

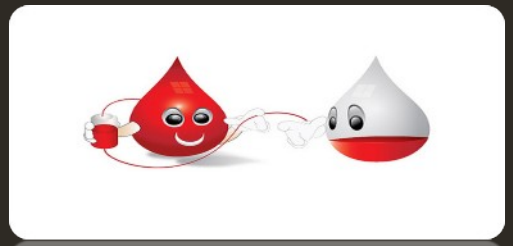
18th International Congress of Anesthesiology, Critical Care and Pain

Perioperative Blood Management

Major Intraoperative Bleeding

Dr. AR Mahoori Cardiac Anesthesiologist

Professor of Anesthesia Urmia University of Medial Sciences



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Case Re-entry



90 Minutes Into Surgery…

- EBL: 1500 mL
- BP: 85/50 mmHg
- HR: 112/bpm
- Hb: 7.2 g/dL
- pH: 7.25
- iCa: 0.92 mmol/L
- Temperature: 35.2°C

“What do you do now?”

First Principle



This Is Not Just Anemia

- Hemorrhage → ⬇ Circulating volume → ⬇ Oxygen delivery → Shock
- Hypothermia + Acidosis + Hypocalcemia → Coagulopathy

"The first goal is not to normalize the Hb

- The first goal is to control hemorrhage and restore

Priority

STOP THE BLEEDING

- Immediate communication with surgeon
- Surgical hemostasis
- Identify source
- Consider temporary packing / damage-control strategy if necessary

No transfusion strategy can compensate for uncontrolled bleeding

What Are We Trying to Restore?

Target	Problem	Intervention
Oxygen delivery	Blood loss	RBC
Coagulation factors	Dilution/consumption	Plasma
Fibrinogen	Low fibrin formation	Fibrinogen
Platelets	Platelet deficit	Platelets
Calcium	Citrate + shock	Calcium
Temperature	Hypothermia	Active warming
Acid-base	Shock	Hemorrhage control + perfusion

RBC: How Much?

RBC: Transfuse or wait?

Hb = 7.2 g/dL + active bleeding + hypotension + CAD history

- Active hemorrhage
- Hemodynamic instability
- Impaired oxygen delivery
- History of MI/CAD

Hb is important but in active bleeding, Hb alone should not drive transfusion

Don't Forget the “Lethal Triad”

Hemorrhage

↓

Hypothermia

↓

Hypoperfusion

↓

Acidosis

Citrate-containing blood products

↓

Hypocalcemia

Blood loss + cold fluids/blood

↓

Hypothermia

Coagulopathy

↓

More bleeding

Calcium

- iCa = 0.92 mmol/L

Why Does Calcium Matter?

- Coagulation cascade
- Platelet function
- Myocardial contractility
- Vascular tone



Temperature & Acid-Base

- T = 35.2°C → Active warming
- pH = 7.25 → Restore perfusion / stop hemorrhage

"Acidosis is primarily a marker of inadequate perfusion"



The Key Question

What Exactly is Wrong with Her Coagulation?

Conventional tests

- PT/INR
- aPTT
- Platelet count
- Fibrinogen

Viscoelastic testing

- ROTEM / TEG
- Whole-blood clot dynamics
- Rapid functional information
- Goal-directed therapy

Major Intraoperative Bleeding



- 1. Control the source
- 2. Restore oxygen delivery
- 3. Correct calcium & temperature
- 4. Assess coagulation
- 5. Treat the specific defect
- 6. Reassess continuously

In major hemorrhage, the question is not ‘How much blood should I give?’ it is ‘What does this patient need right now?


Thank You for Your Attention