Introduction to Postnatal Surgical Management of Congenital Heart Disease

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Chief, Cardiothoracic Surgery

Goal: To Discuss These 47 Complex Lesions -
Anatomy, Physiology, Pre-op Care, Surgical Management, and Post-op Care -
(in the next 20 min)
Introduction to the Cardiac Surgeons

- Who are we?
- What do we do?
- How do we do?
- Why are we a part of the “Heart Center”? 

Who Are We?

- Jim O’Brien
- Been at CMH since 2001
- Congenital Heart Surgery Fellowship at Children’s Hospital of Philadelphia
- General Surgical Residency and Cardiothoracic Surgical Residency at TJUH in Philadelphia
- Boston Red Sox Fan
Dr. Peter Pastuszko

- Joined CMH in April 2013
- Experienced in the most complex repairs for congenital heart disease

Dr. Peter Pastuszko

- Prior to joining CMH he was in San Diego as their busiest congenital heart surgeon and director of Pediatric Cardiac Surgery
- Critical Care
- From 2004 to 2008 he was Chief of Pediatric Cardiac Surgery at the University of Oklahoma
Dr. Peter Pastuszko

- Congenital Training at Children’s Hospital of Philadelphia
- Adult cardiac surgical training at Thomas Jefferson University
- BA and MD from Univ of Pennsylvania
- Not a Red Sox Fan

What do we do?

- The full range of repairs for congenital heart disease
- One of the larger volume programs in the country
- Developing a heart failure/ transplantation/ mechanical assist device program
USA Incidence (New Cases)

- ~1 in 110 babies are born with a heart defect (1 every 15 minutes)
  - ~ 40,000 infants per year
  - ~ 10,000 require potentially life-saving diagnosis, treatment
- Cystic fibrosis: 1 in 3000
- Childhood cancer: 1 in 6,250

USA Prevalence (New + Old CHD)

- ~ 1 to 1.4 million children
- ~ 1 to 1.5 million adults
The Spectrum of CHD

- Serious problems are diagnosed in pregnancy ~16-20 weeks
- Milder problems: in childhood
- Sometimes, we see unrepaired CHD in 80-90 year olds!

Review of Defects

- Defects with Increased Pulmonary Blood Flow
- Defects with Decreased Pulmonary Blood Flow
- Obstructive defects
- Complex Newborn Lesions
- Single Ventricle Lesions (Tricuspid Atresia, HLHS)
Categories of Congenital Heart Disease (CHD)

Severe/Major CHD

– d-Transposition of the Great Arteries (d-TGA)
– Tricuspid and Pulmonary Atresia
– Hypoplastic Left Heart Syndrome (HLHS)
– Single Ventricle Anatomy
– Double Outlet Right Ventricle (DORV)

Categories of CHD

Severe/Major CHD

– Truncus Arteriosus
– Total Anomalous Pulmonary Venous Return (TAPVR)
– Critical Pulmonary Stenosis
– Aortic Arch Abnormalities (IAA, COA, Hypoplastic arch)
Categories of CHD

**Moderate CHD**
- Mild aortic stenosis (AS)
- Moderate pulmonary stenosis (PS)
- Non-Critical Coarctation of the Aorta
- Large ASD
- Isolated VSD

**Mild CHD**
- Small VSD
- Small PDA
- Mild Pulmonary Stenosis (PS)
- Small or spontaneously closing ASD
- Bicuspid aortic valve

Why Imaging is Important to the Surgeon

- Helps us to understand:
  - What the problem is
  - What to do about it
  - When to do it
  - What to look out for…
How do we do?

- Continuous monitoring of our outcomes compared to national benchmarks (Society of Thoracic Surgeons database)
- Strong believers in Transparency
- Outcomes posted on our website: www.childrensmercy.org
# Outcomes

<table>
<thead>
<tr>
<th>STS STAT Complexity Score</th>
<th>Most Recent CMH Surgeons’ 1-year Survival</th>
<th>Most Recent National Average 1-Year Survival (111 Centers)</th>
</tr>
</thead>
<tbody>
<tr>
<td>STAT 1 (least complex)</td>
<td>100%</td>
<td>99.4%</td>
</tr>
<tr>
<td>STAT 2</td>
<td>100%</td>
<td>98.2%</td>
</tr>
<tr>
<td>STAT 3</td>
<td>100%</td>
<td>96.6%</td>
</tr>
<tr>
<td>STAT 4</td>
<td>97%</td>
<td>93.1%</td>
</tr>
<tr>
<td>STAT 5 (most complex)</td>
<td>90%</td>
<td>85.2%</td>
</tr>
</tbody>
</table>

The Ward Family Heart Center at Children’s Mercy
The Collaborative Approach

- Patients with congenital heart disease require treatment by multiple disciplines
- Unfortunately too often our approach has been through our individual specialty silos
- Goal should be patient centered care
- Parents are not interested in different training backgrounds or historical boundaries between specialties – they just want the experts to provide the best care for their child

Ward Family Heart Center

Mission

- The Ward Family Heart Center at Children’s Mercy Hospital and Clinics provides comprehensive, nurturing care of the highest quality to all patients, from fetus to the adult, with congenital heart disease and acquired pediatric heart disease. We excel in clinical care, education, innovative research and community service.
Ward Family Heart Center

Vision

- The Ward Family Heart Center at Children’s Mercy Hospital and Clinics will become a leading center in the delivery of pediatric cardiac care. Our reputation will be based on outstanding outcomes. An innovative, collaborative environment will lead to advancements in the delivery of care, research initiatives and service excellence.

Heart Center Service Line: Overview

- Cultural change that promotes collaboration, teamwork and innovation

- Administrative structure to mirror (at many levels) our functions as a collaborative team caring for patients with congenital heart disease

- Increase efficiency and coordination in academic endeavors, strategic and fiscal planning – including preparation for novel financial models in response to changes in health care financing
Teamwork at The Ward Family Heart Center Starts Early

Elizabeth J. Ferrell Fetal Health Center
Communication
The Hybrid Suite

The Ward Family Heart Center

Ongoing Initiatives
And
Program Development
Center for Advanced Cardiac Imaging

- Joint program
  - Radiology
  - Heart Center

- Goals
  - Clinical care
  - Research
  - Education

Home Surveillance Project

- Newborn babies after complex surgery
  - Too well to be in the hospital...
  - Too fragile to be ‘on their own’ at home

- Moms? Nurses? Doctors?
Care Can Be Very Complex

Developing an App For That…

Monitoring for: Jimmy B Demo

Device Setup
Patient Activities

Indica
Output
Weight
Oxygen Saturation
Video Recording
Send Data

Add Flag
Return to Logik
Red Flags

✓ Any behavior that worries you
✓ Temperature over 101 °F
✓ Does not gain an average of 20 grams over 4 days
✓ Increased work of breathing or stopping to breathe during feeding
✓ Feeding difficulty, increased sweating during feeds, or excessive spitting up
✓ Vomiting or diarrhea (more than 4 episodes) in 12 hours
✓ Irritability, won’t calm, or decreased response to you
✓ Oxygen saturations (less than 90%)
✓ Fewer than 4 wet diapers per day
✓ Feeding pump or pulse ox monitor problems

We encourage you to:
* Make several copies of important documents to share with babysitters, neighbors, etc., and store additional copies in convenient places like diaper bags, strollers, or the car
* Go to all medical appointments
* Respond to calls and other communications from your healthcare providers.
Neurodevelopmental Clinic

Babies who have complex heart defects and need neonatal heart surgery may have long-term neurodevelopmental issues

– Surveillance
– Early intervention
– Research to optimize our treatments
Research Endeavors

- Validation of echo measurements in children with heart defects
- Tissue engineered heart valve
- Outcomes research
- Preventive cardiology
- Genetics of congenital heart disease
Why we all do this.....