Thrombocytopenia

Thrombocytopenia can be qualitative and/or quantitative and is a non-specific finding commonly seen in sick and pregnant patients ranging from a benign finding to life-threatening bleeding; the challenge to anesthetists exists in using regional anesthesia and when to transfuse thrombocytopenic patients

ANESTHETIC CONSIDERATIONS:

- Etiology of thrombocytopenia
- Risk of bleeding & transfusion
- Contraindication to neuraxial anesthesia
- Co-morbidities:
  - Pregnancy: PIH & HELLP, SAB or LEA conflict, & neonatal thrombocytopenic ICH
  - Sepsis / sick in ICU
  - Cancer
- Management of thrombocytopenia: PLTs, steroids, IVIG, plasmapheresis, splenectomy, or chemotherapy / radiation

ANESTHETIC GOALS:

- Prevent morbid iatrogenic hematomas complicating regional anesthesia
- Treatment of ongoing bleeding and promote hemostasis

HISTORY

- Evidence of a bleeding diathesis:
  - Mucosal bleeding - troubles w/ prolonged bleeding after biting tongue, cheek or lips
  - Post dental extraction prolonged bleeding or re-bleeding days later
  - Petechiae seen under BP cuff
  - Ecchymosis - unexplained or larger than expected
  - Bleeding from venipuncture sites
  - H/o GI or GU bleeding
  - Trauma or surgical history
  - Previous pregnancy history
  - Vascular thrombi - HIT
- Absence of soft tissue or joint bleeding (indicative of non-thrombocytopenic bleeding)
- Any medications, OTC, or herbal medications started w/in last week
- Any relatives w/ bleeding diathesis
- Any recent change in health
- Evidence of hepatosplenomegaly
- Specific questions should be directed towards etiologies associated w/ specific patient populations (see background)
- If already diagnosed:
  - On lab work, is the thrombocytopenia REAL, new, stable, or dynamic
  - Has a hematologist been involved in patient care
  - What treatment therapies have been used

PHYSICAL

- **HEENT**
  - Petechiae, purpura, and ecchymoses of skin, oral mucosae, and conjunctivae
- **CVS**
  - Vitals signs, orthostasis, pericardial friction rub, pulsus paradoxus
- **CNS**
  - Neurological exam: mental status, focal findings
  - Reflexes (pre-eclampsia)

INVESTIGATIONS

- **Labs**
  - R/o pseudo-thrombocytopenia:
    - Repeat PLT count using citrated blood instead of EDTA
    - Manual PLT count
  - CBC & smear for pancytopenia, cancer, HUS-TTP, or normal response to increased destruction
  - INR & PTT, fibrinogen, FDP or D-dimer to look for DIC
  - TEG & PFA
  - LDH (increased in HELLP, microangiopathy)
  - U/A for hemolysis; Cr / BUN for renal function
  - X-match blood
- **Imaging**
  - ECG (pericardial effusion)
  - CXR (pericardial effusion, pulmonary hemorrhage)
- **Special**
  - Others as directed by hematopathologist (i.e. bone marrow biopsy)

OPTIMIZATION

- Consult a hematologist as to etiology & treatment
- Active hemorrhage or PLT < 20 → transfuse

- ITP → steroids, IVIG, splenectomy (transfuse if actively bleeding)
- DIC → transfuse
- TTP-HUS → emergent plasmapheresis & avoid PLT transfusions
- HIT → the principle of managing HIT is the discontinuation of all forms of heparin exposure (to prevent thrombotic complications) and the institution of an alternative anticoagulant (lepirudin / argatroban etc. until PLT count recovers > 100 then warfarin) → IVIG, PLT transfusions, plasmapheresis, FFP, consider GPIIb/IIIa inhibitor

ANESTHETIC OPTIONS

- VERY CONTROVERSIAL
- Historically: PLT count > 100 was cut-off, but that was based on opinion of Cousins not on any research
- Current opinion:
  - PLT count > 80 is safe for neuraxial techniques
  - PLT count < 50 or clinical evidence of bleeding contra-indicates neuraxial techniques
  - Grey area = PLT count between 50 & 80
- Factors to consider basically weigh risk of neuraxial vs. GA:
  - Medical management
  - PLT count chronic, but stable w/out evidence of bleeding
  - PLT count dynamic or decreasing
  - PLT function
  - Difficult A/W
  - Pregnancy - proposed method of delivery, PIH (dynamic PLT count), gestational age (risk of ICH), history of recurrent bleeding
  - Difficult neuraxial anatomy
  - Spinal vs. epidural techniques
  - Soft vs. hard epidural catheters

ANESTHETIC SETUP

- **Drugs**
  - Standard emergency drugs
  - DDAVP (only useful in patients with concurrent renal failure or vWD)
- **Equipment**
  - Standard CAS
  - Consider arterial line for frequent bloodwork

MANAGEMENT OF ANESTHESIA

- **Induction**
  - Assess volume status and Hb prior to induction
  - Ensure blood bank has adequate cross-matched pRBCs and PLTs available
- **Maintenance**
  - ↑ risk of blood loss makes vigilance to volume status and replacement essential
- **Emergence**
  - Airway trauma / bleeding can occur with extubation

DISPOSITION & MONITORING

- Depends on underlying disease / extent of hemorrhage

COMPLICATIONS

- Excessive perioperative bleeding
- Epidural hematoma
- Physical exam, PLT count, type of surgical procedure are best predictors of bleeding risk

PATHOPHYSIOLOGY

- Platelets are involved in primary hemostasis and thrombocytopenia is the most common coagulation disorder
- Epidemiology:
  - 10% of pregnant pts
  - 40% of ICU pts
  - 1% of acute care hospital pts
- Etiologies:
  - Pseudothrombocytopenia
  - Parturient:
    - Gestational thrombocytopenia:
      - 75% of pregnancy related thrombocytopenia
      - Diagnosis of exclusion
      - PLT count < 70 & asymptomatic
      - Occurs in 2nd - 3rd trimester and resolves post-partum
      - Anti-PLT antibody are often seen
      - No increased risk of maternal or fetal hemorrhage
      - Static PLT count
    - ITP:
      - 5% of pregnancy related thrombocytopenia
      - Anti-PLT antibodies are seen in 80% of cases
      - Seen pre-pregnancy or in 1st trimester
      - History of easy bruising, petechiae, epistaxis & gingival bleeding pre-pregnancy

        - Fetus may suffer d/t placental crossover of antibody & is at risk for ICH
        - Static PLT count
    - Pre-eclampsia / HELLP:
        - 50% of pre-eclamptic patients
        - Dynamic platelet count which, if falling, correlates to worsening of pre-eclampsia
        - Bleeding is rare unless DIC occurs
    - TTP-HUS:
        - Characterized by microangiopathic hemolytic anemia (RBC fragments on smear), thrombocytopenia, central neurological abnormality, fever, & renal dysfunction
        - TTP usually shows up in 2nd trimester while HUS usually shows up post-partum
    - DIC
    - Drugs
    - Fatty liver of pregnancy
- Acutely ill patient:
    - DIC
    - Sepsis
    - Drugs or HIT
    - TTP-HUS
- Cardiac patient:
    - HIT
        - HIT I (non-immune mediated a.k.a. - HAT)
        - HIT II (immune mediated)
    - CPB
    - GPIIb/IIIa inhibitor
    - TTP d/t Plavix
    - Dilutional
- Ambulatory patient:
    - ITP
    - Drugs
    - Viral infections
    - Connective tissue disease
    - Bone marrow problems

Table 2 Causes of thrombocytopenia

Increased platelet destruction	
Non-immune	Septicaemia/inflammation
	Disseminated intravascular coagulation (DIC)
	Thrombotic thrombocytopenic purpura (TTP)
Immune	Autoimmune: idiopathic or secondary immune thrombocytopenia
	Alloimmune: post-transfusion purpura
	Drug-induced: prothrombic (heparin), prohaemorrhagic (quinine, quinidine, gold, sulpha antibiotics, rifampicin, vancomycin, NSAIDs)
Decreased platelet production	Alcohol, cytotoxic drugs
	Leukaemia, aplastic anaemia
	Myelodysplasia
	Metastatic bone marrow involvement
	Infections
Other causes	Hypersplenism
	Haemodilution (infusion of blood products, colloids, crystalloids)

NSAIDs=non-steroidal anti-inflammatory drugs.

- Platelet testing:
    - The major problem w/ lab testing of PLT number & function is that no test has been devised to test interaction between PLT and vascular endothelium
    - Bleeding time is USELESS d/t:
        - Operator dependant
        - Poorly reproducible
        - Invasive
        - Does NOT reflect bleeding at other sites in the body
    - TEG (thromboelastograph) = promising but UNPROVEN
        - "Maximum Amplitude" of 53 mm correlates to PLT count > 54 w/ 95% confidence interval between 40-70
        - Assoc. w/ normal clot formation which has led to recommendation of using 75 as cut-off for neuraxial anesthesia
        - However, doesn't measure initial PLT adhesion to exposed collagen in damaged vessel wall
    - PFA (PLT function analyzer) = promising but UNPROVEN
        - Correlates particularly well for PLT count < 50 but has significant false-positive rate
    - PLT aggregometry = NOT practical since extremely time consuming and requires complex technical expertise
- 5-6 U of PLTs usually increase PLT count by 30-50

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