CLASSIFICATION OF CHD

• ACYANOTIC
  • Increased PBF
    – ATRIAL: ASD
    – VENTR: VSD
    – ARTERIAL: PDA
    – COMBINED: VSD+PDA
  • Normal PBF
    – Pulm or Aortic Stenosis

• CYANOTIC
  • Decreased Flow
    – TOF
    – Pulm Atresia
  • Increased Flow
    – TAPVD
    – TGA
    – Truncus
    – Tricuspid Atresia
Cyanotic Vs Acyanotic?

- Clinically: nail beds/lips/tongue blue
- But if saturation between 85-93% the human eye cannot detect cyanosis
- So, the gold standard of detection of cyanosis is PULSE OXIMETER
- Infact the pulse-ox is called the 5\textsuperscript{TH} VITAL SIGN
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PULSE OXIMETER
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HOW TO ASSESS PBF?

• Symptoms of incr PBF
  – Inc RR, Retractions, Incr infections
  – Sweating while feeding
  – SOB
  – Failure to thrive
  – Harrisons sulcus

• An objective method of assessing the PBF?
OBJECTIVE ASSESSMENT OF PBF IS BY CHEST XRAY
ASD SECUNDUM
AV CANAL
AV CANAL
MODERATE VSD
LARGE VSD LARGE SHUNT
LARGE VSD
PDA
EISENMANGERS
TRUNCUS

Image from the "Multimedia Encyclopedia of Congenital Heart Disease"
PULM ATRESIA VSD
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ATRIAL SEPTAL DEFECT: SECUNDUM

• CLOSE ≥2 YRS OR WHEN DIAGNOSED

• ELECTIVE

• DEVICE vs SURGERY

• BOTH HAVE EXCELLENT OUTCOME

• DECISION RE MODE OF CLOSURE BY INTERVENTIONALIST: SHLD ECHO HIMSELF
ATRIAL SEPTAL DEFECT

• AFTER FIRST YR: ANNUAL CARDIAC EVALUATION

• PT F/U CLOSELY BY PEDIATRICIAN

• NL Q OF LIFE; NL LIFE SPAN

• DEVICE: NO MRI LIMITATION
TRANSCATHETER ASD CLOSURE

- RAPID RECOVERY
- NO SCAR
- SUCCESS > 98% OF SELECTED CASES
- SELECTION IS THE KEY
- NO BLOOD TRANSFUSION
- PTS WITH SURGERY HAD LOWER IQ SCORES
ADVANCES IN CATH TECHNIQUES:

USE OF INTRA-CARDIAC ECHO FOR DEVICE PLACEMENT

• IMPROVED TECHNIQUES
• BETTER UNDERSTANDING OF ANATOMY

JACC NOVEMBER 2003
VENTRICULAR SEPTAL DEFECT
VSD WHEN TO OPERATE?

- LARGE VSD’s: 3 MONTHS; By 6 MONTHS
  - IF WEIGHT GAIN NOT APPR
  - AND/OR IF PULM HTN DEVELOPING

- MODERATE VSD’S INDIVIDUALIZED

- SMALL VSDS –
  - AORTIC INSUFFICIENCY
  - INFECTIVE ENDOCARDITIS
Interventional PM VSD CLOSURE

• AN EXPERIMENTAL METHOD

• LONGTERM EFFECTS NOT KNOWN

• HEART BLOCK: NEED OF PACEMAKER

• AORTIC INSUFFICIENCY NOT KNOW

• WOULD NOT RECOMMEND
VENTRICULAR SEPTAL DEFECTS

- supracristal
- perimembranous
- muscular
MUSCULAR VSD CLOSURE

• AN ESTAB METHOD

• PREFERRED METHOD

• LONGTERM EFFECTS: NONE

• FAR FROM CONDUCTION SYSTEM

• AORTIC INSUFFICIENCY UNKNOWN
PATENT DUCTUS ARTERIOSUS
PINK BABY W/RESP DISTRESS

• PREMATURE
  – THIS IS THE BABY WITH PDA-HAS BEEN DOING WELL NOW W INC O2 REQUIREMENTS; OR WITH APNEA; NEC; POOR PERFUSION!
  – DIAGNOSIS IS BY ECHO ONLY!

• START THERAPY AFTER ECHO ONLY*
PREMATURE-PDA

• THERAPY

  – INDOMETHACIN: IV OR ORAL

• ORAL OR RECTAL BRUFEN SYRUP

  – ADVANTAGES Vs DISADVANTAGES
PREMATUeRE-PDA

• THERAPY

– ONLY RECORDED DIFFERENCE IN THE PDA CLOSURE BETWEEN BRUFEN AND INDOMETHACIN IS THE RECURRENCE RATE
– BENEFIT: RENAL PERFUSION IS NOT DECREASED WITH BRUFEN
BRUFEN/INDOMT-COCHRANE ANALYSIS-2003

• BRUFEN AND INDOMETHACIN: equally potent in closing PDA; trials to evaluate long-term neuro issues needed

• PROPHYLACTIC INDOMETHIN: no longterm benefit in survival or outcome; only short term decrease in IVH

• PROLONGED Vs SHORT COURSE INDOMETHIN: dec rate of PDA re-opening; prolonged course-assoc w/dec IVH & renal impairment
PDA BEYOND NEONATAL PERIOD
PDA-WHEN TO CLOSE

- ANY PDA THAT CAN BE AUSCULTATED NEEDS TO BE CLOSED
- ANY SYMPTOMATIC PDA NEEDS TO BE CLOSED
- SILENT PDA’S MAY/MAY NOT BE CLOSED IN POST NEONATAL PERIOD
PDA-WHEN TO CLOSE

• POST 5 KGS ANY PDA CAN BE CLOSED

• VERY LARGE PDAS: BABY DOES NOT GAIN WEIGHT-SO NO POINT WAITING

• SMALL PDAS MX MEDICALLY TILL ABOUT 5-6 KG WEIGHT
TRANSCATHETER CLOSURE PDA

- SUCCESS RATE >99% FOR COMPLETE CLOSURE
- NO SCAR
- FAST RECOVERY
- NO BLOOD TRANSFUSION
- COILS OR DEVICES
- SIZE NO LIMITATION
- WEIGHT: SMALLEST 2.2 Kg in IPAH-NO COA
- >100 cases by Speaker
TETRALOGY OF FALLOTS
Embryology

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

- MANAGEMENT:
- DONOT MAKE THE CHILD CRY
- SEDATE MORPHINE/PHENERGANG
- HEPLOCK: IV FLUIDS BOLUS
- BICARB
- IV METOPROLOL 0.05 MG/KG VERY SLOW IV OVER ½ HR
SURGERY-WHEN?

• HYPERCYANOTIC SPELL-EVEN ONE IS ENOUGH TO INDICATE SURGERY

• IF AN INFANT < 6 MO...DO A BT SHUNT
Treatment-TOF

- Surgical
  - Palliative to improve the pulmonary blood flow - Systemic to Pulmonary shunt
NO SPELLS: SURGERY-WHEN?

• IF SATS APPROACHING 75% PLAN FOR SURGERY

• SURGERY DECIDED ON BASIS OF
  – AGE/WT AND PULM A SIZE
  – IF ANATOMY FAVOURABLE: WT> 7.5 KG REPAIR

• IF WT> 8 KG & ANATOMY FAVOURABLE – COMPLETE REPAIR OR ELSE BT SHUNT
• Balloon Dilatation of pulmonary valve in cyanotic children with indication of shunt
  – In a randomised study evaluating for postponement of palliative surgery and growth of pulmonary arteries.
• Coil closure of collaterals
CYANOTIC CHD OTHERS
BLUE BABY..CARDIAC

• DUCTAL DEPENDING LESIONS:RT HEART
  – PULM ATRESIA
  – TOF SEVERE
  – PULMONARY STENOSIS, SEVERE
• MIXING LESIONS
  – TRANSPOSITION

• START PROSTIN IN ANY OF THESE
Transposition of the Great Vessels

Normal

Transposition of the Great Vessels

AO
PA
LA
RV
LV
RA

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CYANOTIC CHD

• FURTHER OPTIONS
  – SEPTOSTOMY: MIXING LESION
  – STENTING THE DUCT: DUCT DEPENDENT
  – BT SHUNT

• MOST IMP OUTCOME FACTOR
  – ACCURATE ECHO
  – EARLY TRANSPORT
  – AVOID INFECTIONS
TGA: WHEN & WHAT SURGERY

• ALL TGA’s DIAGNOSED IN NEWBORN PERIOD: ARTERIAL SWITCH OPERATION

• IDEALLY IN SECOND WEEK

• CAN BE PERFORMED UPTO 4 WEEKS
ARTERIAL SWITCH

Arterial Switch Operation

Aorta

Pulmonary artery

Aorta “switched” with pulmonary artery

Coronary arteries

Coronary arteries are detached from the aortic valve and connected to
OTHER LESIONS

• TAPVD: OPERATE AT DIAGNOSIS; DON’T DELAY

• TRUNCUS; OPERATE AT DIAGNOSIS: NO ADVANTAGE IN DELAYING
COARCTATION

• TO BE TREATED WHEN DETECTED

• BALLOON AS PRIMARY MANAGEMENT GOOD OPTION EVEN IN THE NEWBORN:

• RECURRENCE 30%; IF NO ASSOC PROBLEMS

• POST-6 MO BALLOON IS PREFERRED
COARCTATION

• IF DETECTED IN ADOLESCENT AGE STENTING IS MODALITY OF CHOICE

• BALLOONING ALONE MAY ALSO WORK: RECURRENTNESS

• SURGERY IS ALSO AN OPTION
DIAGNOSING CARDIAC LESION IN THE CRITICALLY ILL NEWBORN
INDICATORS OF CARDIAC PROBLEM

PRIMARY

• Desaturation
• Shock
• Resp Distress

SECONDARY

• Murmur
• Cardiac Enlargement
• Peripheral Pulse Abn
DESATURATION

• Causes of Desaturation:
  – INTRAPULMONARY SHUNTING
    • COLLAPSE
    • PNEUMONIA
    • PPHN
  – INTRACARDIAC SHUNTING
    • Cyanotic CHD
DIFFERENTIAL DIAGNOSIS

• Cyanosis all over
  – Intracardiac Mixing: Single Ventricle
  – Intrapulmonary mixing: PPHN

• Differential Cyanosis
  – Upper Limb Blue: TGA+PDA
  – Lower Limb Blue: Duct Shunting R to L with normally related GA’s

• Combination: PPHN
  – Intrapulmonary + PDA + PFO shunting
THINK CARDIAC WHEN THINKING PULMONARY

ESPECIALLY IF ANY OF THE SECONDARY FACTORS PRESENT
IN SHOCKY PATIENTS:
ALWAYS R/O CARDIAC

ESPECIALLY IF SECONDARY SIGNS PRESENT
WITH RESP DISTRESS IN NEONATES: HAVE A LOW THRESHOLD TO SUSPECT CARDIAC LESIONS
INDICATORS OF CARDIAC PROBLEM

PRIMARY

• DESATURATION
• SHOCK
• RESP DISTRESS

SECONDARY

• Murmur
• Cardiac Enlargement
• Peripheral Pulse Abn
HOW TO REACH A DIAGNOSIS?

• **SUSPECT**: KNOWLEDGE BASE REQUIRED

• **DIAGNOSTIC MODALITY**: ECHOCARDIOGRAM: Ready availability of reliable Bedside Pediatric/Neonatal Echo remains the single most important hurdle in the diagnosis of neonatal CHD
SUSPECTING CARDIAC LESION BEFORE THEY GET CRITICALLY ILL
DIAGNOSING CHD IN THE NEWBORN


• Early clinical screening of neonates for congenital heart defects: the cases we miss. Cardiol Young. 1999 Mar;9(2):169-74 :25% diagnosed after neonatal discharge
CONCLUSION

• PRE DISCHARGE 4 EXTREMITY BP CHECK IS STANDARD OF PRACTISE TO R/O COA

• CY CHD CAN BEST BE EVALUATED PRIOR TO DISCHARGE FROM HOSPITAL BY CHECKING SATS IN THE LEG
TAKE HOME MESSAGE

• EARLY REFERRAL

• INVOLVE PEDIATRIC CARDIOLOGIST IMMEDIATELY: DON’T WAIT

• RIGHT DIAGNOSIS WITH A GOOD ECHO
• KEEP PROSTIN AVAILABLE

• DON’T HESITATE TO CALL IF IN DOUBT
PEDS CARDIO TRAINING MODULE

• 4 HOUR SESSION TO RE-TRAIN PEDS PRACTITIONERS IN:
  • AUSCULTATION
  • READING ECG
  • CARDIAC XRAYS
  • UNDERSTANDING ECHO REPORT
  • WHEN TO OPERATE
  • NEONATAL CARDIO

• FIRST SESSION MARCH 4TH:
  APOLLO: CONTACT 989136223