The Elsevier Lectureship
You Might Blame Her Parents: Hematology for Gynecology

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Disclosures
None.
Acknowledgements

Dr. Mary Anne Jamieson
Foundation for Women & Girls with Blood Disorders

Dr. Hertweck and Dr. Perlman
Baylor College of Medicine trainees

Objectives

1. Recite and briefly explain the more common inherited bleeding disorders responsible for abnormal menstrual flow in teens
2. Efficiently incorporate and interpret screening tools into clinical practice
3. Evaluate when to involve hematology
4. Utilize advocacy groups and clinical resources available for the healthcare provider, the patient and her family
5. Recognize and describe some of the clinical and academic benefits of becoming involved in a multidisciplinary team
History – 1924, Helsinki

• We would not be where we are today if it was not for Erik von Willebrand’s discovery in 1924 in Helsinki and his capillary fragility test!

Von Willebrand Disease (VWD)

• Affects 1% of the population
  - Most are type 1 (mildest form)

• Most common inherited bleeding disorder

• 1 in 5 women with heavy menstrual bleeding (HMB) will be affected

CDC Video:
Living with von Willebrand Disease
Bleeding, bleeding everywhere...

- Any excessive bleeding is concerning
- Inherited conditions are the first thing to consider
- Non-inherited situations occur, too

### Sorting it Out

<table>
<thead>
<tr>
<th>Bleeding Condition</th>
<th>Inherited</th>
<th>Non-inherited</th>
</tr>
</thead>
<tbody>
<tr>
<td>Common</td>
<td>von Willebrand disease</td>
<td>Hypothyroidism</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Chronic steroid use</td>
</tr>
<tr>
<td></td>
<td>Platelet function defects</td>
<td>Anticoagulation</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Acquired platelet dysfunction: NSAID use, renal disease</td>
</tr>
<tr>
<td>Less Common</td>
<td>Factor deficiencies</td>
<td>Acquired factor consumption: Cardiac anomalies</td>
</tr>
<tr>
<td></td>
<td>Hemophilia carrier</td>
<td>Transient: ITP</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Anatomic: connective tissue disorders, polyps, didelphys (i.e., more endometrial surface area)</td>
</tr>
</tbody>
</table>
Why is this important?

Bleeding disorders/tendencies affect many areas

- Surgery
  - Diminished wound healing
  - Complications related to ongoing bleeding during a surgery

- Obstetrics
  - Inherited conditions may be passed on to offspring
  - Postpartum hemorrhage

- Gynecology
  - Heavier bleeding with menses
  - Medical management
  - Avoidance of NSAIDs

Diagnosis of Menorrhagia: Not as easy as you may think...

- A woman’s perception of the amount of their menstrual flow often is not reliable.

- Some questions that may help quantify the amount of menstrual flow include:
  - How often do you change your sanitary pad/tampon during peak flow days? (>3 hour intervals)
  - How many pads/tampons do you use over a single menstrual period? (fewer than 21)
  - Do you need to change the pad/tampon during the night? (seldom)
  - How large are any clots that are passed? (< 1 in)
  - Has a medical provider told you that you are anemic? (rarely anemic)
### Warning Signs from Menstrual History

<table>
<thead>
<tr>
<th>Menstrual History: Qualitative</th>
<th>Menstrual History: Quantitative</th>
</tr>
</thead>
<tbody>
<tr>
<td>The Menstrual Cycle is a VITAL SIGN</td>
<td>Menses lasting more than 7 days</td>
</tr>
<tr>
<td></td>
<td>&gt;80 ml blood loss</td>
</tr>
<tr>
<td></td>
<td>Changing pad or tampon more than hourly</td>
</tr>
<tr>
<td></td>
<td>PBAC score &gt;100</td>
</tr>
<tr>
<td></td>
<td>Clots greater than 1 inch in diameter</td>
</tr>
<tr>
<td></td>
<td>Soaking through clothes</td>
</tr>
</tbody>
</table>

ACOG Committee Opinion No 349. Reaffirmed 2009.

iTouc and iPeriod

[![iTouc and iPeriod](image)](image)

ACOG Committee Opinion No 349. Reaffirmed 2009.

Obstetrics & Gynecology, Pediatrics
PREVALENCE OF BLEEDING DISORDERS IN ADOLESCENTS WITH HEAVY MENSTRUAL BLEEDING

Rosa Díaz MD, Jennifer Dietrich MD, Donald Mahoney Jr. MD, Donald L. Yee MD and Lakshmi Venkateswaran MD, ASPHO 2012

<table>
<thead>
<tr>
<th>Diagnosis</th>
<th>% of patients (N=18)</th>
</tr>
</thead>
<tbody>
<tr>
<td>von Willebrand disease (vWD) (WRC&lt;0.7%)</td>
<td>10 (72%)</td>
</tr>
<tr>
<td>Low VWF activity (WRC&lt;0.75%, normal multimers)</td>
<td>2 (10.2%)</td>
</tr>
<tr>
<td>Clotting factor deficiency</td>
<td>4 (2.2%)</td>
</tr>
<tr>
<td>Platelet function defect</td>
<td>15 (14%)</td>
</tr>
<tr>
<td>Thrombocytopenia</td>
<td>1 (6.1%)</td>
</tr>
<tr>
<td>PAI-1 deficiency</td>
<td>1 (6.1%)</td>
</tr>
<tr>
<td>Nondefinable bleeding disorder</td>
<td>6 (42%)</td>
</tr>
<tr>
<td>Incomplete workup</td>
<td>3 (20%)</td>
</tr>
</tbody>
</table>

Changing Culture

- Menorrhagia and Bleeding Disorder Education
  - Survey of 241 OB residency programs:
    - Reported 9 hours of training in medical management of menorrhagia their intern year, 11 hours 2nd, 3rd, and 4th years
    - 67% reported training in menorrhagia and bleeding disorders was sufficient
    - Less than 25% reported they would send tests for specific bleeding disorders
    - Inconsistently asked appropriate questions regarding bleeding history
Case 1

- An 11-yo female presents with her mom to your office reporting heavy menstrual cycles for the past 6 months. Menarche occurred at 11 years of age. Her cycles were initially light and irregular. Now her cycles are monthly. Her most recent cycle lasted 20 days, she changed pads every hour on the heaviest day, and passed some large clots. She feels tired more often when she returns home from school. Are you concerned? Cycles are supposed to be irregular in the first few years after menarche, right?

A workup for bleeding is initiated and with the assistance of a hematologist, you learn she has a diagnosis of VWD type 1.

What does ACOG say?

- Abnormal uterine bleeding should be classified according to the PALM-COEIN system

What does ACOG say?

Management of Acute Abnormal Uterine Bleeding in Nonpregnant Reproductive-Aged Women

Warning Signs of a Blood Disorder

One or more:
- Heavy menstrual bleeding confirmed by history
- Bleeding during surgery
- Bleeding during dental procedure
- Postpartum hemorrhage

Two or more:
- Epistaxis
- Easy bruising
- Gingival bleeding
- Family history of bleeding disorder(s)
The Coagulation Cascade

Pathophysiology

Tissue injury results in platelet activation
Von Willebrand's factor is ESSENTIAL for platelet adhesion

Adapted from the NEJM 2004 “Treatment of von Willebrand's.” Obstetrics & Gynecology, Pediatrics
Back to our case, and practical points

• How does the patient adjust?
• How does the patient become “normal” again?
• How does the patient transition from childhood to adulthood?

What can you recommend to your patient’s mom?

• If the patient has an underlying inherited condition, remind the caregiver to discuss the potential for other family members to have the condition.

• The hematologist can help establish genetic trees and advise who in the family should be tested.

• This is critical to the well-being of all family members, since a blood disorder may affect males and females, and any age group.
The workup is straightforward right?

Mean time to diagnosis is 9 years! This is way too long!

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Obstetrics & Gynecology, Pediatrics
Hematology and Tiered Workup

Initial tests
- Pregnancy test and CBC
- PT, PTT, Fibrinogen
- von Willebrand panel

Subsequent tests
- Platelet aggregometry
- Platelet electron microscopy
- Other tests for platelet function disorders

Tests for rare causes
- Plasminogen activator inhibitor-1
- Alpha-2 antiplasmin
- Factor XIII

Why isn’t it straightforward?

- Coagulation factors may be affected by many conditions
  - Thyroid hormone
  - Pregnancy
  - Estrogen treatment
  - Stress
  - Active bleeding state
  - Over the counter medications

So what do you do?
- Repeat
- Repeat
- Repeat

Obstetrics & Gynecology, Pediatrics
That is easy for you to say

• How is it possible to incorporate these tools into clinical practice?
  - Utilize screening tools
  - Utilize order sets
  - Talk to your partners in your practice and take a standardized approach so it becomes second nature
  - Educate your staff for ease of phone triage

PBAC Score

Score of >100 correlated with excessive menses
Quantifying the PBAC

Quantifying the PBAC in a pediatric and adolescent gynecology population

<table>
<thead>
<tr>
<th>MENSTRUAL CHARACTERISTICS</th>
<th>GROUP 1 Heavy Menses</th>
<th>GROUP 2 Normal Menses</th>
<th>GROUP 3 Light Menses</th>
</tr>
</thead>
<tbody>
<tr>
<td>AGE AT MENARCHE (years)</td>
<td>11.59 ± 1.56</td>
<td>11.41 ± 1.51</td>
<td>11.78 ± .83</td>
</tr>
<tr>
<td>PBAC SCORE Mean</td>
<td>362</td>
<td>136</td>
<td>44</td>
</tr>
</tbody>
</table>

p value <0.002

Robertson Laboratory Kingston

Clinical and Molecular Hemostasis Research Group
Queen’s University & Kingston General Hospital

BLEEDING QUESTIONNAIRES
1. Condensed WOMENH - VDQ Bloodletting Questionnaire
   - CondensedWOMENH - VDQ Bloodletting Questionnaire
   - Tips for Using the Condensed WOMENH - Bloodletting Questionnaire
   - Validation Paper (PDF)
2. Pediatric Bleeding Questionnaire

Obstetrics & Gynecology, Pediatrics
## Treatment of acute menorrhagia


<table>
<thead>
<tr>
<th>Menstrual Bleeding</th>
<th>Hb (g/dL)</th>
<th>Management/Treatment</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mild</td>
<td>&gt;11</td>
<td>Reassurance, education. Offer iron and low-dose OCP. Reevaluate 3 months</td>
</tr>
<tr>
<td>Severe</td>
<td>7-9</td>
<td>Rule out coagulopathy. Offer iron and high-dose OCP taper. Reevaluate in 4 weeks.</td>
</tr>
<tr>
<td>Hypovolemic Shock</td>
<td>&lt;5-6</td>
<td>Stabilize, rule out coagulopathy. Offer transfusion. Admit for high-dose hormones until VB stops (IV or po route). D&amp;C or balloon tamponade in extreme cases.</td>
</tr>
</tbody>
</table>
Special considerations…

Mini-Review

Gynecologic Concerns in Pubertal Females with Blood Disorders
Lakshmi Venkatadri MD, Jennifer E. Dietrich MD, MSc

1 Division of Adolescent Gynecology, Department of Pediatrics, Boston University School of Medicine, Boston, MA
2 Division of Pediatric and Adolescent Gynecology, Department of Obstetrics and Gynecology, Mayo Clinic College of Medicine, Rochester, MN

Abstract
Purpose of Review: The incidence and prevalence of blood disorders varies depending on the underlying etiology, history, and presence of comorbid medical conditions. Gynecologic problems occurring around puberty may cause patients, as well as management challenges for providers.
Recent Findings: Management strategies in the setting of bleeding disorders include hormonal and non-hormonal problems occurring around puberty. Management strategies in the setting of clotting disorders allow providers problems occurring in adolescence while minimizing risk of serious thromboembolism.

The Acute Bleed Roadmap

Acute Menorrhagia

1. Get labs and ultrasound
2. Start hormones

- 1. IV Estrogen may be given 25 mg IV q6 hours until bleeding stops, transition to OCPs, then taper
- 2. Combination oral contraceptives, then taper

- 1. Norethindrone acetate 5-10 mg every 4 hours orally until bleeding stops then taper
- 2. Medroxyprogesterone 10-40 mg every 4 hours, then taper

The Acute Bleed and Treatment

- Antifibrinolytics may be needed to augment therapy
  
  Tranexamic acid
  - 10 mg/kg IV every 8 hours or 20-25 mg/kg orally every 8 hours
  - No taper required
  - Days to administer vary depending on clinical presentation

  Aminocaproic acid
  - 4-5 grams IV over 60 minutes, then taper to maintenance
  - 50-100 mg/kg orally every 4-6 hours x 5 days

The Acute Bleed

- Involve Hematology early

- Blood products (replace factors)
  - von Willebrand-containing factor replacement (VIII & VWF)
  - Platelets
  - PRBC if indicated (crisis)
  - Fresh frozen plasma

- Other clotting factor replacement products (some Recombinant ex: Factor VIII)
**Mechanical Tamponade**

Pelvic US first, obtain 3 measurements, then use the formula for volume of an ellipsoid.

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**Acute Management: Second-Line**

- D&C (rarely indicated in an adolescent)

- Endometrial ablation, uterine artery embolization
  - for women who have completed child-bearing

- Recombinant Factor VII

- Hysterectomy **ONLY** as a last resort
### Maintenance

- Hormonal agents
- Antifibrinolytic agents
- Involves a team approach

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**When Choosing Treatment Options for maintenance**

<table>
<thead>
<tr>
<th>Factors for Consideration</th>
<th>Patient specific</th>
<th>Medication Specific</th>
</tr>
</thead>
<tbody>
<tr>
<td>Compliance</td>
<td>Cost</td>
<td></td>
</tr>
<tr>
<td>Preference</td>
<td>Availability at pharmacy</td>
<td></td>
</tr>
<tr>
<td>Medical conditions</td>
<td>Prior medications attempted</td>
<td></td>
</tr>
<tr>
<td>Emergent nature (acute or chronic)</td>
<td>Augment current therapy</td>
<td></td>
</tr>
</tbody>
</table>

- Combined pills, patches, rings
- Injectables
- POPs
- IUDs
- Implants
- HRT
## Non-Hormonal Options

### Women without Bleeding Disorders

<table>
<thead>
<tr>
<th>Treatment</th>
<th>N</th>
<th>Mean Reduction Menstrual Blood Loss % (p value)</th>
</tr>
</thead>
<tbody>
<tr>
<td>TA vs placebo (Callendar et al. 1970)</td>
<td>20</td>
<td>34% (p&lt;0.005)</td>
</tr>
<tr>
<td>TA prodrug vs placebo (Edlund et al. 1995)</td>
<td>68</td>
<td>33% (p&lt;0.001)</td>
</tr>
<tr>
<td>TA vs control (Bonner and Shepard. 1996)</td>
<td>76</td>
<td>54% (p&lt;0.001)</td>
</tr>
<tr>
<td>TA vs mefanamic acid (Bonner and Shepard. 1996)</td>
<td>76</td>
<td>34% (p&lt;0.005)</td>
</tr>
<tr>
<td>TA vs ethamsylate (Bonner and Shepard. 1996)</td>
<td>76</td>
<td>54% (p&lt;0.001)</td>
</tr>
<tr>
<td>TA vs placebo (Preston et al. 1995)</td>
<td>46</td>
<td>45% (p&lt;0.0001)</td>
</tr>
<tr>
<td>TA vs luteal progestins (Preston et al. 1995)</td>
<td>46</td>
<td>65% (p&lt;0.0001)</td>
</tr>
<tr>
<td>TA vs baseline (Kadir et al. 2005)</td>
<td>37</td>
<td>40%</td>
</tr>
<tr>
<td>TA vs baseline (Kouides et al. 2009)</td>
<td>116</td>
<td>43%</td>
</tr>
<tr>
<td>TA vs intranasal desmopressin (Kouides et al. 2009)</td>
<td>116</td>
<td>23%</td>
</tr>
<tr>
<td>TA plus desmopressin vs placebo (Edlund et al. 2005)</td>
<td>20</td>
<td>59%</td>
</tr>
</tbody>
</table>


## Non-Hormonal Options

### Women with Bleeding Disorders

<table>
<thead>
<tr>
<th>Treatment</th>
<th>N</th>
<th>Mean Reduction Menstrual Blood Loss %</th>
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<td>20</td>
<td>59%</td>
</tr>
</tbody>
</table>

Surgical Challenges in the patient who needs elective or emergent surgery

• Excessive bleeding presents additional challenges when dealing with someone with a bleeding disorder

• Goals are the same → minimize bleeding AND control abnormally excessive bleeding

Do patients with VWD have more gynecologic concerns?

<table>
<thead>
<tr>
<th>Condition</th>
<th>Cases n = 102</th>
<th>Controls n = 88</th>
<th>P value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Menorrhagia</td>
<td>95%</td>
<td>61%</td>
<td>&lt;0.01</td>
</tr>
<tr>
<td>Ovarian cyst</td>
<td>52%</td>
<td>22%</td>
<td>&lt;0.0001</td>
</tr>
<tr>
<td>Endometriosis</td>
<td>30%</td>
<td>13%</td>
<td>0.005</td>
</tr>
<tr>
<td>Fibroid</td>
<td>32%</td>
<td>17%</td>
<td>0.02</td>
</tr>
<tr>
<td>Endometrial hyperplasia</td>
<td>10%</td>
<td>1%</td>
<td>0.01</td>
</tr>
<tr>
<td>Polyps</td>
<td>8%</td>
<td>1%</td>
<td>0.04</td>
</tr>
<tr>
<td>Hysterectomy</td>
<td>26%</td>
<td>9%</td>
<td>&lt;0.01</td>
</tr>
</tbody>
</table>

Considerations in Gynecologic Surgery

- Sources for hemorrhage
  - Failure to control active arterial/venous bleeding
  - Failed clotting function
    - Problem with vasoconstriction
    - Platelet activation inadequate
    - Coagulation cascade events (intrinsic and extrinsic)

- Choices to augment hemostasis
  - Thermal
  - Chemical
  - Mechanical

Advances in Gynecologic Surgery

- Minimally invasive techniques such as laparoscopy and hysteroscopy
  - Less potential blood loss

- Use of cautery

- Use of hemostatic agents
  - Topical
  - Parenteral
How well do topical hemostatic agents work?

• Another RCT looked at use of a collagen granule agent used topically for minor bleeding related ovarian cystectomy involving 20 patients

• There were 2 groups:
  - 8 in collagen agent group, and
  - 12 in control group involving use of cautery alone

• Cautery control took 172 seconds while collagen application took 182 seconds to cease bleeding

• No statistically significant outcomes

Obstetrics & Gynecology, Pediatrics

How well do topical hemostatic agents work?

• A prospective cohort study was conducted involving a review of over 3 million surgical cases at Columbia Univ, of which 30% utilized hemostatic agents between 2000-2010

• Use of hemostatic agents were found to increase over the time frame by 28.5%

• Rates of transfusion for a variety of surgical procedures declined, liver resection (15%), hysterectomy (3.7%) among many others

Obstetrics & Gynecology, Pediatrics
The Need is There: Combine Forces

• How do you do it?

• How can you justify it?

• What are some current examples?

How do you do it?

➢ Talk with your colleagues

➢ Chances are they notice the same thing...the NEED to do it

➢ Find a common day(s)
How do you justify it?

- Needs assessment in your area
- Follow your numbers
- Academic productivity

A Vision at Texas Children’s Hospital

Wanted to initiate a Multidisciplinary Clinic involving:

- Pediatric Hematology,
- Pediatric Gynecology,
- Adolescent Medicine, and
- Social Work

- In **one** clinic, same setting
  - Patient has access to services at the **same time**
THE YOUNG WOMEN’S BLEEDING DISORDER CLINIC (YWDBC)

DOB: May 30, 2009

Queen’s University Multidisciplinary Conference

CODErouge 2012
1st Canadian Conference on Bleeding Disorders in Women
MAY 25, 2012 • Le Meridien King Edward Hotel • Toronto

This one-day conference exclusively dedicated to bleeding disorders in women will bring together health care professionals from the fields of:
- Hematology
- Nursing
- Obstetrics
- Gynecology
- Family Medicine
- Pathology
- Social Work

CODErouge 2012 will feature the following topics:
- Overview of bleeding disorders in women
- Quality of life in affected women and their families
- Management of bleeding disorders in women
- State of the art research relating to bleeding disorders in women

hemorouge.ca • contact@hemorouge.ca
Do we want to keep a similar slide and have it include the birthdates of both clinics?
Academic Productivity Will Grow

### Utility of Platelet Function Analyzer as a Screening Tool for the Diagnosis of von Willebrand Disease in Adolescents With Menorrhagia

- **Study Title:** Utility of Platelet Function Analyzer as a Screening Tool for the Diagnosis of von Willebrand Disease in Adolescents With Menorrhagia
- **Authors:** Smith, M., Johnson, J., et al.
- **Purpose:** To evaluate the utility of the Platelet Function Analyzer in diagnosing von Willebrand disease (VWD) in adolescents with menorrhagia.

#### Table: Patient category and diagnostic test results

<table>
<thead>
<tr>
<th>Patient category</th>
<th>No. (%)</th>
<th>Test</th>
<th>RCoF ≤50 IU/dl</th>
<th>RCoF &gt;50 IU/dl</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total studied</td>
<td>235</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Age at presentation (years)</td>
<td>Median 13</td>
<td>Range 9–17</td>
<td>Normal PFA</td>
<td>11</td>
</tr>
<tr>
<td>Type 1 VWD or low VWF activity</td>
<td>23 (9.5%)</td>
<td></td>
<td>Abnormal PFA</td>
<td>12</td>
</tr>
<tr>
<td>Type 1 VWD (RCoF 30 IU/dl)</td>
<td>2</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Low VWF (RCoF 30–50 IU/dl)</td>
<td>21</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

#### Observations:

- **Total studied:** 235 patients
- **Age at presentation:** Median 13 years, Range 9–17 years
- **Type 1 VWD or low VWF activity:** 23 patients (9.5%)
- **Type 1 VWD (RCoF 30 IU/dl):** 2 patients
- **Low VWF (RCoF 30–50 IU/dl):** 21 patients

#### Results:

- **Normal PFA:** 11 patients
- **Abnormal PFA:** 12 patients

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### Prospective crossover trial of oral tranexamic acid and combined oral contraceptives in adolescent menorrhagia – interim report of a pilot study

- **Study Title:** Prospective crossover trial of oral tranexamic acid and combined oral contraceptives in adolescent menorrhagia – interim report of a pilot study
- **Authors:** Lahiri A., Sivadas M.D., et al.
- **Purpose:** To evaluate the effectiveness of oral tranexamic acid (TA) and combined oral contraceptives (COCP) in managing adolescent menorrhagia.

#### Study Details:

- **N=17 patients**
- **Mean age:** 14.2 years; range 11.7–16.7 years
- **Completion:** 5 completed both arms; 2 each completing the first and second arm
- **Withdrawal:** 8 patients withdrawn from the study for toxicity / non-compliance
- **Adverse events:** 7 patients (41%) experienced adverse events that were possibly drug-related
  - 2 on TA (28%); all mild - breakthrough bleeding/vomiting, lack of sleep
  - 5 on COCP (62%; 3 mild, 2 severe)
- **Thrombosis:** None developed thrombosis

#### Funded by:

Texas Children's Hospital's Pediatric Pilot Award

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**Presented at the International Society for Thrombosis & Haemostasis meeting 2013**

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**Page 54**
Platelet Function Defects in Adolescents with Menorrhagia

Heather L. Mills, CPNP-AC, Mohamed Shebl Abdel-Baki, MD,2,2, Jun Teruya, MD, DSc,1,2, Jennifer E. Dietrich, MD, MSc,2,4,8, Mona D. Shah, MD,2,2, Donald Mahoney Jr, MD,2,2, Donald L. Yee, MD,2, and Lakshmi Venkateswaran, MD,2,2

1Department of Pediatrics, Baylor College of Medicine, Houston, TX; Texas Children's Cancer and Hematology Centers, Houston, TX; Division of Transfusion Medicine, Baylor College of Medicine, Houston, TX; Department of Obstetrics & Gynecology, Baylor College of Medicine, Houston, TX.

Table 1. Platelet aggregation study results in adolescent menorrhagia patients

<table>
<thead>
<tr>
<th>Category</th>
<th>Number (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Patients with whole blood aggregation</td>
<td>50 (25)</td>
</tr>
<tr>
<td>Patients with abnormal platelet aggregation</td>
<td>18 (9)</td>
</tr>
<tr>
<td>1 Defectory</td>
<td>7 (14%)</td>
</tr>
<tr>
<td>2 or More Defectory</td>
<td>12 (24%)</td>
</tr>
<tr>
<td>Aggregation only</td>
<td>8 (16%)</td>
</tr>
<tr>
<td>Aggregation + secretion only</td>
<td>5 (10%)</td>
</tr>
</tbody>
</table>

- Platelet aggregation abnormalities were present in up to one-third of adolescents with menorrhagia
- Significant platelet aggregation abnormalities to 2 or more agonists were present in 16% of adolescents with menorrhagia

Presented at American Society of Hematology annual meeting 2011

Poster presentation at ASPHO 2013

Pediatric acquired von Willebrand Syndrome in cardiopulmonary disorders:

Do laboratory abnormalities correlate with bleeding?

Mala Pavuluri, MD, Donald L. Yee, MD, Shoko, Hua Mo, Donald Mahoney Jr, MD, Lakshmi V. Venkateswaran, MD

Department of Pediatrics/Hematology, Infectious Diseases, Transfusion Medicine & Coagulation, Texas Children's Hospital, Houston, Texas

Table 1. Laboratory parameters

<table>
<thead>
<tr>
<th>Parameter</th>
<th>n=15</th>
<th>n=16</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age at diagnosis</td>
<td>11 yrs</td>
<td>19 yrs</td>
</tr>
<tr>
<td>Family history of bleeding</td>
<td>Yes</td>
<td>No</td>
</tr>
<tr>
<td>Bleeding symptoms</td>
<td>Yes</td>
<td>No</td>
</tr>
<tr>
<td>Platelet count</td>
<td>211E9</td>
<td>60E9</td>
</tr>
<tr>
<td>Factor VIII activity</td>
<td>74%</td>
<td>53%</td>
</tr>
<tr>
<td>VWF activity assay used</td>
<td>Ristocetin coagulation assay</td>
<td></td>
</tr>
<tr>
<td>Loss of ristocetin collagen</td>
<td>n=2</td>
<td></td>
</tr>
<tr>
<td>No of patients on antiplatelet</td>
<td>n=7</td>
<td></td>
</tr>
<tr>
<td>Anticoagulation</td>
<td>Warfarin 51% / aspirin 13%</td>
<td></td>
</tr>
</tbody>
</table>

Correlation at difference noted in the VWF:Ag levels in patients with and without bleeding symptoms (p=0.00)}
Kingston's Work

生成和验证的简化的MCMDM-1VWD出血问卷对von Willebrand疾病

M. Bowman,* G. Mundell,* J. Grabell,* W. M. Hopman,† D. Rapson,* D. Lillicrap* and P. James†

*Department of Pathology and Molecular Medicine, McMaster University, Hamilton, ON, †Community Health and Epidemiology, McMaster University, Kingston, ON, and Department of Medicine, Queen's University, Kingston, ON, Canada.

Obstetrics & Gynecology, Pediatrics

Negative if Score <4

Condensed MCMDM1-VWD
-1 to 4, ~5 mins

EU Questionnaire (MCMDM1-VWD)
-1 to 4, ~40 mins

Vicenza Questionnaire
0 to 3, ~40 mins
17 pages!!!

Pediatric Bleeding Questionnaire (PBQ)
-1 to 4, ~20 mins

Among VWD patients
Sensitivity 100%
Specificity 87%
PPV 20%
NPV 100%
Support for Collaboration
Multidisciplinary Care is there

• SOGC:
  - “The ideal management of women with IBD who suffer menorrhagia is through multidisciplinary clinics”
  - Feedback from premenarchal girls: “Early introduction to the multidisciplinary team is important”
    - Premenarchal diagnosis, & anticipatory counseling

• ACOG:
  - Consider testing in conjunction with a Hematologist
  - Once diagnosis is made, collaboration with Hematologist is helpful for long-term management

Organizational Awareness is there
Summary: Heavy Menstrual Bleeding in the Adolescent

• Not a straightforward diagnosis
• Must keep in mind there are many options for medical management and surgical management of bleeding is not first line for control of HMB in this population
• A number of tools and advocacy groups are available to providers to aid patients and families
• Start a multidisciplinary clinic, there is a need!
• It is not always something you can blame on her parents!

https://youtu.be/Trcn47fcrY
Thanks!