

An Examination of the Causes, Diagnosis and Management of Placental Abruption

Stephen M. Wagner, MD; Serdar H. Ural, MD

Abstract

Hemorrhage is the leading cause of direct maternal death globally. In the United States, it is responsible for over 11% of pregnancy-related deaths. Placental abruption must be considered in any antenatal patient with hemorrhage. However, the highly variable presentation of placental abruption makes the clinical diagnosis difficult. Furthermore, few studies have been performed to examine the optimal methods of managing these patients. This review examines the current literature on placental abruption diagnosis and management.

Background and Risk Factors

Placental abruption is one of the most concerning complications of pregnancy. Placental abruption is defined as when the placenta undergoes complete or partial detachment prior to delivery and results in hemorrhage into the decidua basalis (1). A classical abruption occurs when the vascular rupture of a spiral artery leads to resulting hematoma which peels the placenta off of the decidua. While not strictly part of the definition, it is important to note that over ½ of placental abruptions occur preterm (1). Placental abruption occurs in 0.4-1% of pregnancies (2). This frequency is significant enough to make placental abruption the leading cause of vaginal bleeding in the second half of pregnancy (3). Studies examining the frequency of placental abruption indicate the incidence may be increasing in the United States, however, it remains to be determined if this is a true elevation or merely the result of improved detection methods (2). A large population study in Finland found that maternal deaths occur in 0.4 per 1000 cases of placental abruption, but raise the maternal mortality ratio from 5.6 per hundred thousand to 38.8(4). The main causes of death were found to be from thromboembolism and obstetric hemorrhage. Placental abruption is associated with one third of all perinatal deaths, but perinatal mortality is highly variable based on risk factors such as gestational age, fetal weight and the degree of abruption (2). The severity of the risks and relatively high percentage of those affected make finding the cause of placental abruption a priority so that it may be prevented.

In the search for the root cause of placental abruption, over fifty risk factors have been identified that are associated with the condition. Several of the strongest risk factors are associated with conditions or lifestyle choices of the mother. Maternal habits can play a large role in predisposing an individual to placental abruption. Maternal alcohol use, smoking and cocaine abuse all significantly increase the risk of placental abruption (5, 6). Multiple theories have been proposed to explain the risk associated with smoking including microinfarcts within the placenta and decidual necrosis along the placental border (4). Increased maternal age and multiparity have also indicated an increased likelihood of placental abruption (3).

Placental abruption from a previous pregnancy elevates the risk of placental abruption tenfold in a subsequent pregnancy, and history of a previous second trimester pregnancy loss results in a threefold increase in risk (7). Cardiovascular complications including HTN, preeclampsia and second or third trimester bleeding are known risk factors for placental abruption. Acute conditions such as chorioamnionitis, premature rupture of membranes or trauma (often a motor vehicle accident or physical abuse) predispose a pregnancy to placental abruption. These patients may be put at risk due to an acute inflammatory response (4, 5). Interestingly, male fetuses tend to be associated with an

elevated risk of placental abruption, although no study has yet to show a statistically significant difference. This difference is postulated to be a result of differences in HCG levels with female fetuses elevating maternal HCG levels higher than their male counterparts (3, 4).

Symptoms and Diagnosis

Placental abruption is a clinical diagnosis, but is complicated by a highly variable clinical picture. Bleeding and pain are classic symptoms, but not always apparent. Therefore, placental abruption should be on the differential in any case of unexplained preterm bleeding or birth. A differential for third trimester vaginal bleeding is elaborated in Table 1.

Table 1: Differential Diagnosis for Placental Abruption

Condition	Clinical Symptoms	Ultrasound Findings	Risk Factors
Labor	Gradual onset of contractions, slight bleeding as cervix dilates “bloody show”	Normal placenta, fetus	N/A
Placental Previa	Typically painless bleeding	US shows placenta within 2cm of cervical os	Previous placental previa / C-section, smoking, multiparity
Uterine Rupture	Continuous pain and bleeding, contractions cease	Defect in Uterine wall	Hx of hysterotomy
Placental Abruption	Bleeding, uterine pain, painful contractions	May show hematoma or thickened placenta	Cocaine or tobacco abuse, HTN, PROM

This table demonstrates a reasonable differential when placental abruption is suspected and how to delineate between the various conditions (5, 8, 9).

Bleeding occurs in 70-80% of cases of placental abruption, as blood escapes out the cervix after traveling between membranes. Cases of concealed abruption can occur with no frank bleeding due to blood collecting behind the placenta and never exiting the uterus. Bleeding in placental abruption can be subchorionic, retroplacental or preplacental (9). Fetal cardiocographic patterns are abnormal in the majority cases and can exhibit bradycardia in addition to late or variable decelerations. Fetal movements will decrease in 11% of cases as well (1). Other symptoms of placental abruption include abdominal pain, uterine contractions, and uterine tenderness. Another important marker of placental abruption that occurs in 50% of cases is bloody amniotic fluid. Typically these symptoms will be apparent 1-24 hours before delivery with 11% of cases showing symptoms more than 24 hours prior to delivery and 24% less than one hour prior (1). In order to bring some order to diagnosing placental abruptions a grading system for their severity has been developed and can be viewed below in Table 2. It should be remarked that while being a clinical diagnosis, cases of placental abruption can be pathologically confirmed following delivery based on adherent blood clot on maternal surface of placental parenchyma (10).

Table 2: Grading System for Placental Abruption

Grade	Symptoms	Fetal Distress	Maternal Distress
0	Asymptomatic	No	No
1	Vaginal Bleeding, Uterine Tenderness	No	No
2	Vaginal Bleeding, Uterine Contractions	Yes	No
3	Severe Bleeding, Uterine hypotonus	Yes	Yes

The grading system for placental abruption modified from (Error! Bookmark not defined.).

Imaging studies can be used when evaluating placental abruption, but each study has significant drawbacks. Ultrasound is often obtained if there is suspicion of placental abruption based on signs and symptoms (11). It is used to attempt to visualize subchorionic or retroplacental hematomas. Acute hematomas vary in appearance and may be hyper or isoechoic with respect to the placenta (4). As abruptions increase in size they become more easily detected on ultrasound. An example of a placental abruption on ultrasound is below in Figure 1. Other signs on ultrasound include thickening of the placenta and what is known as the “jello sign” which refers to placental wobbling when experiencing sudden pressure from the transducer (3). Despite its ready use ultrasound is a weak marker for placental abruption with sensitivity ranging from 15-35% (12, 13). The benefit of ultrasound lies in its relatively high PPV of 88% although the NPV of ultrasound is only 53% (14). Should placental abruption be identified by ultrasound it is an imaging modality that can be used to monitor the patient expectantly should that be the management decision.

Figure 1: Placental Abruption Demonstrated on Ultrasound



Patient presented at 33 weeks and on ultrasound was found to have a layered area of mixed echolucency in the right upper retroplacental area. This is consistent with placental abruption.

Trauma complicates 7% of pregnancies and placental abruption is the most common cause of fetal demise after trauma (15). Despite the risk to the fetus CT scans may be clinically indicated to evaluate injury to the mother following trauma. When the imaging has been performed it can be utilized to evaluate for placental abruption. CT scans have been shown to accurately evaluate placental abruption with the likelihood of abruption being inverse to the degree of placental enhancement. Placental enhancement of less than 25% could serve as an additional marker for the need of caesarean section should fetal heart tones become nonreassuring (18).

Until recently the use of MRI to evaluate placental abruption had not been examined. A small study of 60 patients with suspected placental abruption showed diffusion weighted imaging had a sensitivity and specificity of 100% for detecting placental abruption (16). This was likely due to the improved soft tissue contrast as well as the larger vision field (19). While the cost of MRI and variable course of placental abruption may preclude MRI from becoming the standard of care it would be appropriate to consider MRI if ultrasound is negative and the diagnosis of placental abruption would alter management. Laboratory tests cannot help to predict placental abruption, but can be helpful in management of these patients. In unstable patients monitoring regular CBC and coagulation studies is imperative (8). Fibrinogen levels can be used to estimate maternal bleeding. Levels <200mg/dL have 100%PPPV for severe post-partum hemorrhage although this test is not a substitute for clinical judgment as mild placental abruption is not associated with any abnormalities (17). Some individuals recommend obtaining a Kleihauer-Betke test, which may be positive in placental abruption. This test has a poor correlation with placental abruption, however, and while it may be used as an adjunct it is not recommended for use alone in detecting placental abruption (18).

Management

The management of patients with placental abruption is complicated by the fact there has never been a randomized control trial examining treatment modalities. As a result management is done on an individual basis based on a variety of variables including gestational age, severity of abruption and maternal and fetal status.

In a patient with a gestational age \geq 34 weeks delivery is often undertaken (8). Should the mother appear stable and FHTs reassuring it is possible to undertake a vaginal delivery. While these patients often present with contractions oxytocin and amniotomy are reasonable methods for inducing labor (3). It is imperative that these patients undergo constant monitoring for signs of abruption progression. If FHTs are not reassuring or the mother is unstable, whether due to a coagulopathy, hypotension, or another complication, emergent caesarean section should be performed (5). There is statistically significant data showing improvement in neonatal morbidity and mortality with a caesarean section performed within 20 minutes of fetal bradycardia detection compared to 30 minutes indicating the significant importance of rapid response in this patient population (19). During these procedures it is possible to encounter a Couvelaire uterus, which may require aggressive management with blood products and possible hysterectomy (3). This complication is why products should always be readily available for patients undergoing a caesarean section for placental abruption.

When abruption is diagnosed at a gestational age between 24 and 34 weeks the treatment decisions become more complicated. These patients should receive steroids to promote fetal lung development in case of spontaneous delivery (3). Historically there was controversy over the use of tocolytics in this population due to fear that the side effects of those medications would mask blood loss. However, since

then studies have demonstrated no association between tocolytics and increased mortality or morbidity in this patient population (20). It is recommended that magnesium sulfate be used as the first line tocolytic (11). The goal with these patients is to deliver between 37 and 38 weeks, and they even can be followed up on an outpatient basis should a short hospital stay under observation demonstrate stability in the placental abruption. Should mother or fetus develop unstable symptoms, however, delivery should be attempted (3).

Conclusion

Placental abruption is the most common cause of bleeding in the second half of pregnancy and puts both the mother and the fetus at risk. While many risk factors have been identified that predispose individuals to a placental abruption the etiology remains unclear. Diagnosis of placental abruption is complicated by the variable presentations of patients and significant shortcomings in all current imaging modalities. It is hoped that improvement in this area over the coming decade will aid in improving maternal and fetal outcomes. Management in placental abruption is performed on an individualized basis, but constant monitoring is necessary in all cases to detect the development of an unstable scenario necessitating emergency interventions. Continuing research into placental abruption will lead to a better understanding of the disease, and accordingly improvements in patient care.

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