Outflow Tract View: Normal and Abnormal

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Outline

- Review anatomy of normal outflow tracts
- Imaging of the outflow tracts in the fetal heart
- Differential diagnosis of abnormal outflow tract view
- Brief review of Conotruncal defects
Conotruncal Defects

- Defects of the outflow tracts, constitute 15-20% of CHD

- Key events in formation of outflow tracts
  - Leftward shift of the conotruncus to override the muscular septum
  - Septation of the contruncus
  - Spiraling of the outflow tracts
Outflow Tracts- Checklist

- Are there two outflow tracts?
- Ventriculoarterial concordance?
- Great arteries cross each other?
- Caliber of pulmonary trunk vs ascending aorta
- Excursion /size of aortic and pulmonic valves and sub valvar area
Imaging Outflow tracts

Source: Echocardiographic Anatomy in the Fetus: Chiappa EM, Cook CC, Botta G, Silverman NH
Left ventricular outflow view

Source: www.aium.org
Right ventricular outflow view

Source: www.aium.org
3 Vessel View

Source: www.aium.org
Longitudinal views

Source: www.aium.org
Short axis view - basal
Case 1
Case 1
Case 1
Truncus Arteriosus
Truncus Arteriosus

- Single arterial trunk arises from the heart giving rise to aorta, pulmonary arteries and the coronary arteries
- 1.2% of CHD
- 33% of patients have Di-George syndrome (Deletion in chromosome 22q11)
Truncus Arteriosus

- Truncal valve overrides the large ventricular septal defect
- Truncal valve is dysplastic and often insufficient (50%), stenotic in about 33% of patients
- Neonatal congestive heart failure necessitating repair
Case 2
Case 2
Case 2
Transposition of Great Arteries (d-TGA)
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- 4.7% CHD
- VSD may be present (40%) or intact ventricular septum (IVS)
- Pulmonary/ sub pulmonic stenosis may be present
Transposition of Great Arteries (d-TGA)

- With TGA/IVS, severe cyanosis is present
- Patency of the foramen ovale and ductus arteriosus for mixing
Case 3
Tetralogy of Fallot

1. Pulmonary stenosis (thickened, narrow pulmonary outflow tract)
2. Thickened right ventricle wall
3. Ventricular septal defect
4. Aorta overrides septal defect
Tetralogy of Fallot

- Large ventricular septal defect (VSD)
- Aorta is large and overrides VSD
- Size discrepancy in 3 vessel view (pulmonary trunk smaller than aorta)
Tetralogy of Fallot

- Ductus arteriosus frequently small
- Absent pulmonary valve – aneurysmal dilation of the pulmonary arteries
- Pulmonary atresia (valve does not form)
- Reversal of flow in the ductus arteriosus indicates critical pulmonary stenosis (ductal dependant)
Case 4
LVOT
Aortic valve Doppler
Critical Aortic Stenosis

- Severely obstructive aortic valve - thick, doming
- Dilated poorly functioning left ventricle
- Restricted mitral valve opening
- Mitral regurgitation
- Aortic valve velocity may be normal
Critical Aortic Stenosis

- Reversal of flow in the aortic arch and foramen ovale (FO)
- Restrictive FO – cardiomegaly and left atrial dilation
- Mid gestation severe aortic stenosis may evolve to hypoplastic left heart syndrome
- Role for fetal aortic valvuloplasty
Case 5
Outflow tracts
Pulmonary Valve Doppler
Ductus Arteriosus
Critical Pulmonary Stenosis

- Mild to moderate pulmonary stenosis (PS) difficult to diagnose
- Severe PS – right ventricular hypertrophy
- Right to left shunt at the FO- left heart enlargement
- Tricuspid regurgitation
Critical Pulmonary Stenosis

- Retrograde flow in the ductus arteriosus
- Treatment: balloon valvuloplasty, surgical
Summary

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Summary

Single outlet

Source: Echocardiographic Anatomy in the Fetus : Chiappa EM, Cook CC, Botta G, Silverman NH
Outflow tract view

- Outflow tract evaluation is an essential aspect of fetal cardiac evaluation
- Normal 4 chamber view does not rule out critical congenital heart disease
- Systematic imaging key for accurate diagnosis