

PROGENY

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Postpartum Hemorrhage: The Four T's

In anticipation of the blood loss that will occur at delivery, pregnant women experience hematologic changes that increase both red blood cell mass and plasma volume. In spite of this anticipatory physiologic response, severe uncontrolled bleeding remains one of the causes of maternal death for women with or without risk factors. There are several different definitions of postpartum hemorrhage (PPH): loss of more than 500mL for vaginal deliveries or a loss of 1000mL for cesarean deliveries; a decrease in hematocrit levels by at least ten percent; or blood loss sufficient enough to cause significant symptoms in the woman (lightheadedness, syncope, low blood pressure, tachycardia or low urine output). Early PPH occurs within 24 hours following birth, and late PPH occurs between 24 hours after birth and the sixth week postpartum. Hemorrhages can be caused by a number of different maternal, fetal, uterine or placental factors and medications. The primary goal for PPH is to identify and correct the sources of bleeding, restore blood volume and stabilize maternal vital signs. The Four T's mnemonic sums up the sources of PPH; they are Tone, Trauma, Tissue and Thrombin.

TONE

Uterine atony is the most common cause of postpartum hemorrhage. Patients at risk for uterine atony are those who have been induced with an unripe cervix and those where oxytocin is used at high doses or for longer than 24 to 36 hours. Patients with an over distended uterus (twins, macrosomia, hydramnios) and those requiring prolonged use of magnesium sulfate are also at risk. Uterine atony is treated by fundal massage after the delivery of the placenta, expression of clots and administering medications to achieve uterine contractility (Hemabate, 0.25mg IM, Cytotec 1000mg PR, Methergine 0.2mg IM). A distended bladder can displace the uterus and prevent its contraction and therefore should be emptied. When other interventions are not successful in achieving uterine tone, bimanual compression or surgical intervention (uterine artery ligation/embolization or hysterectomy) may be necessary. The use of a tamponade balloon (*Bakri*) within the uterine cavity may also be used to treat postpartum hemorrhage due to uterine atony.

TRAUMA

Lacerations and hematomas resulting from birth can cause significant blood loss. Precipitous and operative deliveries as well as compound or malposition deliveries can cause lacerations of the cervix, vagina or perineum. Careful inspection of these areas should be performed, and repair of trauma should be done. Hematomas may develop hours after the delivery and they sometimes occur in the absence of vaginal or perineal trauma. The main symptoms of genital tract hematomas are pelvic or rectal pressure. To achieve hemostasis the vagina may need to be packed with gauze or hematomas may need to be incised and drained. Uterine inversion and rupture may also cause excessive bleeding.

TISSUE

Retained placenta (failure of the placenta to deliver within 30 minutes of birth), retained products of conception or invasive attachments of the placenta to the uterine wall (accreta, percreta or increta) can cause massive postpartum hemorrhage. Manual removal of placenta and inspection of placenta looking for missing fragments should be done. Removal of retained products may require intervention in the operating room for curettage. Some risk factors for invasive placental attachments include history of previous cesarean or uterine surgery, high parity, or history of placenta previa. The most common treatment for invasive placenta is hysterectomy. Conservative management of a known invasive placental attachment is to leave the placenta in place and administer weekly oral methotrexate until the human chorionic gonadotropin level is 0.

THROMBIN

Coagulation disorders are a rare cause of PPH. They should be considered when the patient is not responding to the usual measures to control postpartum bleeding and in those patients who are not forming blood clots or are oozing from incision sites. Most coagulopathies are identified before delivery, which allows for advanced planning to prevent PPH. These disorders include idiopathic thrombocytopenia, von Willebrand's disease and hemophilia. Patients with a history of liver disease, those that develop HELLP syndrome or have severe preeclampsia are also at risk for PPH due to coagulopathies. Management includes treating the underlying disease process, supporting vascular volume, evaluating platelet, prothrombin and partial thromboplastin time and fibrinogen levels and replacing needed blood products.

Regardless of the definition or classification, PPH is a clinical emergency requiring quick recognition, evaluation and intervention. Emergency situations create opportunities for errors that affect patient safety. Because of this it is important that obstetric staff work together to develop or use evidence based tools to manage postpartum hemorrhage.

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**References available upon request*

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