

# Imaging of a Case of Atrioventricular Septal Defect: The added value of using the Third Dimension

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## Abstract

Atrioventricular septal defects (AVSD) entails a wide range of morphological anomalies including the interatrial and interventricular communications and the atrioventricular (AV) valve(s). However, “En face” visualization of these anomalies could not be done using standard two-dimensional echocardiography. Therefore, we report a case that highlights the role of three-dimensional echocardiography in imaging AVSDs.

## Case presentation:

24-years old male patient presented to our medical facility complaining of exertional dyspnea and easy fatigability for 4 years. On clinical examination, a loud systolic murmur is heard over the left parasternal area. 2D Transthoracic Echocardiography (2D TTE) revealed a large ostium primum atrial septal defect (ASD), a cleft in the left and right atrioventricular valves with mild regurgitation and a small restrictive inlet ventricular septal defect (VSD). Marked hypertrophy of the right ventricular free wall with increased systolic gradient across the right ventricular outflow tract (RVOT) to 50 mmHg. 3D Transesophageal echocardiography (TOE) with zoomed and full volume mode acquisition revealed a common AV valve with common annulus with clear visualization of the five leaflets. Moreover, the cleft in the left AV valve is directed towards the interventricular septum (IVS) with small coaptation gap seen at the central orifice. An oval-shaped large ostium primum ASD is seen from both the right and left atrial perspectives. Multiple small fenestrated VSDs are seen in the inlet septum. Associated infundibular hypertrophy is noted with normal pulmonary valve orifice (Arrow) (Figure 1, Video 1,2). So, we report a case of complete AVSD associated with infundibular stenosis. The patient was referred for surgical repair of the AV valve, closure of the ASD and VSDs and reconstruction of the RVOT.

Although being one of the common defects encountered by pediatric cardiologists and echocardiographers, imaging of the AVSD associated defects remains challenging.<sup>(1)</sup> Residual cleft and valve dysplasia are one of the common causes for further operations.<sup>(2,3)</sup> With the help of 3D echocardiography, fine anatomical details of the AV valve(s) and associated defects of AVSDs can be clarified.<sup>(4)</sup> Accordingly, 3D echocardiography is highly recommended to provide a clear picture to the surgeon to avoid future reinterventions.

**Disclosure: All authors declare no conflict of interest**

## References:

1. Smallhorn J.F. Cross-sectional echocardiographic assessment of atrioventricular septal defect: basic morphology and preoperative risk factors. *Echocardiography*. 2001; 18: 415-32
2. Barrea C., Levasseur S., Roman MK, Nii M. Three-dimensional echocardiography improves the understanding of left atrioventricular valve morphology and function in atrioventricular septal defects

undergoing patch augmentation J Thorac Cardiovasc Surg 2005;129:746-53

3. Lange A, Mankad P, Walayat M, Palka P, Burns JE, Godman MJ. Transthoracic three-dimensional echocardiography in the preoperative assessment of atrioventricular septal defect morphology .Am J Cardiol.2000;85:630-5
4. Kutty S. , Smallhorn J.F. Evaluation of atrioventricular septal defects by three-dimensional echocardiography: benefits of navigating the third dimension J Am Soc Echocardiogr . 2012 ;25:932-44

Figure 1: (Panel A): 2D TOE (RV inflow-outflow view) shows marked RVOT hypertrophy. (Panel B, C): 2D TOE and TTE (Four chamber views) shows a large ostium primum ASD. (Panel D): Zoomed mode of the AV valve from the ventricular perspective confirms the presence of a common AV annulus with five leaflets (superior and inferior bridging leaflets, left mural leaflet and anteroseptal and posterior leaflets). (Panel E, F): Zoomed mode of the IAS from both left and right atrial perspectives shows an oval-shaped ostium primum ASD.

Video 1: 3D TOE, Zoomed mood of the common AV valve from ventricular perspective

Video 2: 3D TOE (Full volume, 4 beat acquisition) shows multiple fenestrated inlet VSDs and marked RVOT hypertrophy.

