Editorial

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Act fast when confronted by a coagulopathy postpartum

Don't waste valuable time waiting for coagulation studies to return from the lab—use your clinical judgment and start transfusing clotting factors

CASE Unremitting bleeding after vaginal delivery

A nurse-midwife delivered a macrosomic fetus and identified multiple cervical, vaginal, and perineal tears. After spending approximately 30 minutes suturing a few of the vaginal lacerations, she realized that she needed an experienced obstetrician to complete the complex repair. She has consulted you.

You introduce yourself to the patient, obtain consent, and begin to assess the situation. You note that she has a tear of the anterior cervix at its intersection with the vagina; a few deep vaginal lacerations; and a fourth-degree tear. The uterus is well-contracted and the abdomen is not distended.

As you sit to begin the repair, you notice diffuse oozing of blood from all areas of vaginal and perineal trauma. You suture the cervical laceration and notice that, after tying the stitch, bleeding is continuing from the closed laceration.

Based on what you're seeing, you become suspicious that the patient has a coagulopathy. What should you do?

Approximately 1 of every 300 deliveries is complicated by development of a clinically significant coagulopathy. Typically, these cases occur in conjunction with postpartum hemorrhage.

Because postpartum coagulopathy does not occur often, it's difficult for an OB to gain extensive personal experience with this disorder. Yet recognizing postpartum coagulopathy early helps ensure a good outcome.

Diseases that can cause postpartum coagulopathy include:

- placental abruption
- preeclampsia
- amniotic fluid embolism
- acute fatty liver of pregnancy
- prolonged intrauterine retention of a fetal demise
- sepsis
- a previously undiagnosed coagulation disorder.

In addition postpartum hemorrhage of any cause—placenta previa, placenta accreta, postpartum uterine atony—can cause coagulopathy.[1]

Do you suspect postpartum coagulopathy? If so, you should review the above list of possible conditions and diseases for the likely cause, because treatment of any one of them must be tailored to the individual patient. If placenta accreta is present, for example, hysterectomy may be necessary to save the life of the mother.

In this Editorial, I review **three approaches to identifying postpartum coagulopathy**—any one or more of which might be necessary for a given patient:

- clinical diagnosis
- the whole blood clotting test
- clinical laboratory measurement of the coagulation profile.

Clinical observation and diagnosis—key to early, rapid recognition

An experienced clinician often has an inkling that a coagulopathy is present when she observes evidence of abnormal clotting:

- blood oozes excessively from many areas of minor trauma
- suturing lacerations fails to stanch bleeding
- blood is more "watery" and less deeply red than ordinarily encountered (the so-called Kool-Aid sign).

Direct observation of any of these findings might prompt an experienced clinician to immediately activate a postpartum coagulopathy protocol, as I describe below, without waiting for additional test results. Delay in treating the coagulopathy could result in an acceleration of a dire cycle of bleeding and a worsening coagulation

Instant Poll

What were the **key clinical interventions** that helped you save the life of a mother who had a **severe coagulopathy postpartum**?

Tell us—at **robert.barbieri@qhc.com**. Please include your name and city and state.

Lyophilized fibrinogen concentrate: Another source of fibrinogen

In hospitals that provide OB services but have a blood bank with limited transfusion products, stocking RiaSTAP (lyophilized fibrinogen concentrate [human]; CSL Behring) may provide a reliable source of fibrinogen for transfusion.

In many OB cases marked by coagulopathy, a major contributor to the disorder is hypofibrinogenemia. At hospitals with limited blood bank resources, the in-house supply of fresh frozen plasma and cryoprecipitate might be depleted before an obstetrical patient's coagulopathy is fully corrected. RiaSTAP can provide a stable, readily available alternative source of fibrinogen for transfusion.[1]

One major disadvantage of RiaSTAP: It is a more expensive source of fibrinogen than FFP and cryoprecipitate.

Reference

1. Bell SF, Rayment R, Collins PW, Collis RE. The use of fibrinogen concentrate to correct hypofibrinogenaemia rapidly during obstetric hemorrhage. Int J Obstet Anesth. 2010;19(2):218–223.

defect, causing even more bleeding.

On the other hand, some clinicians prefer to wait for a laboratory test to confirm a coagulopathy before they activate a postpartum coagulopathy protocol.

Whole-blood clotting test

This is the so-called red-top–tube test—a simple test that can be performed at the patient's bedside to identify a coagulopathy; it's also known as the Lee and White test.[2–4] Obtain a sample of venous blood in a red-top tube (a glass tube without additives); at the same time, send a specimen of venous blood to the lab for a stat coagulation profile. In people who have normal hematologic function, the median time for blood to clot in the red-top tube, at room temperature (65°F to 90°F), is approximately 6.5 minutes (range, 5 to 8 minutes).

When blood in the red-top tube takes longer than 10 minutes to clot, the patient has a coagulopathy. If the blood clots but the clot then lyses over the following hour, a disorder of fibrinolysis, a type of coagulopathy, is likely.

Coagulation laboratory panel

If you suspect a coagulopathy, have blood drawn for stat measurement of hemoglobin and hematocrit, platelet count, prothrombin time (PT), partial thromboplastin time (PTT), and fibrinogen.

Regrettably, it might take as long as 40 minutes from the time blood is drawn to receive the complete panel of results. Such a delay might necessitate your deciding on a course of action based on your clinical observation and diagnosis, rather than waiting for test results. To delay initiating the transfusion of clotting factors creates the risk of having the coagulopathy cause more bleeding, resulting in a worsening coagulopathy—a cycle that can spiral into a clinical disaster.

Activate the postpartum hemorrhage protocol!

Most obstetric services have developed a formal approach to managing postpartum hemorrhage. That protocol can also guide the treatment of a postpartum coagulopathy.

After vaginal delivery, the standard postpartum hemorrhage algorithm includes:

- administration of uterotonics
- fundal massage
- placement of an additional large-bore IV catheter
- volume replacement
- insertion of an arterial line
- moving the patient from a labor room to a fully equipped operating room.

Procedures that *might* need to be performed include:

- a sonogram to determine whether retained products are in the uterus or if free fluid is in the peritoneal cavity
- a dilatation and curettage to remove retained products of conception
- placement of an intrauterine tamponade balloon*
- repair of vaginal and cervical lacerations
- uterine artery embolization.

After vaginal delivery and postpartum hemorrhage, additional **surgical procedures** that *might* be necessary include:

- exploratory laparotomy
- uterine compression stitches
- sequential devascularization of the uterus with O'Leary stitches
- hypogastric artery ligation
- hysterectomy.

Additional steps in the postpartum hemorrhage protocol often include recruiting additional staff to the OR, including an advanced general surgeon or gyn surgeon; an additional anesthesiologist; and the director of the blood bank.

Blood product transfusion protocol. An additional key feature of the emergency hemorrhage protocol is activation of a standardized blood product transfusion protocol. Rapid replacement of blood products is essential to support effective surgical management (see "Lyophilized fibrinogen concentrate: Another source of fibrinogen," above, and the **TABLE**).

*See "Have you made best use of the Bakri balloon in PPH?" in July 2011 OBG MANAGEMENT, at www.obgmanagement.com.

The clinical impact of various blood replacement products[1–3]

Product	How provided	Clinical effect
Red blood cells	1 unit (bag) contains 300–350 mL	1 unit raises the hemoglobin concentration by 1 g/dL and the hematocrit by 3%
Fresh frozen plasma (all clotting factors)	1 unit (bag) contains 200–300 mL	1 unit raises the fibrinogen level by 7 to 10 mg/dL
Cryoprecipitate (fibrinogen, factor VIII, factor XIII, and von Willebrand factor)	1 dose (as provided by the Red Cross) comprises 2 120–158 mL bags of 5 units each; 1 dose contains protein precipitate from 10 units of fresh plasma	1 dose raises the fibrinogen level by 70 mg/dL in a 70-kg person
Platelets	1 unit (bag) contains 300 mL, from 6 units of whole blood or one apheresis donor	1 unit raises the platelet count by 30×10^3/μL in an adult whose surface area is 2 m^2

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3. Bishop JF, McGrath K, Wolf MM, et al. Clinical factors influencing the efficacy of pooled platelet transfusions. Blood. 1988;71(2):383–387.

Modern transfusion guidelines in a case of massive hemorrhage after trauma call for transfusing fresh frozen plasma (FFP) at a ratio of FFP to red blood cells (RBCs) of >1:1.5.[5–7] At my hospital (Brigham and Women's Hospital), the blood bank is alerted to activate the protocol when a clinician announces that an "emergency obstetric hemorrhage" is in progress. The blood bank emergently transports 2 units of FFP and 2 units of RBCs to the delivery suite and begins to prepare a cooler with 6 units of RBCs, 2 units of FFP, and 1 dose of cryoprecipitate.

Because a postpartum coagulopathy is not a common occurrence, it is of great value to practice the OB hemorrhage protocol using simulation exercises.

CASE Resolved

You recognize the diffuse oozing and failure of the oozing to stop after a laceration is properly sutured as a sign of a developing coagulopathy.

You decide to send a blood specimen for a stat set of coagulation studies. You discontinue repair of the lacerations and pack the vagina with three laparotomy sponges tied together.

The patient is moved to the OR, and you activate the emergency transfusion protocol. You immediately receive 2 units of FFP, which you transfuse.

The blood bank sends a cooler with 4 units of FFP; 8 units of RBCs; and 2 bags of cryoprecipitate to the OR. The anesthesiologists begin the transfusion of these products.

The pretransfusion coagulation profile eventually returns: hemoglobin, 9.8 g/dL; platelet count, 79 X 10^3/μL; PT, 23.1 sec; International Normalized Ratio (INR), 2.0; PTT, 49 sec; and fibrinogen, 60 mg/dL.

After transfusing 4 units of FFP and the bag of cryoprecipitate, you remove the vaginal packs and note that diffuse bleeding has stopped. You resume repair of cervical and vaginal lacerations. During the course of the repair, all products in the cooler and 2 bags of platelets are transfused.

At the conclusion of your repair, the patient is no longer bleeding.

A final coagulation profile shows: hemoglobin, 9.1 g/dL; platelet count, 100 *X* 10^3/μL; PT, 16.6 sec; INR, 1.3; PTT, 36 sec; and fibrinogen, 210 mg/dL. The patient is discharged on the third postpartum day.

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