SNS COLLEGE OF ALLIED HEALTH SCIENCE

Affiliated to The Tamil Nadu Dr MGR Medical University, Chennai

DEPARTMENT OF CARDIOPULMONARY PERFUSION CARE TECHNOLOGY

COURSE NAME : COMPLICATIONS OF CPB

TOPIC : COMPLICATION AND MANAGEMENT ON ANEMIA

UNIT : 1

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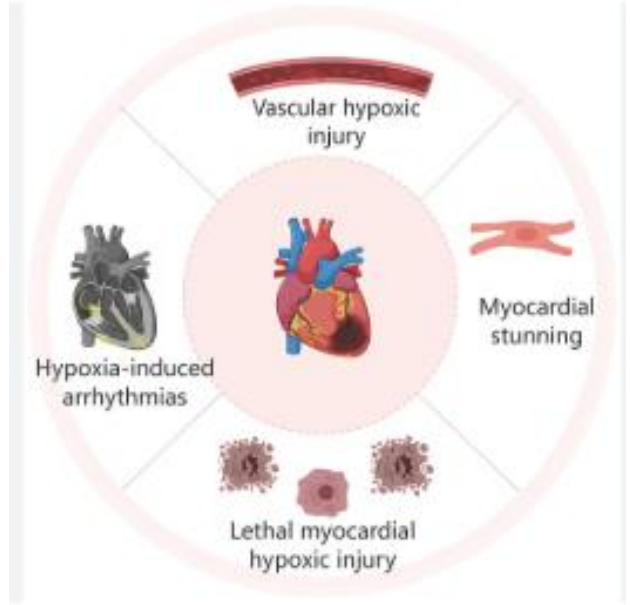
ANEMIA PRE OP RISK

DEFINITION {DEFINE STAGE } :

- **DEFINING THE RISK :**
- Anemia (Hb < 13 g/dL for men; < 12 g/dL for women) is an independent predictor of mortality and morbidity after CPB surgery.
- Increases the risk of Myocardial Ischemia (MI).
- Compromises tissue oxygen delivery DO2.
- Leads to higher transfusion rates, increasing AKI and infection risk.
- **Critical Threshold:** Hb < 10 g/dL warrants aggressive pre-op treatment



PRE OP MANAGEMENT STRATEGIES

Anemia: Iron Supplementation

IV Iron (Ferric Carboxymaltose) preferred over oral iron for rapid repletion if surgery is delayed (Hb $\uparrow$ risk of MI).

Anemia: ESA Therapy

Erythropoiesis-Stimulating Agents (ESA) for anemia of chronic disease (e.g., CKD), coupled with iron, if timeline allows.

PVD: Cannulation Site

Axillary or Femoral artery cannulation planned if transesophageal echo (TEE) or CT confirms porcelain aorta or heavy plaque.

PVD: Antiplatelet Holding

Careful balancing act: Antiplatelets held for bleeding risk, but PVD patients are at high risk of stent thrombosis if present.

Blood Management Protocol

Type and screen/cross match early. Reserve 2 units PRBCs. Cell Saver machine prepared for all cases.

Risk Assessment

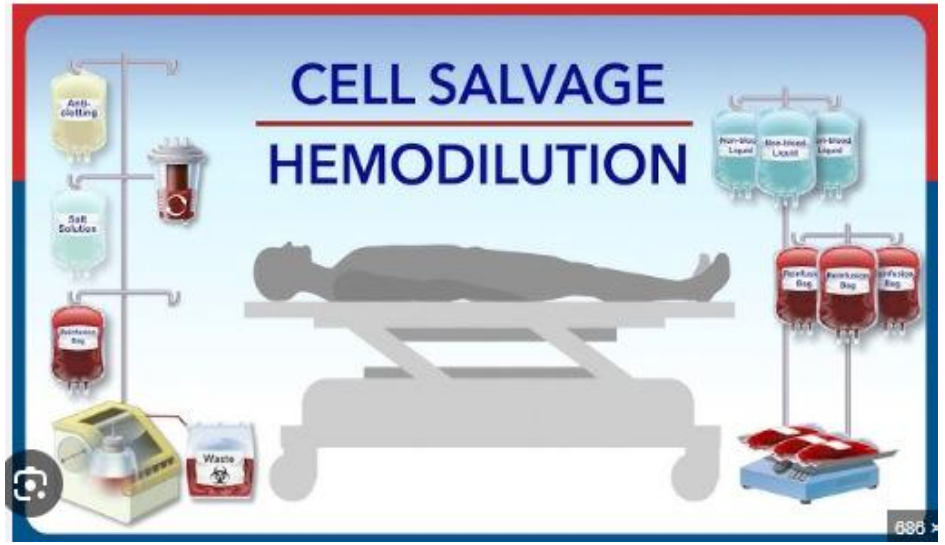
STS and EuroSCORE II calculated using PVD as a major risk factor to inform patient consent and post-op planning.

INTRA OP COMPLICATIONS - ANEMIA

- **Hemodilution:** CPB prime drops Hct. Risk of Myocardial/End-Organ Ischemia due to reduced oxygen-carrying capacity.
- **Transfusion:** Increased use of banked blood (PRBCs) associated with Acute Lung Injury (TRALI), infection, and coagulopathy.
- **Hypoxia:** Critical Hct threshold is 21-24% Below this, the DO2 deficit can cause anaerobic metabolism.

INTRA OP MANGEMENT - FOR ANEMIA

- **Minimize Prime Volume:** Use smaller circuits or Retrograde Autologous Priming (RAP).
- **Transfusion Trigger:** Transfuse PRBCs if Hct is persistently < 24%during CPB, especially in high-risk patients (CKD, low EF).
- **High Flow:** Maintain CPB flow index > 2.2 { L/min/m}to maximize systemic flow despite low Hct.
- **Cell Saver / Ultrafiltration:**



POST OP COMPLICATIONS - ANEMIA

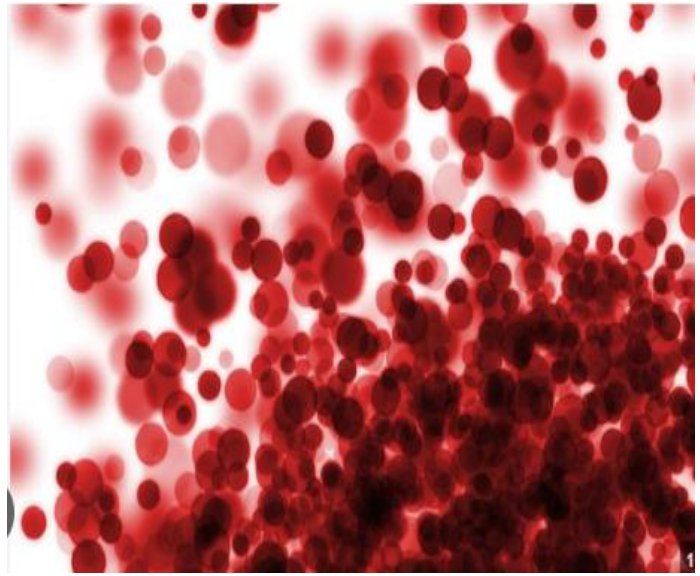
- ****Myocardial Injury:**** Low Hct increases oxygen demand and workload, leading to Post-Op MI (Type II).
- ****Infection & ALI:**** Transfusion is an independent risk factor for post-operative pneumonia and Acute Lung Injury (ALI).

POST OP MANAGEMT - FOR ANEMIA

Restrictive Transfusion: Target Hb 7.0 g/dL. Only transfuse above this if there is active bleeding or signs of ischemia/shock.

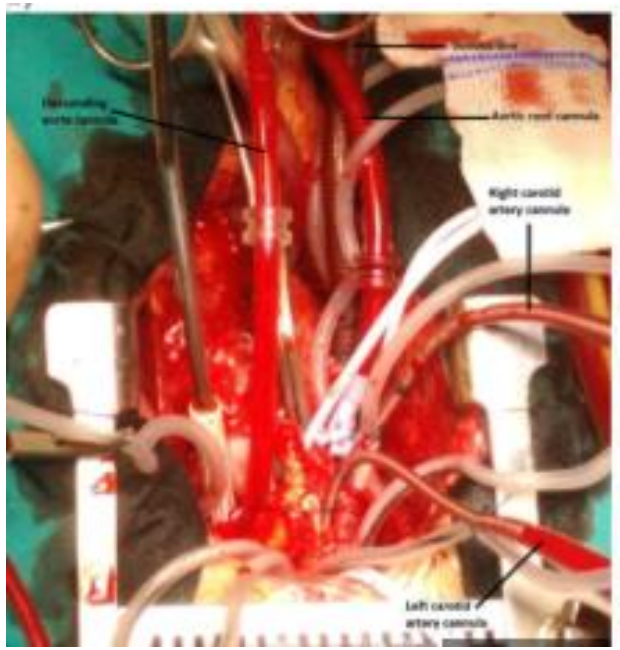
Coagulation Check: Correct surgical bleeding and factor deficiencies before transfusing PRBCs or FFP.

Restart Iron/ESA: Reinstitute IV Iron and ESA therapy early in the recovery phase to correct chronic anemia.

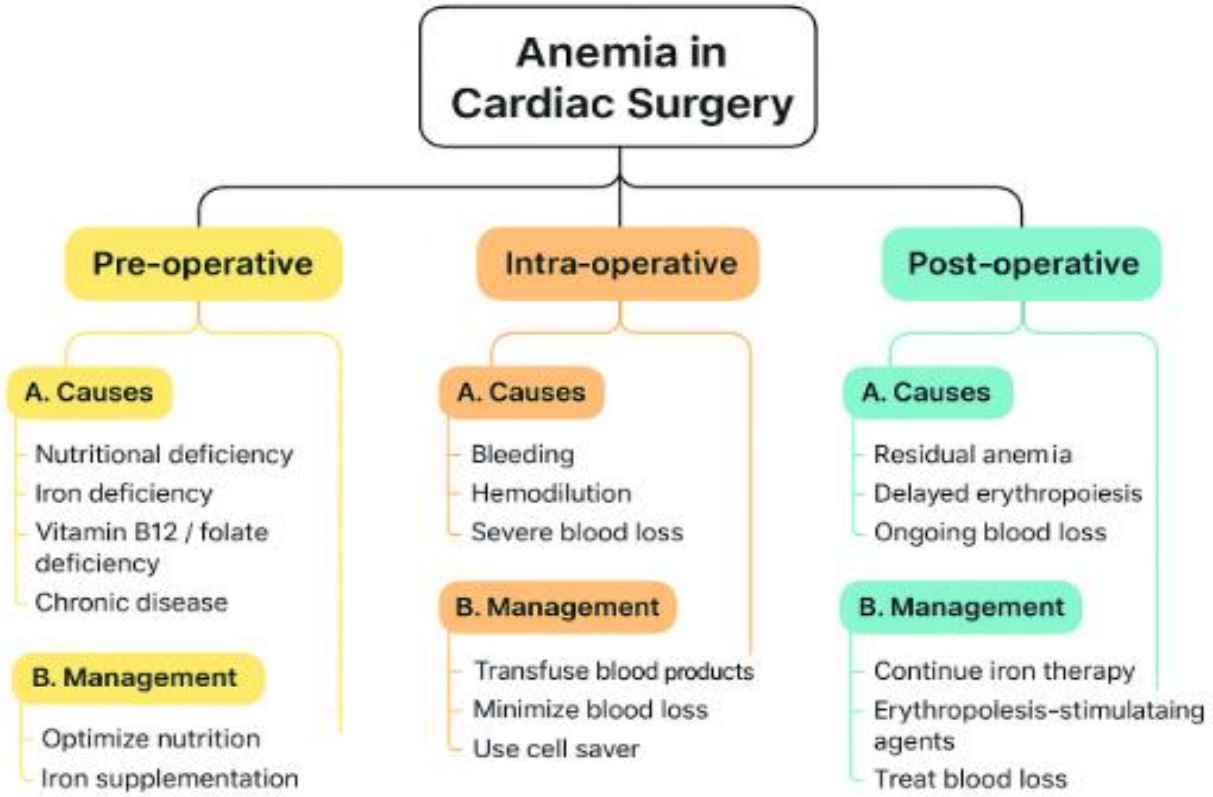


MANAGEMENT

- Prioritize Perfusion and Oxygen
- Management of the cardiac patient with Anemia and PVD requires a simultaneous focus on maximizing oxygen carrying capacity (anemia management) and ensuring adequate pressure and flow distal to stenotic vessels (PVD management). Continuous, high-target perfusion pressure is the key.



SUMMARY


Anemia in Cardiac Surgery
Pre-operative
A. Causes
Nutritional deficiency
Iron deficiency
Vitamin B12 / folate deficiency
Chronic disease
B. Management
Optimize nutrition
Iron supplementation
Intra-operative
A. Causes
Bleeding
Hemodilution
Severe blood loss
B. Management
Transfuse blood products
Minimize blood loss
Use cell saver
Post-operative
A. Causes
Residual anemia
Delayed erythropoiesis
Ongoing blood loss
B. Management
Continue iron therapy
Erythropolesis-stimulataing agents
Treat blood loss

REFERNCE

- https://www.nhlbi.nih.gov/health/anemia/treatment
- https://www.mayoclinic.org/diseases-conditions/anemia/diagnosis-treatment/drc-20351366
- https://my.clevelandclinic.org/health/diseases/3929-anemia
- https://www.nhm.gov.in/images/pdf/programmes/child-health/guidelines/Control-of-Iron-Deficiency-Anaemia.pdf