Approach To The Bleeding Child

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Why is the child bleeding?

- Is it a local cause only?
- Is it an abnormality of the hemostasis?

Bleeding suggesting a hemostatic abnormality

- Excessive in relation to its cause
- Prolonged duration
- Recurrent

Bleeding History

- Epistaxis
  - Prolonged ( > 15-30 min)
  - Requiring medical treatment (packing, cauterization)
  - Recurrent / Leading to anemia
  - Not explained by trauma / nose-picking, allergy, URI

Bleeding History

- Bruising
  - Large ecchymoses ( > 5 cm diam.)
  - Multiple sites
  - Located in areas not usually associated with trauma

- Skin laceration
  - Bleeding lasting more than 30 min
  - Bleeding restarting over the next 7 days

Bleeding History

- Oral cavity bleeding
  - Lasting over 30 min.
  - Restarting within 7 days
  - Requiring medical treatment
  - Prolonged bleeding after dental extractions

- Menorrhagia
  - Requiring medical attention
  - Leading to anemia
Bleeding History
- Gastrointestinal hemorrhage
  - Spontaneous / unexplained by local causes
  - Requiring medical attention
  - Leading to anemia
- Hemarthroses, hematomas
  - After no or minimal trauma

Medical History
- History of hemostatic challenges
  - Surgeries, dental extractions, trauma
- Associated pathology
  - Allergic rhinitis
  - Liver disease
  - Renal failure / uremia

Medical History
- List of medications
  - Aspirin, other NSAID
  - Anticoagulants
  - Anticonvulsants (e.g. Valproic acid)

Family history
- X linked disorders
  - Hemophilia A (Fct VIII)
  - Hemophilia B (Fct IX)
- Autosomal dominant
  - Von Willebrand Disease
- Autosomal recessive
  - Fct VII deficiency
  - Fct XIII deficiency
  - Afibrinogenemia

Family history
- Sites and patterns of bleeding
- Hemostatic challenges
  - Surgeries
  - Major trauma
  - Dental extractions

Family History
- Gynecologic history for female relatives
  - Severe bleeding after childbirth
  - PRBC transfusion after delivery
  - Menorrhagia
  - Early hysterectomy for menorrhagia
Physical examination
- Is usually negative
- Purpura
- Ecchymoses
- Hemarthorses / chronic joint changes

Physical examination
- Telangiectasia:
  - Hereditary hemorrhagic telangiectasia
- Oculo-cutaneous albinism:
  - Hermansky Pudlak syndrome
- Skeletal abnormalities:
  - Thrombocytopenia absent radii
- Joint laxity:
  - Ehlers Danlos syndrome
Physical examination

Pattern of Bleeding

- Muco-cutaneous bleeding
  - von Willebrand Disease
  - Platelets number function

- Deep Bleeding (hematomas, hemarthroses)
  - Coagulation factor deficits F VIII, F IX

- Generalized bleeding
  - DIC, hepatic insufficiency,
Screening tests

- CBC
- Platelet Functional Assay
- PT
- PTT
- Fibrinogen

Complete Blood Count

Platelet Count / Blood Smear

- Pseudothrombocytopenia
  - EDTA induced in vitro agglutination of platelets
  - Confirmed by
    - Using a different anticoagulant (citrate, heparin)
    - Estimating the platelet count on the peripheral smear

Platelet Count / Blood Smear

- RBC morphology
  - Schistocytes = intravascular coagulation
    - DIC
    - TTP
    - HUS
  - Kasabach Merritt syndrome (giant hemangioma)
Platelet Count / Blood Smear

Increased destruction
- ITP
- DIC
- HUS
- Sepsis

Decreased production
- Leukemia
- Lymphoma
- Neuroblastoma
- Sepsis
- Drugs

Platelet Functional Assay

Well looking newborn
- Maternal ITP
- Alloimmune
- Neonatal Thrombocytopenia
- Thrombocytopenia
- Absent Radii
- Wiskott- Aldrich
- Fanconi Anemia

Sick Newborn
- Sepsis
- RDS
- DIC
- Thrombosis
- Viral infections
- Giant hemangioma (Kasabach Merritt)

Thrombocytopenia in newborn

Prolonged PFA times

Von Willebrand disease
Platelet functional defects
- Inherited
  - Glanzman’s thrombasthenia
  - Bernard Soulier
  - Storage pool defects etc.
- Acquired
  - anti-platelet medication
  - uremia

Thrombocytopenia platelet counts below 100,000/mmc
Prolonged PFA times

- von Willebrand factor panel
  - vWF factor antigen
  - vWF factor activity (ristocetin time)
  - Factor VIII
  - vWF factor multimeric analysis
- Blood type
- Platelet aggregation studies

Prothrombin Time Activated Partial Thromboplastin Time

Abnormal PT and PTT

- Mixing studies: plasma from a normal person is added to the patient's plasma
- The PT and / or PTT is determined immediately and after 2 hrs

Abnormal PT and PTT

- PT or PTT will correct with mixing studies
  - Coagulation factor deficit
- No correction with mixing studies
  - Inhibitor of the test
    - Lupus anti-coagulant
    - Anti-Cardiolipin A

Coagulation Factor Deficits

- Prolonged PT only: Fct VII
- Prolonged PTT only: Fct VIII, IX, XI, XII
  - Pre-kallikrein
  - HMWK
- Prolonged PT and PTT: Fct II, V, X, fibrinogen
- Prolonged PT, PTT low fibrinogen: DIC
Clinical cases

6 y.o male
- Recurrent nosebleeds
- Easy bruising
- The mother has a history of
  - heavy menses
  - Recurrent epistaxis

6 y.o male
- Platelet count: 215,000
- PFA: prolonged
- PT 12.5
- PTT 36 (prolonged)
- Fibrinogen 250 mg/dl
- Ristocetin time: 20%
- vWF Fct antigen: 25%
- Fct VIII: 45%
- vWF multimeric analysis: normal
- Blood type: B, Rh positive

6 y.o. male
- Dg: von Willebrand disease

7 y.o. female
- Recurrent nosebleeds
- History of allergic rhinitis
- Family history: negative
7 y.o. female

- Platelet count: 215,000
- PFA: normal
- PT 15.1 (prolonged)
- PTT 25
- Fibrinogen 250 mg/dl

7 y.o. female

- Platelet count: 215,000
- PFA: normal
- PT 12.5
- PTT 70 (prolonged)
- Fibrinogen 250 mg/dl

7 y.o. female

- PT mixing studies
  - PT Baseline: 15.8 (prolonged)
  - Immediate 1:1 mix: 15.6 (not corrected)
  - 2 hrs 1:1 mix: 15.3 (not corrected)

14 mo. old

- Irritable
- Refuses to walk
- Painful swelling of the right knee
- Bruises on the lower extremities

14 mo. old

- Platelet count: 215,000
- PFA: normal
- PT 12.5
- PTT 70 (prolonged)
- Fibrinogen 250 mg/dl

14 mo. old

- Family history
  - Father: normal
  - Mother: normal
  - Maternal great-grandfather: "free bleeder"

7 y.o. female

- Lupus anticoagulant: positive
- No bleeding diathesis
14 mo. old

- PTT mixing studies
  - PTT Baseline: 70 (prolonged)
  - Immediate 1:1 mix: 32 (corrected)
  - 2 hrs 1:1 mix: 33 (corrected)

14 mo. old

- Factor VIII level: 3% (decreased)

14 mo. old

- Dg: Hemophilia A (Fct. VIII deficiency)

10 y.o. male

- Increased bruising x 2 weeks
- Nosebleeds x 1 week
- Gum bleeding x 2 days
- T&A 3 yrs. ago; uneventful
- Family history: negative

10 y.o. male

- Purpuric rash: ecchymoses, petechiae
- Oral mucosa: submucosal hemorrhage
- No fevers
- No lymph node enlargement
- Liver at costal margin
- Spleen not palpable

10 y.o. male

- Platelet count: 5,000
- PFA: not done
- PT 12.5
- PTT 28
- Fibrinogen 250 mg/dl
- Peripheral smear:
  - Normal RBCs, normal WBC, very few platelets; large platelets
10 y.o. male

- Dg: ITP

Approach to the Bleeding Child

- Is the bleeding prolonged, excessive or unexpected?
- What is the bleeding pattern?
- Any prior hemostatic challenges?
- Family history
- Screening tests