SNS COLLEGE OF ALLIED HEALTH SCIENCES

SNS Kalvi Nagar, Coimbatore - 35

Affiliated to Dr MGR Medical University, Chennai

DEPARTMENT OF CARDIO PULMONARY PERFUSION CARE TECHNOLOGY

COURSE NAME :CARDIOPULMONARY BYPASS AND ITS COMPLICATIONS

STERILE TECHNIQUES AND SURGICAL ASEPSIS MAINTENANCE

III YEAR

UNIT : **COMPLICATIONS DURING BYPASS**

TOPIC : **INADEQUATE TEMPERATURE MAINTENANCE**

INTRODUCTION

- Normal core body temperature - 37°C
- Decrease Core body temperature below 37°c.
- To protect the heart and other organs by reducing metabolic rate and oxygen requirement.

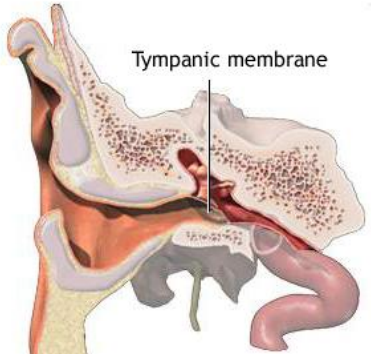
SITES OF TEMPERATURE MONITORING IN CIRCUIT:

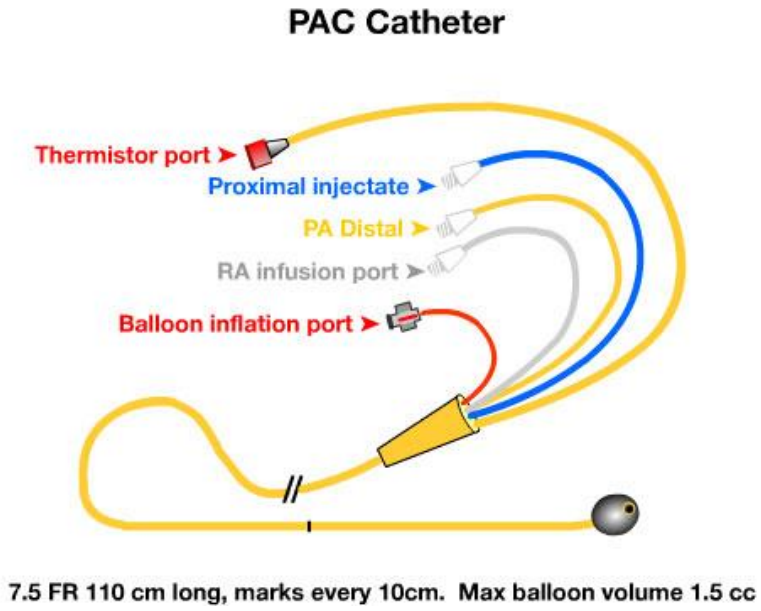
- Venous inlet
- Arterial outlet
- Cardioplegic Delivery System

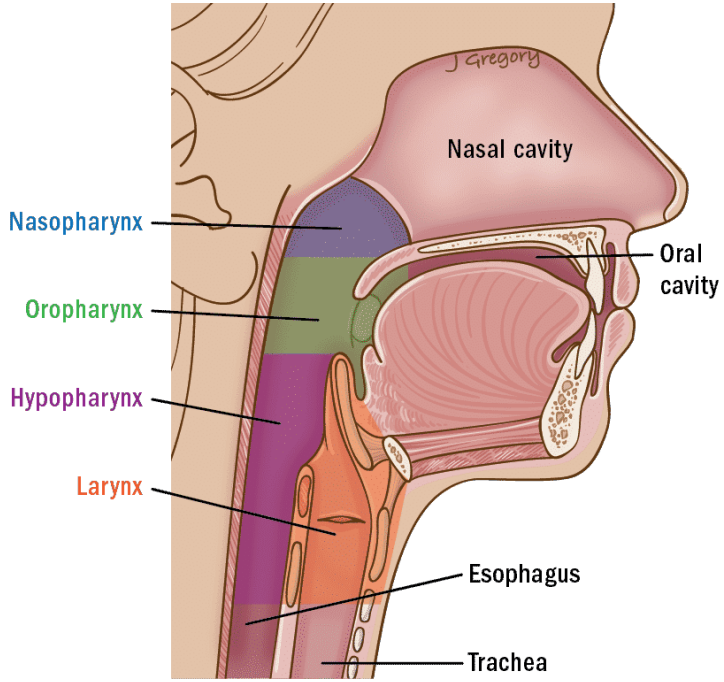
MONITORING SITES IN PATIENT

Temperature monitoring sites in patient

- Nasopharynx
- Tympanic membrane
- Pulmonary artery
- Bladder
- Rectum
- Distal oesophagus







TEMPERATURE GRADIENT

Temperature gradient between Hemotherm and Blood:

- Adult:10 - 12°c
- Pediatric: 6 - 8°c

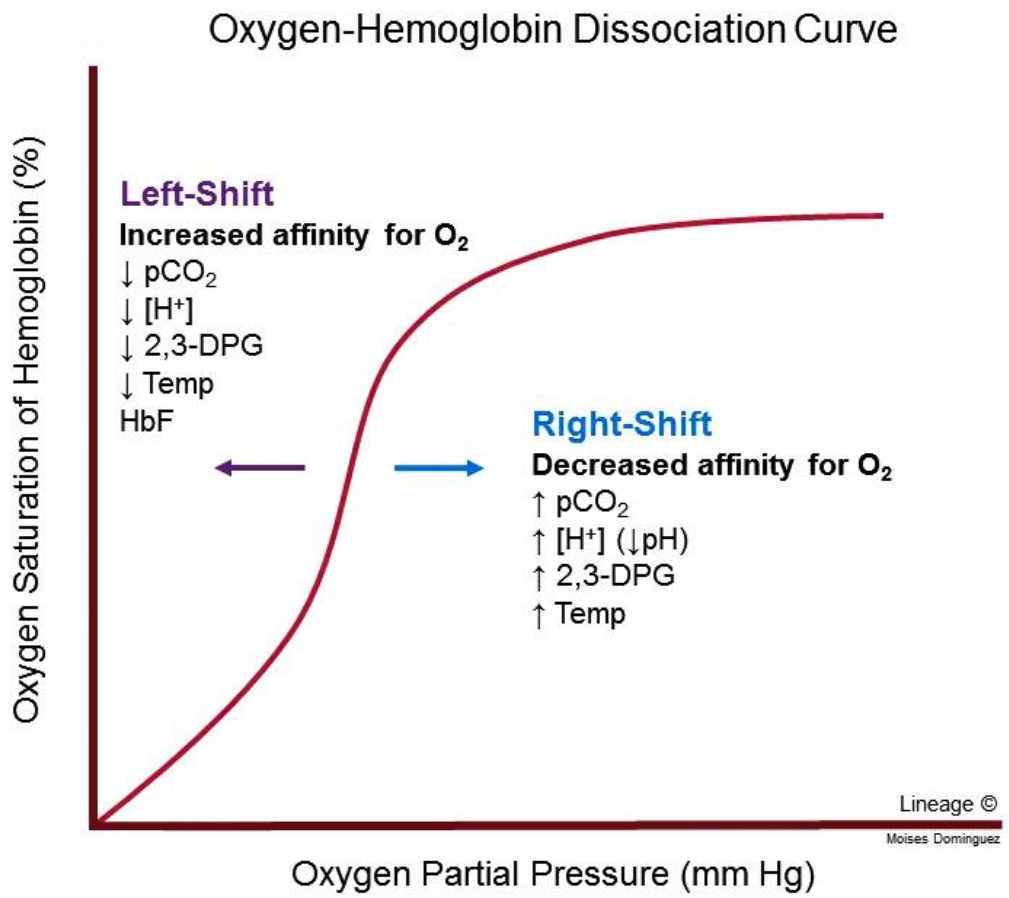
Cooling and Rewarding Gradient:

- Cooling : 1°c for 1 min
- Rewarming : 1° c for 3-5 mins

Q10 Effect & O2 DISSOCIATION CURVE

- For 1°c reduction in temperature there is 7% reduction in metabolic needs.

- For every 7°c reduction in core temperature there is approx. 50% of reduction in oxygen consumption rate.



CAUSES AND MANAGEMENT

Causes	Management
Improper maintenance of temperature gradient between Hemotherm and Blood	Maintain temperature gradient between Hemotherm and Blood Adult=10-12° c Pediatric=6-8° c
Hemotherm machine failure	Use warm blankets, Heated humidified gases (in ICU) and administer warm intravenous fluids during rewarming periods, Pour cold media (for patient cooling during CPB)
Inadequate cooling and rewarming	Cooling -1°c for 1min Rewarming -1°c for 3-5 mins

CAUSES AND MANAGEMENT

Causes	Management
Heat exchanger damage	Replace heat exchanger
Length of circuit (Heat transfer capacity is reduced)	Proper circuit selection based on BSA
Excessive cooling causes Vasoconstriction	Administer vasodilation drugs like phenoxybenzamines, Nitroprusside.
Power supply in HLM	Ensure backup power is available
Improper cooling of CP solution	Proper cooling of CP solution at 4-8° c
Improper placement of probe in circuit with any blood clots	Replace the temperature probs

CAUSES AND MANAGEMENT

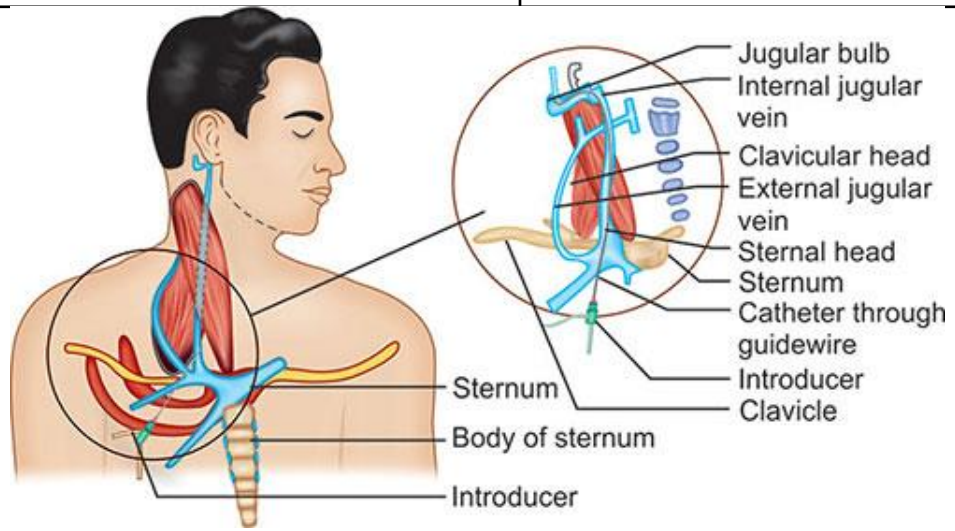
Causes	Management
Low level of water in hemotherm	Maintain adequate volume of water
Adequate size of water lines	Use ½” tubing's
Conduction material in heat exchanger	Use stainless steel material for conduction
Increase hypothermia --→ Hypoperfusion -→ Inadequate temperature maintenance	Maintain adequate hypothermia based on procedure
Adding additional solutions in surgical site	Slow adding of solution
OT light	Adjust the OT light away from the patient

CAUSES AND MANAGEMENT

Causes	Management
Improper probe placement in patients	Proper of probe
Inaccurate temperature monitored in rectal and urinary bladder	Place the probe in lateral or sim's position in rectum
Material of tubing can alter the temperature conduction and convection	Use PVC tubing's
Inadequate temperature maintenance while using parallel heat exchanger	Use counter flow heat exchanger

CAUSES AND MANAGEMENT

Causes	Management
OT temperature	Use cold bags to maintain patients temperature
Malposition of Jugular vein bulb catheter	Catheter inserted into internal jugular veins via jugular foramina and introduce catheter to bulbous dilatation below the base of skull



COMPLICATIONS

- Cerebral damage due to excessive rewarming
- Sudden rewarming leads to improper organ rewarming
- Improper arresting of heart
- Hemolysis
- Probe related tympanic membrane injury in pediatric leads to hear loss
- Uneven cooling causes organ damage and increased metabolic rate
- Excessive cooling causes increased affinity of O2
- Improper cooling causes myocardial fibrillation
- Air embolism
- Sepsis because of unsterile water
- Necrosis
- Protein denaturation

REFERENCES

- Principles of Cardiopulmonary Bypass – Sunit Ghosh
- The Manual Of Clinical Perfusion –D.Mark Brown

THANK YOU