Thrombocytopenia

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Risk

- Commonly present in pts with systemic illness (e.g., sepsis), pathologic conditions of pregnancy, and in pts requiring extracorporeal circulation.
- Prognosis is determined by underlying illness, not absolute platelet count.
- HIT, a prothrombotic immune-mediated disorder, occurs in <5% of pts exposed to heparin.

Perioperative Risks

- Bleeding associated with invasive procedures.

Worry About

- Spontaneous bleeding when platelet count <10,000/μL
- Bleeding from nonneurologic invasive procedures when platelet count <50,000/μL
- Bleeding from neurologic and spinal procedures when platelet count <100,000/μL
- Excessive periop bleeding with resultant hypovolemia and hemodynamic instability
- Potential need for transfusion of blood and blood products
- Concurrent anemia and pancytopenia
- Underlying cause(s) of thrombocytopenia
- Risk of thrombosis in pts with HIT (~50%)

Overview

- Defined by <150,000 platelets/mL. Severe thrombocytopenia defined by <50,000 platelets/mL.
- High risk of bleeding if prior bleeding at similar platelet count.
- High risk of bleeding if presence of generalized petechiae, purpura, and bleeding from mucous membranes.
- Treatment of thrombocytopenia is guided by underlying illness.
- Initial diagnostic workup includes CBC and peripheral smear, with other tests based on clinical examination.
- Bleeding time does not correlate with the risk of surgical bleeding.
- Need for platelet transfusion is determined by severity of thrombocytopenia and invasiveness of procedure.

Etiology

- Increased platelet destruction and non-immune causes: Infection with or without DIC, pregnancy-related HELLP syndrome, and TTP.
- Increased platelet destruction and immune causes: Drug-induced (including HIT), ITP, rheumatologic disorders, post-transfusion purpura, neonatal immune thrombocytopenia, and HUS.
- Hypersplenism (e.g., due to portal hypertension or hematologic malignancy).
- Decreased platelet production: Bone marrow failure, chemotherapy and radiation therapy, ethanol, and liver failure.
- Dilution: Platelet count is maintained until intravascular replacement >1.5-2 blood volumes

Usual Treatment

- Treat underlying cause:
  - Discontinue offending drugs, treat infection, splenectomy.
  - If HIT confirmed by positive platelet factor 4 antibody test and serotonin release assay, then anticoagulate with direct thrombin inhibitor.
  - ITP is treated with steroids and high-dose IgG in severe cases.
  - TTP is treated with exchange transfusion and plasmapheresis.
- Platelet transfusion is performed up to a single apheresis unit or equivalent at a time.
- Effect of platelet transfusion: Each unit of transfused platelets should raise count by ~10,000 platelets/μL but increases risk of future thrombocytopenia from alloimmunization (occurs in 50% of pts transfused with platelets).
- Transfusion thresholds:
  - ≤10,000/μL: Prophylaxis of spontaneous bleeding.
  - <20,000/μL: Prophylaxis of elective central venous catheter placement.
  - <50,000/μL: Prophylaxis of elective lumbar puncture, neuraxial anesthesia/analgesia, and nonneuraxial surgery.
  - <100,000/μL: Treatment of active bleeding; prophylaxis of neuraxial surgery (intracranial or spinal).
- Pts undergoing cardiac surgery with cardiopulmonary bypass should not be routinely transfused with platelets in the absence of thrombocytopenia.
- Transfusion of platelets in a ratio of 1:1:1 unit with packed red blood cells and fresh frozen plasma improves hemostasis and reduces risk of death from exsanguination in trauma pts requiring massive transfusion.

Assessment Points

System	Effect	Assessment by Hx	PE	Test
HEENT	Mucosal hemorrhage		Petechiae, purpura and ecchymoses of skin, oral mucosa and conjunctivae	
NEURO	Intracranial hemorrhage	Change in mental status	Mental status (GCS), focal motor deficits	Head CT
CV	Hypovolemia, anemia, pericardial effusion	Lightheadedness, syncope, palpitations	Tachycardia, hypotension, orthostasis, pericardial friction rub, pulsus paradoxus	ECG, CXR, ECHO
RESP	Pulm hemorrhage	Cough, hemoptysis		CXR
GI	GI bleeding	Hematemesis, hematochezia, melena		Stool guaiac
RENAL	Prerenal or renal azotemia, glomerulonephritis with specific disease entities	Urine output		BUN, Cr, urinalysis

Key References: Kumar A, Mhaskar R, Grossman BJ, et al.: Platelet transfusion: a systematic review of the clinical evidence, *Transfusion* 55(5):1116–1127, 2015; Kaufman RM, Djulbegovic B, Gernsheimer T, et al.: Platelet transfusion: a clinical practice guideline from the AABB, *Ann Intern Med* 162(3):205–213, 2015.

Perioperative Implications

Preinduction/Induction/Maintenance

- Assess hematologic and hemodynamic presentation.
- Determine bleeding risk based on underlying pathology, physical exam, degree of thrombocytopenia, and proposed surgical procedure.
- Ensure blood products availability based on the risk assessment.
- Consider prophylactic platelet transfusion if platelet count <50,000/μL or if <100,000/μL and high-risk surgical procedure.
- Avoid use of hetastarch, which can cause platelet dysfunction.

General Anesthesia

- Caution with nasal procedures, including nasotracheal intubation, nasogastric intubation, and nasopharyngeal thermometer placement.

Monitoring

- Platelet count should be obtained when a history of bleeding is present; diagnosis of periop bleeding is unclear; screening for heparin-induced thrombocytopenia (5–14 d after heparin exposure).
- Viscoelastic tests of coagulation (e.g., thromboelastography, thromboelastometry) can help diagnose cause of periop bleeding and reduce blood product usage.

Regional Anesthesia

- Neuraxial techniques may be considered when platelet count is >50,000/mL.
- Similar considerations should be given to performing deep plexus or peripheral nerve blocks.

Anticipated Problems/Concerns

- Excessive bleeding with invasive procedures
- Requirements for transfusion of platelets and other blood products