

Perioperative Management of Bleeding Disorders

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Preoperative Evaluation

- History of bleeding-site, pattern, circumstances
- Hereditary bleeding disorders-need preoperative plan with hematologist.
- If bleeding preoperatively, coagulation studies including fibrinogen and platelet count

Uncrossmatched Blood

- Indication: bleeding with hemodynamic instability when crossmatched blood is not available.
- Risk: less than 0.5% of the general population has a red cell alloantibody that could cause a hemolytic reaction. In transfused patients, closer to 2-3%. In sickle cell anemia, 30-40%.
- Depending on test method, minimum 45-60 minutes to get XM.
- Bottom line: in an unstable bleeding patient, it is worth the risk.

Topical Control of Bleeding

- Expected to have the highest benefit to risk ratio of any hemostasis therapy

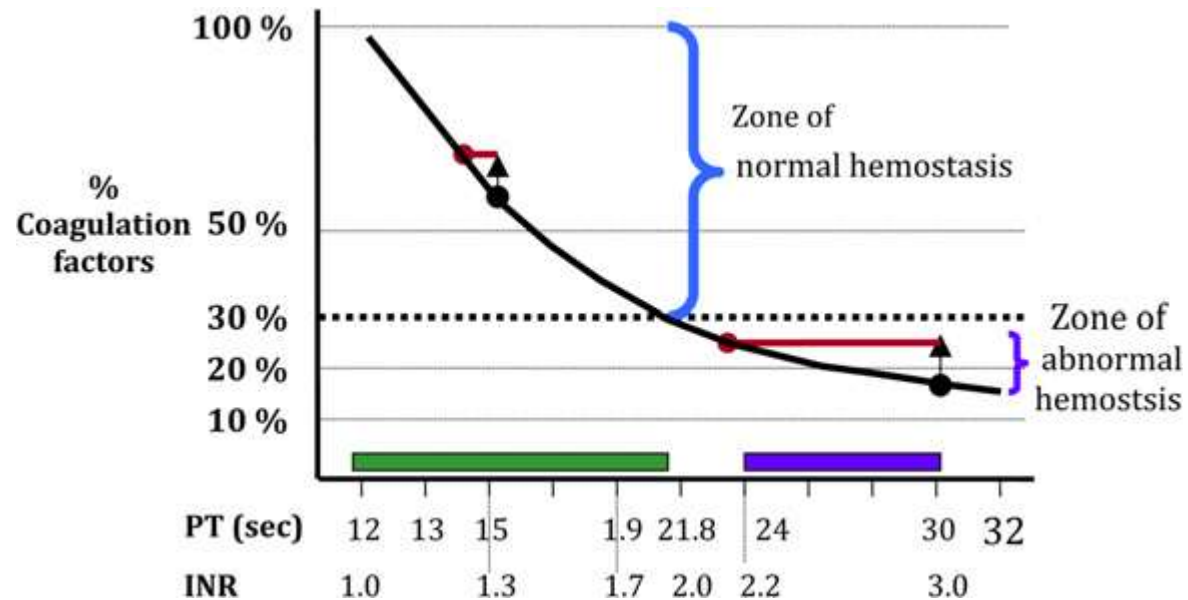
Massive Transfusion

- Transfusion of more than one blood volume (approximately 70 mL/kg) in 24 hours.
- Ten units of red cells in adults is commonly used in the literature as the cutoff.
- Massive transfusion in trauma vs. massive transfusion in other surgery. Can information obtained in one be generalized to the other?

Reasons for Coagulopathy in Massively Bleeding Patients

- Consumption: can happen at sites of injury or from disseminated intravascular coagulation secondary to inadequate perfusion. Unpredictable in time course and how much consumed. Follow serial coagulation tests. Replace with plasma. May need additional fibrinogen replacement with cryoprecipitate. Low fibrinogen correlates with poor outcomes both in trauma and obstetrics.

Coagulation Factor Levels and Tests



Reasons for Coagulopathy in Massively Bleeding Patients

- Dilution: giving fluids, including red cells, crystalloid and colloid, without clotting factors. Predictable in that if you replace one blood volume, all coagulation factors will decrease by 65-70%. Clinical effects most felt in platelet count and fibrinogen level (e.g. platelets from 200,000 to 60,000 or fibrinogen from 300 mg/dl to 90 mg/dl). Prolongation of PT and PTT usually don't happen until 1.5 to 2 blood volumes.

Reasons for Coagulopathy in Massively Bleeding Patients: More Specific to Trauma

- Hypothermia: prevent with warming
- Metabolic acidosis: maintain adequate perfusion
- Activation of protein C and hyperfibrinolysis: plasma, cryoprecipitate, antifibrinolytics.

Use of Fixed Ratios

- Military use of higher ratios of plasma to red cells beginning in Iraq based on two retrospective studies. The US Surgeon General changed the policy to 1:1 plasma to red cell ratio.
- This was followed by a large number of civilian trauma studies confirming this.
- Beginning in 2009, several studies provided evidence that earlier studies were affected by survivor bias (nonsurvivors are more likely to die before getting FFP).

More on Fixed Ratios

- In 2010 the US Army reported on 777 patients cared for before and after the 1:1 ratio put in place. No mortality benefit observed. Many more blood components used.
- So is there a happy medium where we give enough FFP so we don't allow dilutional coagulopathy, but less than 1:1??? More information is needed on this.

Adjunctive Therapy

- As shown in a very large randomized trial, in trauma with significant bleeding, tranexamic acid reduces the risk of death and death from hemorrhage. Despite its antifibrinolytic activity, no increased risk of thromboembolic complications.
- Several controlled trials showed lack of benefit in use of recombinant factor VIIa. There is also clear evidence of harm, including both venous and arterial thrombosis.

Massive Transfusion Protocols

- “Plans are useless; planning is indispensable.” Dwight David Eisenhower
- Most hospitals have these in place
- No evidence on what should be done. Essentially a declaration of emergency.
- Massive transfusion “packs” are usually some mix of components- 6 units red cells and 4 units of plasma is commonly used but local issues are taken into account.
- Other logistics-messengers, communications, etc.

Reversal of Anticoagulants

- Warfarin- FFP, 4-factor PCCs
- Antiplatelet agents-no specific reversal.
Platelet transfusion is used but no trials to support their use.
- Xa inhibitors (xabans) and direct thrombin inhibitors (Dabigatran)-no specific reversal