

Airway

- Avoid nasal manipulation.
- Use extreme caution with friable oral and pharyngeal mucosal surfaces.

Preinduction/Induction

- May exhibit hypotension and excessive fluid requirements to maintain adequate CO.
- Central neuraxial blockade contraindicated in ongoing thrombocytopenia requiring transfusion.
- Peripheral neural blockade may be approached cautiously if coagulation status is judged adequate.

Maintenance

- PEEP assures adequate tissue oxygenation at lower FIO₂ as hyperoxia depresses normal erythropoietin synthesis and marrow function.

- Nitrous oxide depresses BM function even after brief exposure; best to use O₂-air mixture.
- Normothermia promotes coagulation.
- Chronically anemic pts may tolerate lower Hct; adequacy of tissue O₂ must be addressed if CV decompensation ensues.
- Avoid induced hypotension in anemic pts.

Extubation

- Period with greatest O₂ demands

Postoperative Period

- Continued monitoring of coagulation status
- Transfusion requirements >normal
- Increased susceptibility to infection
- Pain management requires balance between pulm toilet versus sedation

Anticipated Problems/Concerns

- Age of RBC in pts with aplastic anemia is older than usual, with lower 2,3-DPG levels inside cells resulting in increased O₂ binding by Hgb (shift to the right) and decreased delivery of oxygen to tissues for same SaO₂.

Anemia, Chronic Disease/Inflammation

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Risk

- Incidence in USA: 5%; incidence in surgical population: 5% to 75%.
- Historically thought to be due to chronic infectious, inflammatory, or malignant conditions. Now known to occur with severe trauma, DM, aging, and acute immune activation.
- More than 130 million Americans living with chronic diseases.

Perioperative Risks

- Risks related to underlying diseases
- Transfusion related risks (e.g., TRALI, TACO, hemolytic reactions, immunosuppression)
- Risks related to compensatory mechanisms for increasing O₂ delivery (e.g., angina, heart failure, dysrhythmias)

Worry About

- Underlying diseases and their periop complications.
- Impaired tissue O₂ delivery and compensatory mechanisms aimed at correcting it.
- Delayed wound healing and infection.

Overview

- WHO definition of anemia: children 6 mo to 6 y: Hgb <11 g/dL; 6 to 14 y: Hgb <12 g/dL; nonpregnant females: Hgb <12 g/dL; pregnant females: Hgb <11 g/dL; males: Hgb <13 g/dL.
- Usually mild with Hgb 8-11 g/dL.
- Usually normochromic, normocytic with low reticulocyte count.
- Low serum Fe, TIBC, and transferrin levels.
- ACD/I due to disturbances of Fe homeostasis – diversion of Fe from the circulation into storage sites

within the reticuloendothelial system and reduced GI absorption of Fe.

Etiology

- Relative Fe deficiency
- Reduction in RBC production and mild decrease in RBC survival time
- Certain treatments for chronic conditions

Usual Treatment

- Treatment of underlying disease
- Fe, folic acid, and cobalamin supplementation
- Erythropoiesis-stimulating agents
- Allogeneic blood transfusion

Assessment Points

System	Effect	Assessment by Hx	PE	Test
CV	Hyperdynamic circulation Myocardial ischemia CHF	Palpitation Pounding pulse Angina Sx, dyspnea Exercise intolerance	Tachycardia Wide pulse pressure	ECG Exercise ECG
RESP		Dyspnea		
GI	Chronic blood loss Hypoperfusion	Blood in stool Angina equivalent (pain, nausea, indigestion)		Occult blood in stool See CV
HEME	Hgb below WHO definition level (see Overview)	Decreased exercise tolerance		Hgb
RENAL	Chronic renal failure	Decreased urine output Dialysis	Shunt	Cr K ⁺
CNS	Decreased cerebral O ₂ delivery	Dizziness Headache Transient cerebral ischemia		
MS	Low exercise capacity	Fatigue		

Key References: Gangat N, Wolanskyj AP: Anemia of chronic disease, *Semin Hematol* 50:232, 2013; Shander A: Anemia in the critically ill, *Crit Care Clin* 20(2):159–178, 2004.

Perioperative Implications**Preoperative Preparation**

- Standard monitoring.
- Warm the room.
- CVP, Hgb, electrolytes.
- ST-segment analysis in pts with signs of CAD.
- PA cath for large fluid shifts or pts with signs of LV dysfunction or advanced renal failure.
- ABG.

Airway

- None

Preinduction/Induction

- Prehydrate liberally if CV status will tolerate.

- Avoid CO reduction.
- Avoid hypoxemia.
- Choose drugs according to underlying conditions.

Maintenance

- Avoid hypoxemia.
- Maintain CO.
- Avoid hypovolemia.
- Keep pt warm.
- Maintain Hgb above critical level for pts taking comorbidities into account.

Extubation

- Keep pt warm.
- Maintain high PaO₂.

- In pts with CAD, this is the period of greatest risk for ischemia.

Postoperative Period

- Keep pt warm, prevent shivering.
- Maintain high PaO₂.

Adjuvants

- According to underlying disorder

Anticipated Problems/Concerns

- Myocardial ischemia/infarction or CHF in pts with concomitant CAD.
- Deterioration of renal function in pts with CRI.
- Prolonged effects of drugs in pts with impaired renal and/or hepatic function.