Management of placenta previa

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INTRODUCTION — The management of pregnancies complicated by placenta previa is best addressed in terms of the clinical setting: asymptomatic women, women who are actively bleeding, and women who are stable after one or more episodes of active bleeding.

ASYMPTOMATIC PLACENTA PREVIA — The management goals in women with asymptomatic placenta previa are to:

- Determine whether the previa resolves with increasing gestational age
- Reduce the risk of bleeding
- Reduce the risk of preterm birth

Follow-up transvaginal ultrasound examination — Development of the lower uterine segment over time often relocates the lower edge of a marginal or minimally overlying previa away from the internal os. The majority of placenta previa identified earlier in pregnancy will resolve with advancing gestational age. We agree with the approach of an expert group for monitoring the placental location of these pregnancies across gestation [1]:

- For pregnancies >16 weeks,
    - If the placental edge is ≥2 cm from the internal os, the placental location is reported as normal and follow-up ultrasound for placental location is not indicated.
    - If the placental edge is <2 cm from, but not covering, the internal os, the placenta is labeled as low-lying. If the placental edge covers the internal os, the placenta is labeled a previa. For either diagnosis, follow-up ultrasonography for placental location is performed at 32 weeks of gestation.
- At the 32-week follow-up ultrasound,
    - If the placental edge is ≥2 cm from the internal os, the placental location is reported as normal and follow-up ultrasound for placental location is not indicated.
    - If the placental edge is still <2 cm from the internal os (low-lying) or covering the cervical os (previa), follow-up transvaginal ultrasound is performed at 36 weeks.

Transvaginal ultrasonography with color and pulsed Doppler is recommended to rule out placenta previa as well as vasa previa, as resolution of a low-lying placenta can be associated with vasa previa. (See "Clinical features, diagnosis, and course of placenta previa", section on 'Ultrasound presentation and course'.)

These pregnancies are at no or minimally increased risk of intrauterine growth restriction. There is no evidence that specifically monitoring fetal growth with serial ultrasound examinations is useful; however, this information is generally available since fetal growth is estimated whenever ultrasound examination is performed for assessment of placental position. (See "Clinical features, diagnosis, and course of placenta previa", section on 'Associated conditions'.)

Prediction of and reduction of risk of bleeding — For an individual patient, it is not possible to accurately predict whether a bleed will occur, nor the gestational age, volume, or frequency of bleeding. Sonographic features reported to be associated with a higher likelihood of bleeding include placenta completely covering the os, placenta with a thick edge (>1 cm), placenta with an echo-free space in the edge overlapping the os, and cervical length ≤3 cm. (See "Clinical features, diagnosis, and course of placenta previa", section on 'Bleeding'.)

We advise women with placenta previa to avoid vaginal intercourse and exercise after 20 weeks of gestation (earlier if they have experienced vaginal bleeding), and to decrease overall physical activity in the third trimester. The rationale is that these activities cause uterine contractions, which, in turn, provoke bleeding. Additionally, there is concern that vaginal intercourse might cause direct trauma to the previa, resulting in bleeding. There is no evidence to either support or refute these recommendations. However, it is clear from anecdotal experience that palpation of placenta previa through a partially dilated cervix can result in severe hemorrhage.

Women should also be advised to seek immediate medical attention if contractions or vaginal bleeding occur, given the potential for severe bleeding and need for emergency cesarean delivery.

It is unclear whether asymptomatic women benefit from hospitalization prior to delivery. Findings from observational studies suggest that women with placenta previa who have not experienced any antepartum bleeding are at low risk of needing an emergency cesarean delivery [2-5]. These women can generally be managed on an outpatient basis until vaginal bleeding occurs or until admission for scheduled cesarean birth. However, patient-specific risk factors (eg, short cervical length, ability to get to the hospital promptly in an emergency, home support) need to be taken into account.

Delivery — A workshop held by the Eunice Kennedy Shriver National Institute of Child Health and Human Development and the Society for Maternal-Fetal Medicine developed consensus recommendations regarding the gestational age for delivery to optimize maternal, fetal and neonatal outcomes in the setting of various pregnancy complications, including placenta previa [6]. They stratified placenta previa as complicated or uncomplicated, where uncomplicated was defined as no fetal growth restriction, no superimposed preeclampsia, and no other issues that take precedent for delivery decision-making.

We agree with the recommendations by the committee, which was based on available data and expert opinion, and the American College of Obstetricians and Gynecologists (ACOG). Delivery of pregnancies with uncomplicated placenta previa should be accomplished at $36^{0/7ths}$ to $37^{6/7ths}$ weeks, without documentation of fetal lung maturity by amniocentesis [6,7]. The rationale behind this recommendation is that the risks associated with continuing the pregnancy (severe bleeding, emergency unscheduled delivery) are greater than the risks associated with prematurity at this gestational age [6]. (See "Late preterm infants".)

The route of delivery and procedure are described below. (See 'Route' below and 'Cesarean procedure' below.)

ACUTE CARE OF BLEEDING PLACENTA PREVIA — An actively bleeding placenta previa is a potential obstetrical emergency. These women should be admitted to the Labor and Delivery Unit for maternal and fetal monitoring, and the anesthesia team should be notified. The major goals in managing these pregnancies are to:

- Achieve and/or maintain maternal hemodynamic stability
- Determine if cesarean delivery is indicated

If there is evidence of persistent severe vaginal bleeding (picture 1), maternal hypotension, or a nonreassuring fetal heart rate pattern, delivery is generally expedited via cesarean regardless of gestational age. If bleeding is not persistent and severe, the mother is hemodynamically stable or quickly stabilized, and the fetal heart rate pattern is normal, expectant management is preferable to delivery before 34 weeks of gestation. To some degree, these assessments are subjective and made on a case-by-case basis while observing the patient's course on the labor unit. Administration of magnesium sulfate to pregnancies <32 weeks of gestation for neuroprotection and a course of antenatal corticosteroids may significantly improve neonatal outcome. This benefit needs to be compared with the estimated maternal risk from persistent or worsening bleeding. The neonatal benefits of avoiding expeditious delivery decrease with advancing gestational age, while maternal risks probably increase. During the period of decision-making, every attempt to ensure maternal safety should be made, as described below.

Assessment

Maternal — We use a cardiac monitor and automated blood pressure cuff to monitor maternal heart rate and blood pressure. Urine output is evaluated hourly with a Foley catheter attached to an urometer.

Accurate estimation of vaginal blood loss is difficult to determine visually, particularly when blood is partially saturating or soaking towels, maternity pads, or gauze sponges, or dripping onto the floor [8,9]. The following techniques are used for quantitating blood loss and can be used in combination [9,10]:

- Collect blood in graduated volumetric containers.
- Use of visual aids that correlate the size and appearance of blood on specific surfaces (eg, maternity pad, emesis basin, bed sheet, lap sponge) with the volume of blood absorbed by that surface (picture 1). Regularly scheduling standardized training in the use of these charts can be helpful for this assessment.
- Measure the total weight of bloody materials and subtract the known weight of the same materials when dry. The difference in weight between wet and dry in grams approximates the volume of blood in milliliters.

For all of these methods, the clinician should attempt to account for fluids other than blood (eg, amniotic fluid, irrigation fluid, urine) that are collected or absorbed.

Fetal — The fetal heart rate should be monitored. The presence of fetal hypoxia or anemia may result in category 2 or 3 fetal heart rate tracings. (See "Intrapartum fetal heart rate assessment".)

Laboratory — There is no consensus about the components of routine laboratory assessment of patients with bleeding placenta previa [11,12].

- At a minimum, blood should be sent for baseline complete blood count and type and antibody screen. The blood bank should be notified that a patient with placenta previa has been admitted.
- When bleeding is heavy or increasing, delivery is likely, or difficulty in procuring compatible blood is anticipated, we advise cross-matching two to four units of packed red blood cells.

- Massive blood loss or suspicion of coexistent abruption should prompt evaluation for coagulopathy: fibrinogen level, activated partial thromboplastin time, prothrombin time. A crude clotting test can be performed at the bedside by placing 5 mL of the patient's blood in a tube with no anticoagulant for 10 minutes [4-6]. Failure to clot within this time or dissolution of an initial clot implies impairment of coagulation, and is suggestive of a low fibrinogen level. Prolonged oozing from needle puncture sites also suggests coagulopathy. (See "Placental abruption: Clinical features and diagnosis" and "Placental abruption: Management".)

A Kleihauer-Betke test on a specimen of vaginal blood can diagnose fetal bleeding from disruption of fetal vessels in placental villi, vasa previa, or a velamentous cord; however, the fetal bleeding typically results in fetal demise or a nonreassuring fetal heart rate tracing necessitating emergency delivery. (See "Velamentous umbilical cord insertion and vasa previa".)

Anti-shock garments — Anti-shock garments have been used to restore adequate blood pressure in pregnant/postpartum women who are hemodynamically unstable due to severe bleeding in low resource settings [13-15]. However, these devices have not been used when the fetus was viable and there is no information on their effect on uteroplacental blood flow and the fetus.

Intravenous access and crystalloid — One or two large bore intravenous lines are inserted and crystalloid (Ringers lactate or normal saline) is infused to achieve/maintain hemodynamic stability and adequate urine output (at least 30 mL/hour). (See "Treatment of severe hypovolemia or hypovolemic shock in adults".)

Transfusion — Transfusion of blood products in a woman with an actively bleeding placenta previa should be guided by the volume of blood loss over time and changes in hemodynamic parameters (eg, blood pressure, maternal and fetal heart rates, peripheral perfusion, and urine output), as well as the hemoglobin level. A reasonable approach is to begin red cell transfusions in hypotensive patients whose blood pressure fails to improve after two liters of crystalloid have been rapidly infused.

Types and actions of blood replacement products are shown in the table (table 1). The blood bank should be notified about the possible need for massive transfusion (algorithm 1). (See "Indications and hemoglobin thresholds for red blood cell transfusion in the adult" and "Massive blood transfusion".)

Tocolysis — Tocolysis is sometimes used in pregnancies with symptomatic placenta previa to reduce or eliminate uterine contractions, which may promote placental separation and bleeding. Observational studies in women with symptomatic placenta previa suggest this therapy may prolong pregnancy and result in an increase in birthweight, without causing adverse effects on the mother or fetus [16,17]. However, it is likely that underlying differences in the treated and untreated (control) patients accounted for this benefit. Furthermore, these studies have generally not shown a decrease in the number of episodes of hemorrhage after admission, the total amount of blood loss, or the number of blood transfusions. If tocolytics are used, indomethacin has an inhibitory effect on platelet function and thus should be avoided in women with placenta previa due to the risk of increased blood loss. (See "Inhibition of acute preterm labor".)

We do not administer tocolytic drugs to actively bleeding patients. We may use tocolytics (other than indomethacin) to minimize contractile activity while administering a course of betamethasone if bleeding is diminishing or has ceased and delivery is not otherwise mandated by the maternal or fetal condition.

Magnesium sulfate — We suggest a course of magnesium sulfate therapy for neuroprotection in patients with preterm (24 to 32 weeks) placenta previa in whom a decision has been made to deliver within 24 hours, but not emergently. Emergency delivery because of maternal or fetal status should not be delayed to administer magnesium sulfate. (See "Neuroprotective effects of in utero exposure to magnesium sulfate".)

Antenatal corticosteroids — A course of antenatal corticosteroid therapy should be administered to symptomatic women between 23 and 34 weeks of gestation to enhance fetal pulmonary maturity. We do not administer steroids to asymptomatic women. We would give a first course of steroids to women whose first bleed is at >34 and <37 weeks of gestation and for asymptomatic women whose cesarean delivery is planned between 36 and 37 completed weeks who have not received prior antenatal corticosteroids. (See "Antenatal corticosteroid therapy for reduction of neonatal respiratory morbidity and mortality from preterm delivery", section on 'After 34 weeks'.)

Indications for delivery — Cesarean delivery is indicated if any of the following occur:

- A nonreassuring fetal heart rate tracing unresponsive to resuscitative measures. (See "Management of intrapartum category I, II, and III fetal heart rate tracings".)
- Life-threatening maternal hemorrhage refractory to standard interventions (transfusion, tocolysis, rest)
- Significant vaginal bleeding after 34 weeks of gestation

Anesthesia — General anesthesia is typically administered for emergency cesarean delivery, especially in hemodynamically unstable women or if the fetal status is nonreassuring. However, regional anesthesia is an acceptable choice in hemodynamically stable women with reassuring fetal heart rate tracings [18-20].

An epidural anesthetic may be placed in a hemodynamically stable woman, even if the decision to deliver is not definite. The advantage of this approach is that it may allow avoidance of general anesthesia for delivery. The disadvantages are that the patient may not be delivered and the catheter will have to be removed, a substantial hemorrhage may induce hypotension and the anesthetic may exacerbate hypotensive end-organ effects, and general anesthesia is preferable to epidural anesthesia if

hysterectomy is necessary at delivery because the placenta previa is complicated by accreta or atony unresponsive to conservative measures.

CONSERVATIVE MANAGEMENT AFTER AN ACUTE BLEED — Most women who initially present with symptomatic placenta previa respond to supportive therapy and do not require immediate delivery [21-25]. In observational series, 50 percent of women with a symptomatic previa (any amount of bleeding) were not delivered for at least four weeks [22,24,25]. Even a large bleed does not preclude conservative management. In one large series, 50 percent of women whose initial hemorrhagic episode exceeded 500 mL were successfully managed with aggressive use of antepartum transfusions and had a mean prolongation of pregnancy of 17 days [21].

Management of placenta previa after acute bleeding is based upon findings from observational studies and clinical experience. A 2003 Cochrane review that attempted to assess the impact of clinical interventions in these pregnancies concluded there were insufficient data upon which to make evidence-based recommendations for clinical practice; only three randomized trials involving a total of 114 women were identified [26].

After the patient has been stabilized, we take the following approach with the goal of prolonging the pregnancy.

Inpatient versus outpatient management — Symptomatic women often remain hospitalized from their initial or second significant bleeding episode until delivery. Since the frequency and severity of recurrent bleeding episodes are unpredictable, maintaining close proximity to the labor and delivery unit may minimize the risk of serious maternal or fetal complications by enabling prompt access to transfusion therapy and emergency cesarean delivery when needed.

We discharge selected women with placenta previa whose bleeding has stopped for a minimum of 48 hours and who have no other pregnancy complications, although the safety and efficacy of this approach has not been established [24,27-29]. In our opinion, candidates for outpatient care should:

- Be able to return to the hospital within 20 minutes [30].
- Be reliable and able to maintain bed rest at home.
- Understand the risks entailed by outpatient management.
- Have an adult companion available 24 hours/day who can immediately transport the woman to the hospital if there is light bleeding or call an ambulance for severe bleeding.

The only randomized clinical trial of outpatient versus inpatient management of women with placenta previa after resolution of the initial bleeding episode reported that outpatient care was not associated with greater morbidity than inpatient management [24]. Patients randomly assigned to the outpatient arm who had a recurrent bleed were treated initially as inpatients, and were again discharged home if stable after a minimum of 48 to 72 hours. If these patients had a third episode of bleeding, they were hospitalized until delivery. Significant differences in outcome may not have been appreciated given the small number of women (n = 53) who participated in this trial.

Correction of anemia — Iron supplementation may be needed for optimal correction of anemia. Stool softeners and a high-fiber diet help to minimize constipation and avoid excess straining that might precipitate bleeding. (See "Treatment of iron deficiency anemia in adults".)

Autologous blood donation — Some women may consider autologous blood donation, given the high frequency of blood transfusion in placenta previa. A program of autologous blood collection and transfusion can decrease the need for homologous blood transfusion [31]. However, most women who have bled from a placenta previa, will not meet standard criteria for autologous donation [32,33]. Autologous blood donation is safe in stable women who meet usual criteria (hemoglobin ≥11.0 g/dL) [31,34,35]. Some centers have lowered the hemoglobin threshold to >10 g/dL for pregnant women with placenta previa to enable autologous donation for more of these women [31]. (See "Surgical blood conservation: Preoperative autologous blood donation".)

Anti-D immune globulin — Theoretically, disruption of the fetomaternal interface may result in fetomaternal transfusion. For this reason, prevention of Rh alloimmunization guidelines suggest that Rh(D)-negative women receive anti-D-immune globulin for symptomatic placenta previa (ie, bleeding previa) [36,37]. The presence of positive anti-D antibody titers on periodic assessment can help ensure that the patient is protected from potential alloimmunization in the setting of recurrent bleeds. Readministration is not necessary if delivery or rebleeding occurs within three weeks of administration, unless a large fetomaternal hemorrhage is detected. (See "Prevention of Rhesus (D) alloimmunization in pregnancy".)

Fetal assessment — There is no proven value of nonstress testing or performing a biophysical profile in pregnancies with asymptomatic placenta and no evidence of uteroplacental insufficiency (eg, preeclampsia, fetal growth restriction, oligohydramnios) or other indications for antepartum fetal assessment. As discussed above, active vaginal bleeding is an indication for fetal monitoring (see 'Fetal' above).

Cerclage — Cervical cerclage has been used in an attempt to minimize early development of the lower uterine segment, which is thought to promote placental separation. However, the efficacy of this approach is unproven. Although a meta-analysis of two, small randomized trials that evaluated cerclage for improving pregnancy outcome in placenta previa [38,39] reported that cervical cerclage reduced the risk of delivery before 34 weeks (RR 0.45, 95% CI 0.23-0.87) and the birth of a baby weighing less than 2000 g (RR 0.34, 95% CI 0.14-0.83), the lack of consistency between trials and methodological issues prevent making a clear conclusion of

benefit [26]. In the absence of high quality evidence of efficacy and safety, we advise not performing prophylactic cerclage to improve pregnancy outcome in placenta previa. However, the presence of a stable placenta previa is not a contraindication to cerclage placement when indicated for cervical insufficiency. (See "Cervical insufficiency".)

Preterm premature rupture of membranes — Antepartum decidual hemorrhage is a major risk factor for preterm premature rupture of membranes (PPROM). PPROM can occur despite the presence of a complete placenta previa. In these cases, each condition is managed independently. (See "Preterm premature (prelabor) rupture of membranes".)

Delivery

Timing — Timing of delivery depends on the patient's status.

Delivery of patients with stable (no bleeding or minimal bleeding) placenta previa should be accomplished at 36 to 37 weeks, without documentation of fetal lung maturity by amniocentesis (see 'Delivery' above).

Delivery is indicated emergently if any of the following occur (see 'Indications for delivery' above):

- Any vaginal bleeding with a nonreassuring fetal heart rate tracing unresponsive to resuscitative measures
- Life-threatening refractory maternal hemorrhage
- Labor

In women with moderate vaginal bleeding >34 weeks or progressively increasing frequency or volume of bleeding after cessation of an initial bleed, we deliver the patient if she has previously received a course of betamethasone anytime during the pregnancy. If she is clinically stable and has not received a course of betamethasone because her first bleeding episode occurred after 34 weeks and before 37 weeks, we administer a course of steroids and then perform cesarean delivery in 48 hours, based on limited data that even late in gestation neonatal respiratory problems may be reduced with steroid use. (See "Antenatal corticosteroid therapy for reduction of neonatal respiratory morbidity and mortality from preterm delivery".)

Route

Previa — A cesarean delivery is always indicated when there is sonographic evidence of a complete placenta previa and a viable fetus. Vaginal delivery may be considered in rare circumstances, such as in the presence of a fetal demise or a previable fetus, as long as the mother remains hemodynamically stable.

When the placenta reaches the internal os but does not cross it, it has been hypothesized that vaginal delivery can occasionally be performed because the fetal head tamponades the adjacent placenta, thus preventing hemorrhage. These pregnancies remain at high risk of intrapartum hemorrhage; therefore, we suggest scheduled cesarean delivery to minimize the risk of emergent delivery and need for transfusion.

Low placenta — Rates of cesarean delivery and antepartum bleeding decrease as the distance between the placental edge and internal os increases. There is a general consensus of a reasonable possibility of vaginal delivery without hemorrhage when the placenta is more than 20 mm from the internal os, so a trial of labor is appropriate if there are no other contraindications to vaginal birth [40-45]. When this distance is between 1 and 20 mm, the rate of cesarean delivery ranges from 40 to 90 percent, so management of these patients is more controversial. One of the larger retrospective studies that looked at the outcome of this specific group of pregnancies reported vaginal birth in 6/24 (25 percent) women with a cervix-to-placenta distance of 1 to 10 mm and in 20/29 (69 percent) women with cervix-to-placenta distance of 11 to 20 mm [46]. Although a variety of factors influenced the decision to perform cesarean delivery, these data support allowing a trial of labor in pregnancies in which the placenta is more than 10 mm from the internal os.

Cesarean procedure — Two to four units of packed red blood cells should be available for the delivery. Appropriate surgical instruments for performance of a cesarean hysterectomy should also be available since these patients are at increased risk of placenta accreta, even in the absence of a prior cesarean delivery. Evaluation for placenta previa-accreta should have been performed antenatally, with appropriate preparations for management, if present. (See "Clinical features, diagnosis, and course of placenta previa", section on 'Associated conditions' and "Clinical features and diagnosis of the morbidly adherent placenta (placenta accreta, increta, and percreta)" and "Management of the morbidly adherent placenta (placenta accreta, increta, and percreta)" and "Peripartum hysterectomy for management of hemorrhage".)

The surgeon should try to avoid disrupting the placenta when entering the uterus. If the placenta is incised, hemorrhage from fetal vessels can result in significant neonatal anemia. Preoperative or intraoperative sonographic localization is helpful in determining the position of the hysterotomy incision (for intraoperative imaging, the transducer is placed in a sterile bag and sleeve). If the placenta is in an anterolateral location, a vertical incision can be made in the lower uterine segment on the opposite side from the placenta. If the placenta wraps around the cervix from the anterior to posterior lower uterine segment in the midline, a transverse or vertical incision may be possible above it [47,48], although this often results in extension into the upper uterine segment. When incision of the placenta is unavoidable, the infant should be delivered rapidly and the cord promptly clamped.

Management of hemorrhage — After delivery of the placenta, severe bleeding may occur from the placental bed. In a systematic review, 16 to 29 percent of women with a placenta previa had a postpartum hemorrhage [49]. Standard interventions for management of postpartum hemorrhage should be performed, and may include placement of endouterine hemostatic square

sutures, intrauterine balloon tamponade, and/or placement of uterine compression sutures [50-53]. (See "Management of postpartum hemorrhage at cesarean delivery".)

Vasopressin — After removal of the placenta, subendometrial injection of vasopressin at the placental implantation site may be beneficial [54,55]. The favorable effect has been attributed to binding to the vasopressin V1α receptor, which is highly expressed in smooth muscle cells in the lower segment of the uterus. Intravascular injection should be avoided, as it can cause severe adverse cardiovascular effects (bradycardia, cardiac arrhythmia, ischemia, right heart failure, shock, cardiac arrest, limb ischemia).

In one study, local injection of 4 units of vasopressin in 20 mL of saline into the placental implantation site significantly reduced blood loss without increasing morbidity (blood loss: with vasopressin 1149 mL, without vasopressin 1634 mL) [56]. In a case report, 5 units of vasopressin in 20 mL saline injected in 1 to 2 mL amounts into the area of placental implantation stopped bleeding within 90 seconds [54]. Use of this technique, while biologically plausible and potentially clinically relevant, is considered anecdotal.

PREGNANCY TERMINATION IN WOMEN WITH PLACENTA PREVIA — Clinicians should discuss with patients the various options for pregnancy termination in the setting of placenta previa (eg, hysterotomy, dilation and evacuation, use of abortifacient) and document the discussion in the medical record. The presence of a placenta previa does not preclude second trimester pregnancy termination by standard techniques, although data are limited to a few studies [57-60].

- One series of 131 consecutive women undergoing elective pregnancy termination by dilation and evacuation (D&E) after laminaria placement at 13 to 24 weeks of gestation compared the outcome of those with (n = 23) and without placenta previa based upon an ultrasound examination before the procedure [57]. Women with a placenta previa had greater intraoperative blood loss (21 mL), but no significant increase in operative time, time to discharge, infection, hemorrhage, or other complications.

- The second series consisted of 306 consecutive women undergoing pregnancy termination by D&E at 19 to 24 weeks [58]. An ultrasound diagnosis of complete previa was made in eight patients. None of these women had excessive bleeding with laminaria insertion or required blood transfusion due to procedure related hemorrhage. Operative time was comparable to women without complete previa.

- The third series included 15 second or third trimester terminations of pregnancy by administration of systemic abortifacients in women with complete previa [59]. Preinduction feticide was performed 2 to 14 days prior to the procedure. Four of nine women who underwent labor induction without previous feticide required blood transfusions and one required hysterectomy; none of the six patients with preinduction feticide required transfusion. The authors concluded that preinduction feticide might help to reduce blood loss in these cases.

The fourth series included 158 women undergoing second trimester termination in whom 11 had placenta previa, 4 underwent D&E and 7 had gemeprost termination [60]. There was no statistical difference in mean intraoperative blood loss between these groups and controls without previa, but one woman with placenta previa who underwent gemeprost termination developed serious bleeding requiring blood transfusion.

INFORMATION FOR PATIENTS — UpToDate offers two types of patient education materials, "The Basics" and "Beyond the Basics." The Basics patient education pieces are written in plain language, at the 5th to 6th grade reading level, and they answer the four or five key questions a patient might have about a given condition. These articles are best for patients who want a general overview and who prefer short, easy-to-read materials. Beyond the Basics patient education pieces are longer, more sophisticated, and more detailed. These articles are written at the 10th to 12th grade reading level and are best for patients who want in-depth information and are comfortable with some medical jargon.

Here are the patient education articles that are relevant to this topic. We encourage you to print or e-mail these topics to your patients. (You can also locate patient education articles on a variety of subjects by searching on “patient info” and the keyword(s) of interest.)

- Basics topics (see "Patient education: Placenta previa (The Basics)")

SUMMARY AND RECOMMENDATIONS

Asymptomatic previa

- In pregnancies with asymptomatic placenta previa, we monitor placental position with ultrasound examination as an outpatient and counsel these patients to avoid excess physical activity and to call their provider promptly if bleeding or labor occurs. We perform cesarean delivery at 36 to 37 weeks. (See 'Asymptomatic placenta previa' above.)

Acute management of bleeding previa

- An actively bleeding placenta previa is a potential obstetrical emergency. Women with active bleeding are hospitalized for close maternal and fetal monitoring and supportive care. Indications for emergency cesarean delivery include refractory life threatening maternal hemorrhage, nonreassuring fetal status, and significant vaginal bleeding after 34 weeks of gestation. (See 'Acute care of bleeding placenta previa' above.)

Conservative management after an acute bleed

- After a bleeding episode has resolved, outpatient management of select women is reasonable. These women should be able to return to the hospital quickly if rebleeding occurs and should not have additional pregnancy complications. (See 'Conservative management after an acute bleed' above.)

- We recommend a course of antenatal corticosteroid therapy for symptomatic patients between 23 and 34 weeks of gestation to enhance fetal pulmonary maturity (**Grade 1A**). We would give a first course of steroids (but not a second course) to women whose first bleed is at >34 weeks and to asymptomatic women >34 weeks in whom cesarean delivery is planned between 36 and 37 weeks. We also recommend anti-D immune globulin for symptomatic Rh(D)-negative women to prevent possible alloimmunization (**Grade 1B**). Readministration of anti-D immune globulin is not necessary if delivery or rebleeding occurs within three weeks, unless a large fetomaternal hemorrhage is detected. (See 'Antenatal corticosteroids' above and 'Anti-D immune globulin' above.)

- We schedule cesarean delivery at 36 to 37 weeks. (See 'Timing' above.) Incision of the placenta should be avoided, as this increases the risk of fetal hemorrhage. (See 'Cesarean procedure' above.)

- Vaginal delivery may be attempted when the placental edge is >10 mm from the internal os because the risk of hemorrhage during labor is much lower. (See 'Low placenta' above.)

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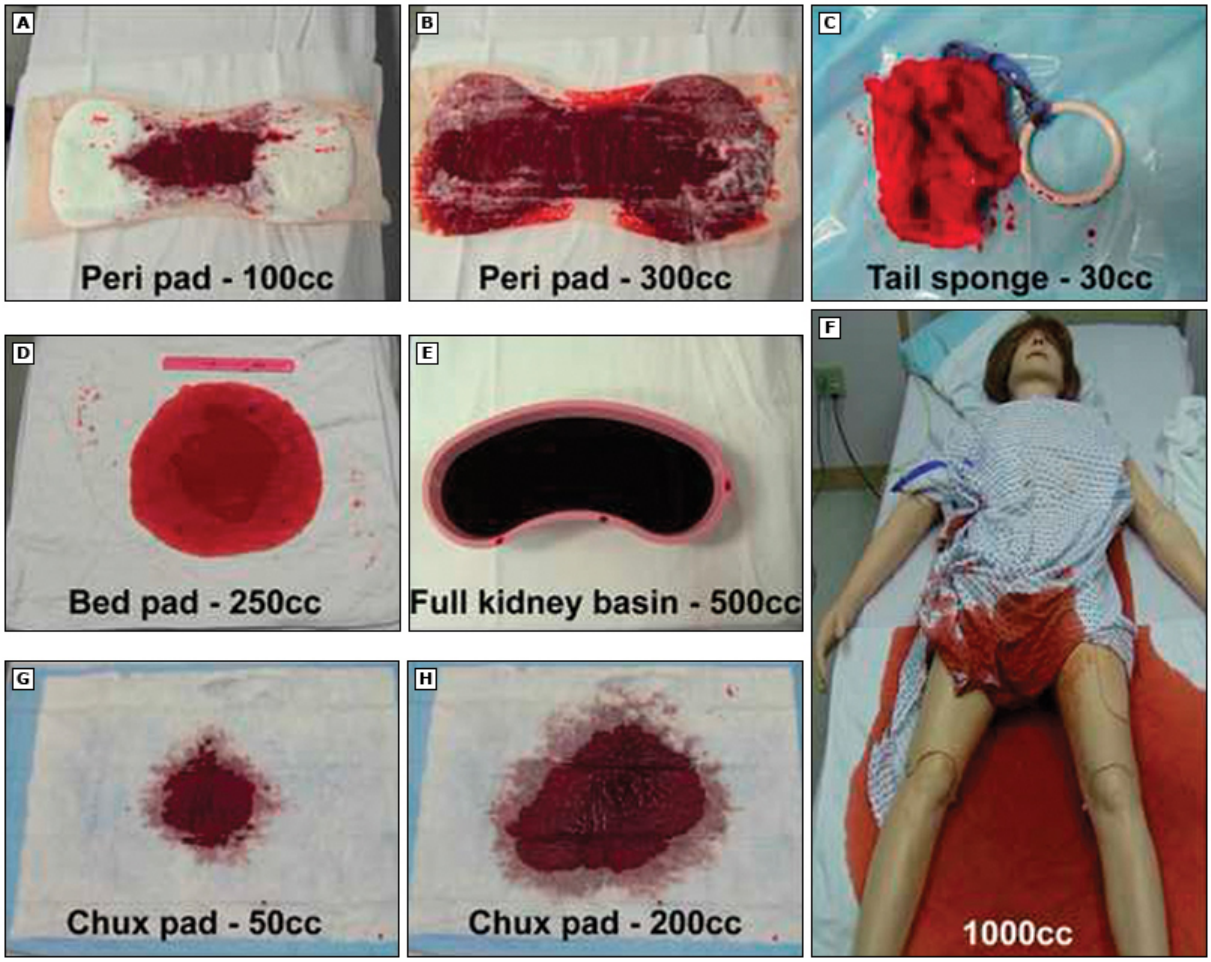
Topic 6809 Version 25.0

GRAPHICS

Visual aid for estimating intrapartum blood loss



Visual aid. Pocket card with images of measured volumes of artificial blood.

Graphic 103418 Version 1.0

Blood components: Indications and dosing in adults

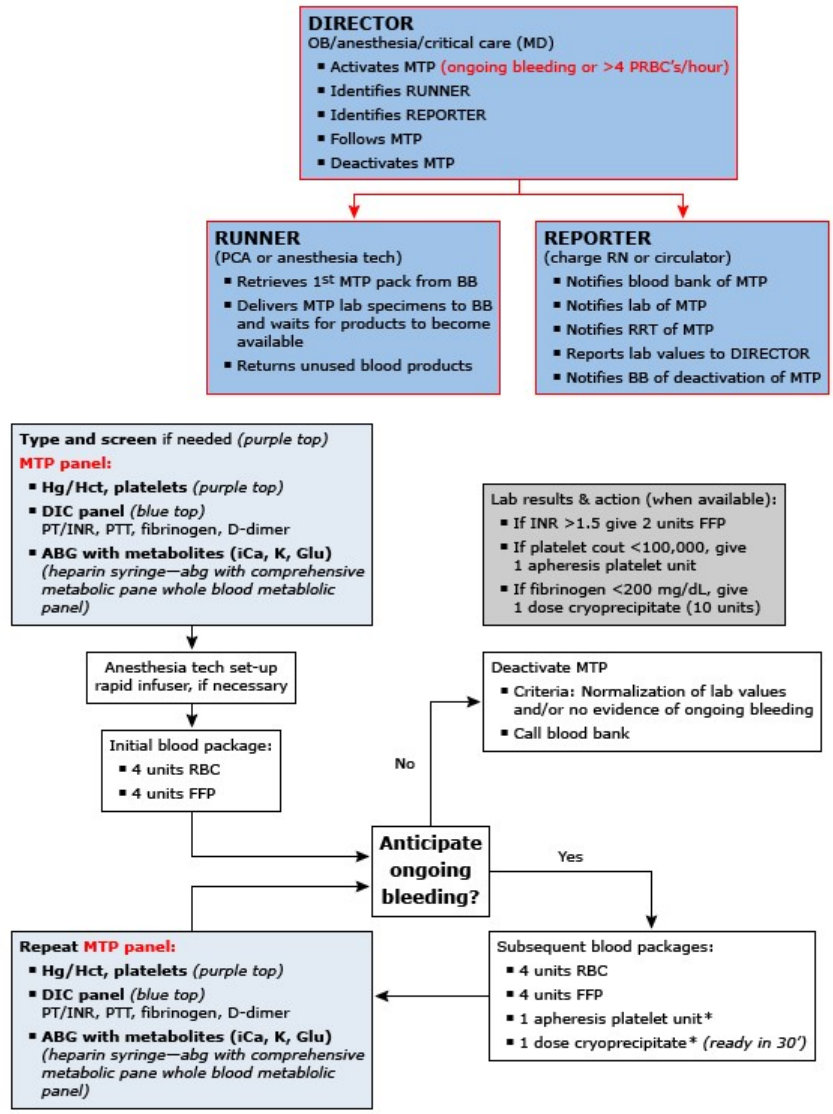
Component (volume)	Contents	Indications and dose
Whole blood (1 unit = 500 mL)	RBCs, platelets, plasma	Rarely required. May be appropriate when massive bleeding requires transfusion of more than 5 to 7 units of RBCs (increasingly used in early trauma management).
Red blood cells (RBCs) in additive solution (1 unit = 350 mL)	RBCs	Anemia, bleeding. The increase in hemoglobin from 1 unit of RBCs will be approximately 1 g/dL; the increase in hematocrit will be approximately 3 percentage points.
Fresh Frozen Plasma (FFP) or other plasma product* (1 unit = 200 to 300 mL)	All soluble plasma proteins and clotting factors	Bleeding or expected bleeding (eg, emergency surgery) in individuals with deficiencies of multiple coagulation factors (eg, DIC, liver disease, massive transfusion, anticoagulation with warfarin or other vitamin K antagonist, warfarin overdose); therapeutic plasma exchange in TTP. The increase of plasma fibrinogen from 1 unit of plasma is 7 to 10 mg/dL. A usual dose is 10 to 15 mL/kg. May also be used in individuals with isolated factor deficiencies if a factor concentrate or recombinant factor is unavailable (FFP only).
Cryoprecipitate, also called "cryo" (1 unit = 10 to 20 mL)	Fibrinogen; factors VIII and XIII; VWF	Bleeding or expected bleeding with low fibrinogen: The increase in plasma fibrinogen from 1 unit of Cryoprecipitate per 10 kg body weight will be approximately 50 mg/dL. Bleeding or expected bleeding in individuals with deficiencies of factor XIII or factor VIII (hemophilia A) if a recombinant product or factor concentrate is unavailable. Bleeding or expected bleeding in individuals with VWD if DDAVP is ineffective and recombinant VWF or a VWF concentrate is unavailable. Cryoprecipitate is generally provided in pools containing 5 units and most patients receive one to two pools.
Platelets (derived from whole blood or apheresis) (1 unit of apheresis platelets or a 5 to 6 unit pool of platelets from whole blood = 200 to 300 mL)	Platelets	The platelet count increase from 5 to 6 units of whole blood-derived platelets or 1 unit of apheresis platelets will be approximately 30,000/microL in an average sized adult.

Refer to UpToDate topics on these products and on specific conditions for details of use. Frozen blood products (FFP, Cryoprecipitate) take 10 to 30 minutes to thaw. It may take the same amount of time to perform an uncomplicated crossmatch.

DIC: disseminated intravascular coagulation; FFP: Fresh Frozen Plasma; kg: kilograms; TTP: thrombotic thrombocytopenic purpura; VWD: von Willebrand disease; VWF: von Willebrand factor.
* Other plasma products include Plasma Frozen Within 24 Hours After Phlebotomy (PF24) or Thawed Plasma.

Graphic 53854 Version 13.0

Sample massive transfusion algorithm



Texas Children's Pavilion for Women massive transfusion protocol.

MTP: massive transfusion protocol; PRBC: packed red blood cells; PCA: patient-controlled analgesia; RRT: rapid response team; BB: blood bank; Hg: hemoglobin; Hct: hematocrit; DIC: disseminated intravascular coagulation; PT: prothrombin time; INR: international normalized ratio; PTT: partial thromboplastin time; ABG: arterial blood gas; RBC: red blood cells; FFP: fresh frozen plasma; OB: Obstetrics; Anes: Anesthesia; OR: operating room; CRNA: certified registered nurse anesthetist; Chrg: charge; RN: registered nurse; Lab: laboratory; Tech: technician; MD: medical doctor; L&D: labor and delivery; iCa: ionized calcium; K: potassium; Glu: glucose; PCA: patient care assistant.
* Every two packages or based on lab results.

Graphic 91236 Version 4.0

Contributor Disclosures

Charles J Lockwood, MD, MHCM Consultant/Advisory Boards: Celula [Aneuploidy screening (No current products or drugs in the US)]. **Karen Russo-Stieglitz, MD** Nothing to disclose **Deborah Levine, MD** Nothing to disclose **Susan M Ramin, MD** Nothing to disclose **Vanessa A Barss, MD, FACOG** Nothing to disclose

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Conflict of interest policy