Unexpected interventricular septal hematoma after ventricular septal defect closure: Intraoperative echocardiographic early detection

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Abstract We report a rare case of an interventricular septal hematoma in a 4-month-old infant after patch closure of a membranous ventricular septal defect. Routine intraoperative transesophageal echocardiographic monitoring allowed immediate detection of intraventricular hematoma that was promptly treated by simple needle drainage after weaning off cardiopulmonary bypass. Patient’s postoperative clinical course was uneventful.

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The use of an intraoperative transesophageal echocardiography has become integral part of surgical repair of congenital heart disease.1

We describe a case of interventricular septal hematoma in a 4-month-old infant who underwent surgical repair of a large ventricular septal defect. Transesophageal echocardiography allowed prompt successful treatment of this unusual and unexpected complication.

Case report

A 6 kg female baby was admitted to our Unit with diagnosis of subaortic membranous ventricular septal defect (VSD) and failure to thrive.

She underwent surgical repair by aorta–bicausal cardiopulmonary bypass (CPBP) at moderate hypothermia (32 °C), with left atrial venting and cardioplegic arrest. Transesophageal echocardiography (TEE) was routinely performed with a miniMulti TEE Philips Medical System® multiplane probe before starting CPBP (Fig. 1). The VSD was routinely closed with a 0.4-mm Goretex® patch, with continuous suture, through a right atriotomy. After declamping, despite stable hemodynamics, ECG showed sinus rhythm with enlarged QRS complex, and continuous TEE monitoring revealed a hypoechoic mass in the thickened interventricular septum (IVS), presumably a hematoma, bulging both on the right and left sides (Fig. 2a and b). Ventricular function was not impaired and neither atrioventricular valves nor ventricular outflows tract was affected by the mass. During rewarming, by TEE guidance, the hematoma was completely drained with a fine 16-Gauge needle (Fig. 3a) through the left ventricular apex. On stable hemodynamic we weaned the child off CPBP and reverse heparinization. She remained stable and ECG slowly normalized. Since the hematoma reappeared, via TEE guidance, we drained it again twice, until we could see it reabsorbed (Fig. 3b). The patient was transferred to ICU on stable hemodynamics. Troponin levels
were checked on arrival and on POD#1 (maximum value: 164.3, returning within normal limits on POD#1). Postoperative course was uneventful and patient was extubated on POD#1. She was discharged home on POD#8. Predischarge 2D echocardiography showed absence of residual shunts and good ventricular function; IVS appeared mildly thickened in the distal portion at the site of previous hematoma, with no paradoxal motion (Fig. 4).

Discussion

Nowadays intraoperative TEE is a useful tool in evaluating immediate surgical result in patients with congenital heart disease.1,2 Despite being an invasive technique, overall complication rate is of the order of a fraction of 1% in most series.

Potential adverse effects of compression of tracheobronchial structures and the descending aorta3,4 by TEE probe in small infants have been described. We use TEE for all congenital cardiac surgery procedures in patients whose weight was greater than 5 kg, so as to evaluate preoperative diagnosis accuracy, and postoperative surgical

Figure 1 Transesophageal preoperative 4-chamber view, showing ventricular septal defect (VSD). IVS, interventricular septum; LA, left atrium; LV, left ventricle; RA, right atrium; and RV, right ventricle.

Figure 2 (a) Transesophageal postoperative 4-chamber view. Note the interventricular septal hematoma (*), and the fine 16-Gauge needle () used to drain the IVS hematoma, during and after cardiopulmonary bypass. LV, left ventricle; RA, right atrium; and RV, right ventricle. (b) Transesophageal postoperative 4-chamber view. Note the interventricular septal hematoma (*), after drainage, with chest closed; it appears to be smaller in size. LV, left ventricle; RA, right atrium; and RV, right ventricle.

Figure 3 (a) Transesophageal postoperative 4-chamber view. Note the interventricular septal hematoma (*), and the fine 16-Gauge needle () used to drain the IVS hematoma, during and after cardiopulmonary bypass. LV, left ventricle; RA, right atrium; and RV, right ventricle. (b) Transesophageal postoperative short axis view. Note the IVS hematoma (*), and the mitral valve papillary muscles (-). LV, left ventricle; RA, right atrium; and RV, right ventricle.
As reported elsewhere, in our 10-year experience, it has been a highly useful and safe tool that helps to achieve the best results for our patients.

Various complications have been reported after closure of VSD, such as atrioventricular block, patch dehiscence and thrombus formation. The occurrence of an interventricular septal hematoma is very rare. A similar interventricular septal hematoma after VSD closure has recently been reported by Drago et al. but late diagnosis in ICU has complicated the postoperative course with delayed sternal closure and prolonged hospital stay.

In our experience, the immediate recognition of this unusual complication by TEE made the hematoma evacuation possible promptly, and allowed a regular postoperative course and hospital stay. Considering that when treated conservatively, mortality for this kind of complication is reported to be as high as 90%, we believe that the intraoperative echocardiographic assessment has drastically reduced the impact of this potentially lethal complication on our patient’s clinical course.

In conclusion, we advocate routine use of intraoperative TEE in congenital cardiac surgery. Its benefits are by far superior to the rare complications that can occur and allow optimal surgical repair and postoperative treatment.

References