Ankara University with a diagnosis of perimembranous VSD and a history of failure to thrive, sweating, and repeated pulmonary infections. On admission, the physical examination showed perioral cyanosis during crying, a 4°/6° holosystolic murmur at the left sternal border accompanied by a hyperactive precordium and moderate tachypnea. Echocardiography revealed a large (8 mm) perimembranous VSD with an interventricular pressure gradient of 52 mmHg.

Surgical repair was performed through a right atrial approach, using aorto-bicaval cannulation with mild hypothermia and antegrade cardioplegic arrest. During 35 minutes of aortic cross-clamp time, the VSD was closed using a Dacron patch (1 x 0.8 cm). Multiple pledget-supported horizontal mattress sutures - beginning from the insertion area of the

muscle of Lancisi - were placed superficially and carefully along the inferoposterior margins of the defect, paying careful attention to the conduction system. Care was given to avoid the aortic annulus, eventually transitioning to the septal leaflet of the tricuspid valve. The remainder of the VSD underneath the septal leaflet of the tricuspid valve was closed through the valve leaflet. A patch was then appropriately tailored and inserted by attaching the interrupted sutures.

Upon arrival in the intensive care unit, the patient's hemodynamic variables were stable, but myocardial ischemia signs appeared (anterolateral ST-segment depression associated with increased levels of cardiac enzymes [troponin: 75.71 ng/ml, creatine phosphokinase-MB: 81.4 ng/ml]). Routine postoperative transthoracic echocardiography showed severe hypoechoic (24x32 mm) thickening of the IVS with neo-cavitations beneath the VSD patch without ventricular dysfunction (Fig. 1). There was a thinned endomyocardial border surrounding the cavitory defect. Ventricular myocardium was identified in the regions outside the cystic areas. Neither atrioventricular valves nor ventricular outflow tracts were obstructed by the mass. These findings suggested the diagnosis of interventricular septal hematoma (IVSH). As the baby was



**Fig. 1.** Two-dimensional echocardiographic image of interventricular septal hematoma without left ventricular outflow obstruction; arrows show the hematoma. LV: Left ventricle; Ao: Aorta.



**Fig. 2.** Two-dimensional echocardiographic image of marked regression of the hematoma two weeks later.

hemodynamically stabilized, we decided not to re-intervene. Our patient remained stable in the following days. The evolution of the hematoma was followed by serial echocardiographic examination. The echolucent acoustic density of the hematoma regressed spontaneously over the following days. The postoperative course was uneventful, and the patient was extubated on postoperative day 2. When the patient was discharged 13 days after the operation, the septal thickness was 15 x 30 mm, and the hematoma had been replaced by hyperechoic material (Fig. 2).

At the six-month follow-up, there had been no complications, and the patient remained asymptomatic. Echocardiography showed resolution of the hematoma and only mild dyskinesia of the IVS.

## Discussion

The PubMed database revealed eight patients related to occurrence of hematoma in the IVS following congenital heart defect closure<sup>2-8</sup>. One of these patients suggested spontaneous intraoperative development of an IVSH during operative repair of a large atrial septal defect<sup>3</sup>.

In the non-pediatric population, IVSH has been described after myocardial infarction, chest trauma, percutaneous coronary artery intervention or angiography, cineventriculography, endomyocardial biopsy, and coronary artery bypass grafting.

The signs of myocardial infarction followed by the rapid postoperative increase in the thickness of the IVS, as in our patient, suggest a surgical trauma of the septal branch during placement of the septal patch sutures. The resultant bleeding probably dissected along a plane beneath the endocardium, resulting in a hematoma that bulged out into the ventricular cavity.

Because of the rarity of this complication, the optimal treatment strategy is not known. Hemodynamic stability is one of the main factors in deciding the management. In half of the reported cases, prompt re-interventions were carried out, and the IVSH was drained either surgically<sup>1,6,7</sup> or with needle puncture<sup>5</sup>. A conservative approach was chosen in the remaining half. Our patient's hemodynamics also led us to manage the infant conservatively.

Intraoperative transesophageal echocardiography is essential in all types of congenital heart surgery to facilitate the early detection of any complications. Size and the rate of enlargement are also important in decision-making. If the IVSH is diagnosed after the patient has left the operating room, as in our patient, serial echocardiograms should be performed until the hematoma is stabilized and periodically thereafter until it has resolved. If it enlarges, or causes any other serious complications, such as ventricular outflow tract obstruction, the hematoma should be evacuated.

An IVSH can cause ventricular dysfunction and give rise to a block of the electrical circuitry of the ventricle, as in our case. The electrocardiogram of our patient demonstrated right bundle branch block. All previously reported patients recovered uneventfully without hospital mortality, except for one

among the surgical group, who had a good ventricular function and no complaints at his last checkup, but who suddenly died eight months later<sup>6</sup>. His death was believed to be related to lethal arrhythmias.

Although transient heart block, junctional ectopic tachycardia, and transient ventricular dysfunction were reported with this complication, it was not clear that these findings were actually related to the hematoma. Pediatric cardiologists, cardiac intensive care unit staff and heart surgeons should be aware of this rare entity because perioperative decisions regarding treatment could potentially complicate otherwise straightforward cases. Conservative management may be an option for dealing with IVSH. Watchful waiting, as in our case, may be less harmful than hematoma evacuation. Review of larger congenital heart surgery registries might be helpful and would lend insight into the relative frequency and natural history of this rare postoperative complication.

## REFERENCES

1. Mavroudis C, Backer CL, Jacobs JP, Anderson RH. Ventricular septal defect. In: Mavroudis C, Backer CL (eds). *Pediatric Cardiac Surgery* (4<sup>th</sup> ed). West Sussex, UK: John Wiley & Sons, Ltd.; 2013: 311-341.
2. Drago M, Butera G, Giamberti A, Lucente M, Frigiola A. Interventricular septal hematoma in ventricular septal defect patch closure. *Ann Thorac Surg* 2005; 79: 1764-1765.
3. Bernasconi A, Cavalle-Garrido T, Redington A. Spontaneous intraoperative ventricular haematoma in a neonate. *Heart* 2007; 93: 898.
4. Jensen R, Burg P, Anderson C, et al. Postoperative ventricular septal hematoma: natural history of two pediatric cases. *J Thorac Cardiovasc Surg* 2007; 133: 1651-1652.
5. Padalino MA, Speggorin S, Pittarello D, Milanese O, Stellin G. Unexpected interventricular septal hematoma after ventricular septal defect closure: intraoperative echocardiographic early detection. *Eur J Echocardiogr* 2007; 8: 395-397.
6. Zuhang J, Chen JM, Huang X. Interventricular septal dissecting haematoma. *Eur Heart J* 2008; 29: 2488.
7. Jacobs S, Rega F, Vlasselaers D, Gewillig M, Meyns B. Dealing with a septal hematoma after switch operation with ventricular septal defect closure. *Heart Surg Forum* 2010; 13: 263-264.
8. Mart CR, Kaza AK. Postoperative dissecting ventricular septal hematoma: recognition and treatment. *ISRN Pediatr* 2011; 2011: 534940.