Imaging Assessment of the Atrial Septum

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Imaging Assessment of the Atrial Septum

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As a faculty member for this program, I disclose the following relationships with industry:

(GRS): Grant/Research Support  (C): Consultant  (SB): Speaker's Bureau
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W.L. Gore Medical: C, Echo Core Lab
Objectives

- Describe the anatomy of the atrial septum
- Review the pertinent echo characteristics
  - Transthoracic
  - Transesophageal
  - Intracardiac
  - 3D
Embryology - Atrial Septation

- As the ostium primum closes, the ostium secundum forms by breakdown of a portion of the posterior part of the septum primum.

- The septum secundum forms along the roof of the atrial segment to the right of the septum primum and grows in an arc inferiorly and anteriorly.

- The arc of the septum secundum does not close completely, forming the border of the foramen ovale.
Anatomy

1 = Secundum defect
2 = Primum defect
3 = Sinus Venosus defect
4 = Coronary Sinus defect
Anatomy

Courtesy Dr. Robert Anderson
Anatomy

Secundum ASD

- Defect of the septum primum in the area of the fossa ovalis
- Size varies from 2-4 mm to 2-4 cm
- May be one defect or several small (fenestrations)
- Account for 70 % of all atrial level defects
Sinus Venosus Septal Defect

- Right upper pulm veins
- Defect
- Right lower pulm vein
- Oval fossa

Courtesy Dr. Robert Anderson
Anatomy

Sinus Venosus Septal Defect

- Defect in the posterior atrial septum
- 5-10% of ASDs
- Commonly associated with anomalous PVR
Ostium Primum Defect

Well-formed atrial septum

Shunting at atrial level through AVSD

Courtesy Dr. Robert Anderson
Primum ASD

- Deficiency in endocardial cushion tissue - inferior atrial septum
- Accounts for 5-10% of ASDs
- Associated cleft anterior leaflet MV mitral regurgitation
Echocardiographic Assessment

- **4-Chamber View**
  - AV valve rim
  - RUPV to IVC rim
- **Bi-caval View**
  - SVC rim
  - IVC rim
- **Short axis View**
  - Aortic rim
  - Posterior rim

*Images and references:*

Secundum ASD Anatomic Sub-types

- Deficient aortic rim
- Deficient posterior rim
- Central defect
- Multi-fenestrated
- Multiple
- Deficient IVC rim

AORTA
Echo Assessment – Transthoracic Subxiphoid

- Location and # of Defects
- Diameter
- Atrial septum length
- Rims
- RUPV
- Anomalous Pulm Veins to SVC/IVC
- RV Size
- Pulmonary Valve
Echo Assessment – Transthoracic Subxiphoid
Echo Assessment – Transthoracic Subxiphoid
Echo Assessment – Transthoracic Apical
Apical 4 chamber view demonstrates right atrial and ventricular volume overload.

- AV Valve rim
- TV Regurgitation
- Estimated RV Pressure (PAP)
Echo Assessment – Transthoracic Parasternal
Echo Assessment - Transesophageal

- TEE usually necessary except smaller children
- Aortic (Anterior-Superior) rim deficiency is common
- 30-60° is good for evaluating anterior and posterior rims
TEE - Aortic Rim

- Sequential imaging and rim measurement at 0°, 15°, 30°, 45°, 60°, and 75°
Echo Assessment - Transesophageal

- Bicaval view shows SVC and IVC rims
- Inferior rim requires TEE manipulation to assess the IVC
Echo Assessment - Transesophageal

- Transgastric view also shows SVC and IVC rims
- ASD diameter
- Better alignment for Doppler evaluation of caval flow
Echo Assessment - Intracardiac

- Intracardiac echo helpful to look at ASD in adults undergoing cardiac catheterization for other reasons
- Can assess candidacy for device closure at that time or at a later date
Echo Assessment - Intracardiac

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Echo Assessment - Intracardiac

- ICE is best way to assess IVC rim
- Complex ASD’s may be more difficult to assess with ICE
- Recommended when available
- Location of max diameter varies with shape of defect
- Relationship to surrounding structures
- Correlation with Balloon sizing was better for round defects than for oval defects

Jeong-Sook S et al. JASE 2012;25:1031-40
Multi-modal ASD Measurement

ASD – Examples
ASD – Examples
ASD – TEE Patient 1
ASD – Example 1
ASD – Example 2

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ASD Example 2
Sinus Venosus Defect

IVC Deficient Rim
Thank You
Echo Correlation – 3D

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