1 Cardiac Pathologies to Be Aware OF Michelle Wilson Ed.D, RDMS, RDCS

#### 2 Left Hypoplastic Heart Syndrome

- Hypoplastic left ventricle
- Mitral valve atresia or hypoplasia
- Aortic valve atresia
- Coarctation of the aorta
- Hypoplastic ascending aorta
- Small left atrium

# 3 Sonographic Findings

- 4 chamber
  - Chamber discrepancies
  - Stenotic mitral valve
  - Foramen Ovale function
- Basal short axis
  - Chamber size and contractility differences
- Outflow tract vessels
  - Right side larger than the left
- Three Vessel View
  - Right side larger than the left
- M-Mode and Doppler
  - Aortic valve, Mitral valve, Tricuspid regurgitation

# 4 Small Right Ventricle Pulmonary Atresia Intact Ventricular Septum Atretic Tricuspid Valve

Hypoplastic Right Ventricle

#### 5 Summary

Hypoplastic Heart Syndrome affects not just one structure
HLHS most common cause of death from CHD
Males are more often affected than females

#### 6 Fetal Cardiac Tumors

#### 7 Rhabdomyoma

Commonly involve ventricular walls and septum May be found in the atrial septum and walls Echogenic solid lesions Most small, but can vary in size Evaluate for dysrhythmia

#### 8 Teratoma

- <sup>2</sup> Second most common
  - Often originate from pericardium
  - Heterogenous echogenicity
    - Solid and Cystic components

Complex pericardial effusions

## 9 🔳 Hemangioma

- Rare
- Benign vascular tumor
- Originate anywhere
- Typically right atrium
- Pericardial effusion common
- Often regress spontaneously

# 10 Normal Structures

Moderator band Chordae Tendinae and Papillary Muscles Eustacian valve Foramen Ovale

## 11 Summary

- <sup>2</sup> Cardiac tumors are rare
  - Most common rhabdomyomas
  - Look for arrythmias

## 12 Valvular Anomalies

#### 13 Tricuspid Atresia

- Tricuspid valve fails to develop
  - Right ventricle hypoplastic
  - 25% great arteries are transposed
- Rare
  - 1 in 15,000 births

#### 14 Ebstein's Anomaly

- Tricuspid Displacement, apically
  - Poor coaptation
    - Regurgitation develops
- Right ventricle smaller
  - Less effective
- Psuedopulmonary atresia
- Lung hypoplasia, 50% cases
- Atrial Septal defect, 90% cases

#### 15 Pulmonary Stenosis

- •
- Narrowing of the semilunar valve
- Can be isolated, or associated with other congenital defects
- Right ventricle
  - Hypokinetic and Hypertrophied
- Pulmonary trunk
  - Poststenotic dilatation
  - Reduction of pulmonary valve excursion
  - Turbulent flow across the pulmonary valve

Retrograde flow through the ductus arteriosus

# 16 Tetralogy of Fallot

- Pulmonary Valve
  - stenosis
  - Right Ventricle
    - Hypertrophy
  - Large Ventricular Septum Defect
  - Overriding Aorta

## 17 Mitral valve stenosis

- Rarely occur in isolation
  - Commonly observed in other forms of left heart obstruction
- Stenosis involves thickening and dysplasia of leaflets
  - Shortened and thick chordae
  - Closely spaced papillary muscles
  - Single papillary muscle
- Valve typically hypoplastic
- Left ventricle often small relative to right ventricle

# 18 Aortic Stenosis

- Valvular
  - Most common type
- Subvalvular
  - Second most common type
- Supravalular
- Least common

# 19 Bicuspid Aortic Valve

Does not develop properly

Two leaflets present

Affects approximately 20 per 1000 babies

## 20 Summary

- Stenosis
  - Doesn't open completely
- Atresia
  - Doesn't form correctly
- Regurgitation
  - Doesn't close completely
  - Blood travels back through the valve

# 21 Fetal Cardiac

# Vessel Issues

- 22 Aortic Arch Anomalies
  - Coarctation of the Aorta
  - Arch Hypoplasia
  - Interrupted Aortic Arch

Double aortic arch

## 23 Coarctation of the Aorta (COA)

- Narrowing of the aortic lumen
  - Commonly short segment of transverse arch
- Earlier sonographic sign
  - Ventricular discrepancy
  - Great artery size discrepancy
    - Three Vessel View
- Aortic Valve abnormalities common
  - Bicuspid valve and Ventricular Septal Defects

## 24 Anomalous Pulmonary Venous Return

Total=ABNORMAL CONNECTION OF ALL PULMONARY VEINS

Partial=one or more vessels are not connected to the left atrium

## 25 Monthead Total Anomalous Pulmonary Venous Return

- 1 SUPRACARDIAC AND CARDIAC
- <sup>2</sup> Supracardiac, TAPVR
  - Pulm. Veins drain into the right atrium via the SVC
  - Innominate vein connects to SVC then to Rt. Atrium
  - Cardiac, TAPVR
  - Pulm. Veins drain into the coronary sinus then into the right atrium
- <sup>3</sup> INFRACARDIAC AND MIXED
- Infracardiac, TAPVR
  - Pulm. Veins drain into the hepatic veins and inferior vena cava
    - Then into the right atrium
  - Mixed Connections
    - Right and left pulm. Veins drain to different sites
- <sup>26</sup> Complete Transposition of the Great Arteries
  - Great arteries are reversed from their normal connections
    - Aorta arises from the right ventricle
    - Pulmonary artery arises from the left ventricle
    - Associated anomalies
      - Ventricular septal defect
      - Left ventricular outflow tract obstruction
      - Atrial septal defects

# 27 Corrected Transposition of the Great Arteries

- Occurs in about 1 in 25,000 births
- Abnormal embryonic cardiac tube "bending" OBends to the left

- Left ventricle on the right, Right ventricle located in the left aspect of the heart.
- Atrioventricular valves follow their ventricles OMitral on the right OTricuspid on the left
- Other associated defects: OVentricular septal defects OPulmonary stenosis OAbnml tricuspid valve ODextrocardia

OComplete heart block

## 28 Persistent Truncus Arteriosus

- Single great artery, gives rise to:
  - Coronary
  - Pulmonary
  - Systemic arteries
- Higher incidence in diabetic mothers
- Valve regurgitation and stenosis
  - 10-15% of patients
- Other associated anomalies
  - Leaking truncal valve
  - Narrowing or complete interruption of the aortic arch

# 29 Double Outlet Right Ventricle

- Most of the aorta and pulmonary valve arise completely or almost completely from the right ventricle.
- Term refers to position of the great vessels
- Sonographic Features:
  - Alignment of the two vessels totally or predominantly from the right ventricle
  - Presence of both vessels
  - •

# 30 Summary

Aortic Arch Anomalies Double Outlet Ventricle Interrupted Aortic Arch Transposition Total Anomalous Pulmonary Venous Return