New Trends in Pediatric Cardiac Surgery

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Recent Advances in Congenital Heart Surgery

- Less-invasive cardiac surgery
- Hybrid pediatric cardiac surgery
- Robotic pediatric cardiac surgery
- Fetal cardiac interventions
Less-Invasive Heart Surgery

- Minimally-invasive: a misnomer for heart surgeons
  - Small incisions
  - Less surgical trauma
Tetralogy of Fallot

3-6 months

2 years

3-6 months
Reasons for early cardiac repairs:

- early elimination of cyanosis ("blue babies")
- early elimination of heart failure
- reduction in the number of needed operations
- reduced costs
- reduced parenteral anxiety
- MARKEDLY REDUCED MORBIDITY AND MORTALITY OF NEONATAL REPAIRS
Transposition of the Great Arteries

RV
LV
RA
LA
Ao
PA
RA
LV
RV
The Arterial Switch Operation
The Arterial Switch Operation

- **Diagram Description**

  - **Diagram O**: Illustrates the initial surgical step involving anastomosis of the aorta (Aorta) to the pulmonary artery (Pulmonary a.)

  - **Diagram P**: Demonstrates the graft placement (Graft) ensuring proper blood flow

  - **Diagram Q**: Highlights the aorta (Aorta) with additional surgical details

  - **Diagram R**: Continues the surgical process with another view of the aorta (Aorta) and further illustrations of the procedure

These diagrams provide a visual representation of the Arterial Switch Operation, a surgical intervention for certain congenital heart defects.
Small Incisions

• Routine cases

• No difference in bypass times, length of hospital stay or post-operative pain

• >>> Cosmetic issue
VATS PDA closure
PDA: Thoracoscopic view
Intraoperative View: VATS PDA
Hybrid Pediatric Cardiac Surgery

- Collaboration between pediatric cardiac surgeons and pediatric cardiologists (interventionalists)
- Aims to solve difficult clinical problems that do not have straightforward surgical or interventional solutions
- Examples:
  - multiple muscular VSDs
  - Hypoplastic left heart syndrome (HLHS)
Surgical Treatment of Muscular VSDs

- unsatisfactory:
  - when multiple
  - when apical
  - if left ventriculotomy required
  - when associated with other lesions
Percutaneous Device Closure of Muscular VSDs

• Emerged as an attractive alternative
• Difficult in
  – small infants
  – poor vascular access
  – unusual ventricular septal planes (TGA, DORV)
Devices

Amplatzer Duct Occluder
- Can be retrieved
- Malleable (Nitinol)
- Can be used as “plug”
- Bulky (neck acts as occluder, septal function)

Amplatzer musc. VSD device
- Cannot be retrieved
- Easier to “catch” chordae
- Self-centering
- Can be trimmed easily
- Not bulky (disks act as occluders)

CardioSeal

Starflex
Patient 1: 5 m.o. (7kg)
DORV, subao. VSD, PS, apical VSD’s

Discharged POD 6
Robotic Pediatric Cardiac Surgery

• Mostly for older children (size of instruments!)

• Mostly valve surgeries
Interchangeable instruments with EndoWrist™ technology simultaneously follow surgeon’s hand and wrist movements.

Anesthesiologist

Assistant

Heart and lung specialist

Surgical cart

Nurse

Surgeon

Surgeon uses open-surgery hand movements which are precisely replicated in the robotic instruments.
Robotic Mitral valve repair

Dr. Emile Bacha M.D.
Fetal Cardiac Procedures

• Limited to aortic balloon dilation and atrial septal dilation
• > 100 cases worldwide
Conclusions

• Pediatric Cardiac Surgery in 2010 has matured to become a very safe specialty, with many individualized clinical options for kids born with heart defects
“For my part, I know nothing with certainty, But the sight of the stars make me dream”
-Vincent Van Gogh-

Wall Decoration
Morgan Stanley Children’s Hospital
New York Presbyterian