Neonatal Platelet Disorders

Normal platelet function:

- Adhesion – after damage of the endothelial lining, platelets adhere to the exposed subendothelium. Neonatal platelet adhesion is similar to that in adults.
- Aggregation – Adenosine diphosphate (ADP), epinephrine, thromboxane A2, platelete activating factor (PAF), thrombin, and collagen activate platelets, causing them to degranulate and aggregate.

Qualitative platelet disorders:

- Platelet type bleeding, i.e. petechiae, purpura, mucous membrane bleeding (gastrointestinal bleeding and epistaxis), with a normal platelet count
- Bleeding time is most accurate test of platelet function, i.e. adhesion, activation and aggregation, but rarely done in the NICU. Prolonged bleeding times can also occur in conditions with abnormal blood vessels, e.g. Marfan's syndrome or Ehlers-Danlos syndrome.
- Genetic disorders that effect platelet function are rarely seen presenting in newborns. An example is Glanzmann's thromboasthenia, an autosomal recessive disorder where platelets fail to aggregate.
- Acquired disorders of platelet function include: pharmacologic effects, such as those due to aspirin and indomethacin, chronic disease, such as uremia and liver disease, and extracorporeal membrane oxygenation (ECMO), which effects the number of platelets and their function.

Thrombocytosis:

- Platelet count > 450,000
- Physiologic: Platelet counts to 600,000 at about 4-6 weeks of age in premature infants are not unusual
- Reactive: A response to infection and inflammation

- Iron deficiency, especially in association with erythropoietin (EPO) therapy and inadequate iron supplementation
- Asplenia
- Down syndrome
- Congenital adrenal insufficiency
- Thrombocytosis itself is benign and does not require specific therapy

Thrombocytopenia

- Platelet count < 150,000, incidence is 0.7 – 0.9% in screening cord blood samples
- Severe thrombocytopenia, < 50,000, 0.12 – 0.14% in screening cord blood samples
- Specific cause is frequently not known

Neonatal Alloimmune Thrombocytopenia (NAIT)

- Incompatibility between parental platelet antigens leading to maternal antibodies to antigens expressed by fetal platelets. Mother has a normal platelet count.
- First pregancy can have affected child (unlike neonatal Rh disease)
- Human platelet antigen 1 (HPA-1 or PLA-1) incompatibility accounts for 80% to 90% of cases of NAIT.
- Incidence of NAIT is 0.05% to 0.1%
- Severe thrombocytopenia, < 50,000 in 87% of cases
- Petechiae in 80% of cases
- Intracranial hemorrhage in 11% of cases

Autoimmune Thrombocytopenia

- Maternal autoimmunity leads to passive immunization with antibodies that bind both fetal and maternal platelets
- Most commonly with maternal idiopathic thrombocytopenic purpura (ITP), also with systemic lupus erythematosis (SLE), Grave's disease, etc.
- 13% to 56% of infants born to mothers with ITP develop thrombocytopenia, with only 5% to 20% having platelets < 50,000
- Intracranial hemorrhage rate of 3% in infants born to mothers with ITP

Infectious Causes of Thrombocytopenia

- 80% of patients with proven infections are thrombocytopenic
- When associated with disseminated intravascular coagulation (DIC) platelet counts tend to be lower, frequently < 20,000
- Commonly associated with viral infections, e.g. cytomegalovirus (CMV), herpes, enteroviruses and occasionally with human immunodeficiency virus (HIV). Mechanism is most likely a combination of accelerated destruction and decreased production.

Genetic Associations with Thrombocytopenia

- Thrombocytopenia with absent radii (TAR) syndrome – autosomal recessive disorder with severe thrombocytopenia < 10,000 to 30,000, absent radii, but thumbs and digits are almost always present
- Fanconi's anemia – autosomal recessive disorder with radial ray defects in 49% of patients, short stature, microcephaly (25%), brownish pigmentation of skin (64%), hematologic manifestations rare in infants
- Other genetic syndromes: congenital amegakaryocytic thrombocytopenia, familial macrothrombocytopenias, Wiskott-Aldrich syndrome, Noonan syndrome, Turner's syndrome, Down syndrome

Miscellaneous Causes of Thrombocytopenia

- Thrombosis – associated with an indwelling catheter, extracorporeal membrane oxygenation (ECMO), valvular cardiac disease
- Necrotizing enterocolitis – 80% to 90% of infants with necrotizing enterocolitis (NEC), due to platelet destruction, most without DIC
- Intrauterine Growth Retardation/Infants of women with pregnancy induced hypertension (PIH) – Usually associated with PIH, most often in premature infants, associated with decreased platelet production and usually resolves by 10 days of age. These patients are also frequently neutropenic due to decreased neutrophil production. About 25% to 45% of infants born to mothers with severe PIH have thrombocytopenia lasting up to 21 days or more.
- Asphyxia – Thrombocytopenia is seen commonly in asphyxiated infants.

Management of Thrombocytopenia

- In the absence of active bleeding treat thrombocytopenia if platelet count is less than 20,000 – 50,000. (Use the higher platelet value threshold, i.e. 50,000 in preterm and/or sick infants.)
- Platelet transfusions – usually give irradiated platelets from CMV-negative donors, 1 unit (or 2 units in large term infants or in cases of platelet destruction), reduced volume to about 10 to 20 mL/kg, over 30 – 60 minutes.
- Alloimmune thrombocytopenia (NAIT) – Treat with washed maternal platelets if available. Make arrangements directly with the Puget Sound Blood Center. In utero transfusion of platelets to the fetus before delivery has been effective. Treatment of the newborn with intravenous immune globulin (IVIG), 1 gm/kg, may also be helpful.
- Autoimmune thrombocytopenia – Platelet tranfusions usually not needed as thrombocytopenia is usually less severe, i.e. >50,000. Treatment with IVIG, 1 gm/kg, can be effective. Transfuse in addition to treatment with IVIG in cases of active bleeding.

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