



SNS COLLEGE OF ALLIED HEALTH SCIENCES
SNS Kalvi Nagar, Coimbatore - 35
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DEPARTMENT OF CARDIO PULMONARY PERFUSION CARE
TECHNOLOGY

COURSE NAME : PRINCIPLES OF PERFUSION TECHNOLOGY I
II YEAR

TOPIC : APPROACH TO PEDIATRIC PATIENTS



PEDIATRIC PERFUSION

- The procedures in neonates and infants are likely to involve much **greater differences** from adult's procedures.
- The specialized paediatric perfusionist should have the advanced knowledge of all the various surgical interventions
- The various types oxygenators and their different sizes, the appropriate size of the circuit for each patient, characteristics and numbers of cannulas for different procedures.



DIFFERENCES IN ADULT & PEDIATRIC CASES

Certain anatomic features such as,

- The presence of **large aorto-pulmonary collateral** vessels or an interrupted aortic arch
- Immature organs (**liver** immature leads to vit k deficiency that causes decrease clotting factors production)
- The patients with liver immature give **high flows** to maintain adequate metabolic needs.
- Temperature management (temp decrease then flow can be decrease)
- Profound cooling** provides the surgeon with the opportunity to **remove the cannulas** from the patient and perform a precise repair in an operative field unencumbered by blood, cannulas, or other apparatus related to CPB.
- 6 months of gestation to 6 months after birth is the period for the development of the cortical structure of the **brain** that **affects the perceptual process.**



- Immature brain tolerates **O₂ deprivation** better than the mature brain so, DHCA is tolerated.
- The **lungs** are also immature at birth, and lung development proceeds up to about 8 years of age, lungs are fragile so, it leads to **increased pulmonary edema and hypertension**.
- The **kidneys** of neonates and infants have a high vascular resistance with blood flow decreased sodium reabsorption and excretion, concentrating and diluting mechanisms, and acid–base balance
- **The immune system** of the neonate is immature. Complement generation is low
- Immature **myocardium** with 30-60 % less contractile protein.
- Fewer matured **mitochondria and lower oxidative capacity**
- Incomplete **sympathetic and parasympathetic** innervations depending more on circulating catecholamine.
- Less compliant **ventricles**, less tolerant to distension.



Table 35: Differences Between Adult and Pediatric CPB					
parameter	Adult patient		Pediatric patient		
Estimated blood volume	Male	70 ml/kg	>10 Kg	85 ml/kg	
	female	60 ml/kg	10-20 Kg	80ml/kg	
			21-45 kg	75 ml/kg	
Dilution effects on blood volume	25 - 33%		50 - 200%		
Oxygen consumption	2 – 3 ml/kg/min		6 – 8 ml/kg/min		
Full CPB flow at 37°C	50 – 75 ml/kg/min		<3 Kg	150-200	ml/kg/min
			3-7 Kg	120-190	
			7-10 Kg	100-170	
			10-30Kg	80-120	
			30-50Kg	75-100	
Minimum CPB temperature	Commonly 32 - 37°C		Commonly 18 - 28°C		
Temperatures gradient (between blood and water)	10-12°C		8°C		
Perfusion pressures	50 – 90 mmHg		20 – 70 mmHg		
Acid-base management	Mainly Alpha-stat		Alpha-stat and/or pH-stat		
Measured PaCO ₂ differences	35 – 45 mmHg		20 – 60 mmHg		