



## Original Article

## Analysis of 62 placental abruption cases: Risk factors and clinical outcomes



Yang Li, Yuan Tian, Ning Liu, Yang Chen, Fujun Wu\*

Department of Obstetrics and Gynecology, The Second Hospital of Jilin University, Changchun 130041, China

## ARTICLE INFO

## Article history:

Accepted 8 January 2019

## Keywords:

Placental abruption  
Postpartum hemorrhage  
Pre-eclampsia  
Pregnancy outcome  
Risk factors

## ABSTRACT

**Objective:** This study aimed to explore the clinical characteristics and outcomes of placental abruption.

**Materials and methods:** A total of 62 placental abruption cases were collected from the Second Hospital of Jilin University between January 2007 and December 2012. A retrospective study was conducted to explore the risk factors for placental abruption, clinical characteristics, and maternal and fetal outcomes. **Results:** Risk factors for placental abruption mainly include preeclampsia (39%) and premature rupture of membrane (10%). Abdominal pain (68%) and bleeding (35%) comprise the classical symptoms of placental abruption but the clinical picture varies from asymptomatic, in which the diagnosis is made by inspection of the placenta at delivery, to massive abruption leading to fetal death and severe maternal morbidity. Emergency cesarean section was performed in 45 cases (73%) of placental abruption. Sixty-two placental abruption cases were divided into 2 groups according to whether uteroplacental apoplexy occurred. The incidence of preeclampsia and the duration (time between on-set of clinical symptom and placenta delivery) in the observational group were significantly higher than that of the control group, showing statistical significance ( $P < 0.01$ ).

**Conclusion:** The diagnosis of placental abruption should consider risk factors, symptoms, physical signs, dynamic ultrasound monitoring, and cardiac care. Early diagnosis and treatment can improve maternal and infant prognosis.

© 2019 Taiwan Association of Obstetrics & Gynecology. Publishing services by Elsevier B.V. This is an open access article under the CC BY-NC-ND license (<http://creativecommons.org/licenses/by-nc-nd/4.0/>).

## Introduction

Postpartum bleeding or postpartum hemorrhage is often defined as the loss of more than 500 ml or 1000 ml of blood within the first 24 h following childbirth. Placental abruption, also known as abruptio placentae, is the most common cause of postpartum bleeding, and involves separation of the normally situated placenta after the 20th week of gestation and prior to birth [1]. Placental abruption complicates approximately 1% of pregnancies [2,3], with two-thirds classified as severe because of accompanying maternal, fetal, and neonatal morbidity [4]. The incidence appears to be increasing in the USA, Canada, and several Nordic countries [2], possibly because of increases in the prevalence of risk factors for the disorder and/or to changes in case ascertainment [5,6].

The clinical hallmarks of abruption include painful vaginal bleeding accompanied by tetanic uterine contractions, uterine hypertonicity, and a non-reassuring fetal heart rate pattern [7]. The exact etiology of abruption is unknown, but the risk factors such as high parity, advanced maternal age, low socioeconomic status, cigarette smoking, abdominal trauma, alcohol use, crack cocaine use in pregnancy, maternal hypertension, polyhydramnios, multiple pregnancy, thrombophilias, and prior history of abruption have all been identified [8–10].

Abruptio is characterized by acute onset, rapid development, and high risk for the mother and infant. Despite its clinical significance, there are no reliable diagnostic tests or biomarkers to predict or prevent the occurrence of abruption. As the risk factors for preterm placenta include differences in socioeconomic status and health system efficiency, the ability to provide effective preventive measures requires investigation of potential risk factors. Therefore, we reviewed the clinical data of placental abruption cases treated by our hospital, and analyzed the risk factors and clinical characteristics.

\* Corresponding author. Department of Obstetrics and Gynecology, The Second Hospital of Jilin University, Changchun, 130041, China. Fax: +86 431 88796709  
E-mail address: [cnfujuwu@126.com](mailto:cnfujuwu@126.com) (F. Wu).

## Patients and methods

### Data collection

This was a 5-year retrospective analysis of all cases of placental abruption seen at the Department of Obstetrics and Gynecology, Jilin University Bethune Second Hospital between January 2007 and December 2012. The data were collected from the labor ward delivery register, operating room records, and patient case notes obtained from the main records department. All placentas underwent pathological examination. Diagnosis of placental abruption and uteroplacental apoplexy was based on criteria listed in Williams Obstetrics 24Ed. The Jilin University Bethune Second Hospital Ethics Committee provided approval for the study.

### Observation indexes

Information extracted from the records included demographics, parity, gestational age, clinical presentation, risk factors for placental abruption, complications, and perinatal and maternal outcomes.

### Statistical methodology

All data were processed using SPSS 21.0 (IBM Corp), and rates (%) were used to express data.

## Results

### General conditions, delivery mode, diagnosis time, and gestational age

Between January 2007 and December 2012, 21,203 pregnant women were admitted to Jilin University Bethune Second Hospital. The perinatal mortality rate during this period was 0.36%. However, among the 62 placental abruption cases, the incidence was 0.16%. The average age of placental abruption cases was 28 years (range: 23–40 years). Of these, 24 were sequential pregnancies and 38 were first pregnancies. There were 5 late abortions (gestational age <28 weeks), 38 premature deliveries (gestational age: 28–36 weeks), and 19 term births (gestational age: 37–41 weeks). There were 17 spontaneous vaginal deliveries (27%), whereas 45 (73%) were delivered by emergency cesarean section. There were 3 gemellary pregnancy (4.84%) and 59 singleton pregnancy (95.16%).

### Risk factors

There were 24 cases of gestational hypertension, 6 of premature rupture of membrane, 10 of polyhydramnios, 4 of abdominal trauma, 3 of gemellary pregnancy and 15 had no clear pathology. Risk factors included preeclampsia in 39% (24/62) and premature rupture of membrane in 10% (6/62). Preeclampsia and premature rupture of membrane were the major causes of placental abruption (Table 1).

**Table 1**

Risk factors.

Risk factors	Case	Percentage
Preeclampsia	24	39%
Premature rupture of membranes	6	10%
Polyhydramnios	10	16%
Abdominal trauma	4	6%
Gemellary pregnancy	3	5%
No clear pathology	15	24%

**Table 2**

Clinical characteristics.

Clinical characteristics.	Case	Percentage
Abdominal pain	42	68%
Vaginal bleeding	22	35%
Bloody amniotic fluid	28	45%
Abdominal tension	16	26%
Fetal distress	28	45%
Hematometra	10	16%
Postpartum hemorrhage	16	26%

### Clinical characteristics

Table 2 shows the clinical presentations. The most common presenting complaints were abdominal pain in 42 (68%), bloody amniotic fluid in 28 (45%), fetal distress in 28 (45%), and vaginal bleeding in 22 (35%). Other presenting complaints included abdominal tension in 16 (26%), postpartum hemorrhage in 16 (26%), and hematometra in 10 (16%). Among all cases, 9 showed abruption in  $\geq 2/3$  of the placenta, 30 showed abruption in  $\leq 1/3$ , and 23 showed abruption in  $1/3$ – $2/3$  (Table 2).

### Maternal and fetal complications and prognosis

Table 3 shows the maternal and fetal complications and prognosis. Maternal complications included 4 cases of hemorrhagic shock (6.5%), 4 of disseminated intravascular coagulation (6.5%), 2 hysterectomies (3.2%) and 20 cases of uteroplacental apoplexy (32.3%). There were a total of 4 perinatal deaths in the 2 groups; the mortality rate was 6.5% (4/62). Fetal complications included 3 stillbirths (4.8%), 12 cases of neonatal asphyxia (19.4%), and 1 neonatal death (1.6%) (Table 3).

### Comparison on risk factors for placental abruption incidence

62 placental abruption cases were divided into 2 groups according to whether uteroplacental apoplexy occurred: 20 patients with uteroplacental apoplexy complicating placental abruption fell into observational group; the other 42 cases fell into control group. A retrospective research was adopted to analyze and compare the two groups' risk factors for placental abruption. Comparing risk factors for pre-mature rupture and polyhydramnios and other conditions yielded no significant difference ( $P > 0.05$ ). The incidence of preeclampsia and the duration (time between on-set of clinical symptom and placenta delivery) in the observational group were significantly higher than that of the control group, showing statistical significance ( $P < 0.01$ ) (Table 4).

## Discussion

Placental abruption is a common yet serious complication and one of the major factor of postpartum hemorrhage in obstetrics and gynecology; if unrecognized or uncontrolled, both the mother and infant will be at risk. The worldwide incidence of placental

**Table 3**

Maternal and fetal complications and prognosis.

complications and prognosis	Case	Percentage
Hemorrhagic shocks	4	6.5%
DIC	4	6.5%
Hysterectomy	2	3.2%
Uteroplacental apoplexy	20	32.3%
Stillbirth	3	4.8%
Neonatal asphyxia	12	19.4%
Neonatal death	1	1.6%

**Table 4**  
Comparison on risk factors for placental abruption incidence.

Group	cases	Preeclampsia		Pre-mature rupture		Polyhydramnios		Other factors		Duration (h)
		Case	Percentage	Case	Percentage	Case	Percentage	case	Percentage	
Observation group	20	15	75%	4	20%	2	10%	3	15%	6.8
Control group	42	9	21%	6	14%	4	10%	21	50%	4.0
P value		<0.01		>0.05		>0.05		<0.01		<0.01

abruption is reportedly 1%. However, in recent years, some reports have shown a declining incidence; the current study showed an incidence of 0.29%. This decline can be attributed to rapid economic development, improved pregnancy care, enhanced public health care awareness, and the increasing number of pregnancies receiving regular examinations at hospitals. However, some mild cases of placental abruption are misdiagnosed or ignored. Thus, the potential risk factors for preterm placenta require investigation.

#### *The causes of placental abruption*

Placental abruption is a major cause of obstetric hemorrhage and perinatal death. The high maternal morbidity and mortality is because of severe hemorrhage that follows this complication. In one review, 40–60% of abruptions occurred before 37 weeks of gestation and 14% occurred before 32 weeks [11]. However, gestational age-specific incidence rates vary considerably depending on the etiology [12,13]. The exact etiology of placental abruption is unknown, but a hypothesis suggests the involvement of placental or vascular abnormalities because of failure of secondary invasion of trophoblastic villi. Abnormal placentation, vascular malformations, and increased fragility of vessels predispose to hematoma formation, resulting in separation of the placenta [14]. The fetal morbidity and mortality is because of reduced placental surface area necessary for oxygenation [15]. However, risk factors such as high parity, advanced maternal age, low socioeconomic status, cigarette smoking, abdominal trauma, alcohol use, crack cocaine use in pregnancy, maternal hypertension, polyhydramnios, multiple pregnancy, thrombophilias, and prior history of abruption have all been identified [8–10]. We confirmed that gestational hypertensive disease, polyhydramnios, and premature rupture of membrane were significantly associated with placental abruption. The underlying mechanism of placental abruption is unknown. In the absence of complications, placental abruption is more likely to occur in gemellary pregnancy than in singleton pregnancy. Placental abruption usually occurs during the delivery of a twin pregnancy, when the first fetus is delivered too quickly and the pressure in the uterine cavity decreases sharply. Recently, placental abruption has been reported to be more prevalent in thrombophilic pregnancies and in women with a familial history of venous thromboembolism. Most risk factors for placental abruption are also related to increased risk of venous Thromboembolism Lindquist [16]. In addition, Hung found oligohydramnios and polyhydramnios to be independent risk factors, indicating that placental abruption may be associated with diverse pathological conditions [17].

#### *The clinical diagnosis of placental abruption*

The diagnosis of placental abruption is based on clinical symptoms such as abdominal pain and vaginal bleeding, usually confirmed by ultrasonographic findings and histopathological examination of the placenta.

Placental abruption may be suspected in pregnant women with vaginal bleeding and/or abdominal pain, and history of trauma, as well as in those who present with unexplained preterm delivery.

About 35% of abruption presents with occult bleeding and about 68% presents with occult abdominal pain. Occasionally, the presenting sign is fetal death. In our study, 45% (28 cases) of cases had fetal distress and 4.8% (3 cases) were stillbirths. The incidence of placental abruption was inconsistent in previous reports by Tikkanen et al. [18], and only serious cases were reported. Since the diagnosis is only possible during cesarean section, some patients with mild presentations may have delivered vaginally.

Ultrasound examination is useful primarily to exclude placenta previa or vasa previa. Classic echographic signs include peripheral detachment of the placenta or increased thickness of more than 5–6 cm, associated with a variably echogenic zone, depending on hematoma age. The reported accuracy of ultrasound in the diagnosis of placental abruption was <30% in 2002 [19]. With the rapid development of ultrasound technology, Shinde reported the accuracy of ultrasound in diagnosis was 87.5% in 2016 [20]. Ultrasound is also very helpful in ruling out other causes of vaginal bleeding. However, a positive finding is associated with more aggressive management and worse neonatal outcome.

Usually, the diagnosis of placental abruption is established or confirmed by direct visualization of a placental hematoma, but this may be absent if detachment has been so sudden and recent that clots have not had time to form. This also applies to the pathological examination, when subacute placental abruption may not leave any traces. Accordingly, histological examination has a sensitivity of only 30.2% (specificity: 100%) [21]. When histological examination confirms the diagnosis, chronic and often nonspecific lesions are regularly found; only placental infarctions and decidual vasculopathies are significantly more common in the event of placental abruption.

#### *The treatment of placental abruption*

Maternal mortality has become very rare in developed countries. Nevertheless, there is still significant morbidity linked to hemorrhagic risk, mainly because of hematoma formation itself, which is often associated with disseminated intravascular coagulation. Early management of such patients should be performed, with involvement of an intensive care team. Mild placental abruption can be managed with vaginal delivery, whereas cesarean section is used in most cases of serious placental abruption. Obstetric management of placental abruption is guided by fetal vitality and maternal status. When the fetus is living, an emergency cesarean should be performed unless vaginal delivery is imminent. In the current report, emergency cesarean section was performed on 45 patients (73%) with placental abruption, whereas 17 (27%) had spontaneous vaginal delivery. In cases of fetal bradycardia, extraction by cesarean section within 20 min significantly reduces neonatal mortality and the incidence of cerebral palsy [22]. The need for rapid extraction explains the high rate of general anesthesia. However, if intrauterine fetal death has been confirmed, vaginal delivery is preferred, with close clinical and laboratory monitoring. Since the diagnosis is only possible during cesarean section, some mild cases of uteroplacental apoplexy may have delivered vaginally. Thus, future management strategies should

focus on prevention, screening, and early diagnosis to reduce mortality.

## Conclusions

Early medical intervention is needed to ensure a good outcome, but is not available in several parts of the world. Treatment depends on the severity of abruption and the gestational age. Physicians must be aware that patients with a history of multiparity, prior cesarean section, abortion, and placental abruption are at increased risk of abruption. Although these variables have limited predictive value, we believe that our results will improve the management of pregnant women at high risk of placental abruption, as well as the ability to predict its occurrence, thereby improving maternal and fetal outcomes. Early diagnosis, prenatal follow-up, and cesarean section improve the maternal and fetal prognosis. The findings emphasize that better care can reduce serious complications in this disease.

## Conflicts of interest

The authors declare no conflict of interest.

## References

- [1] Abasi IJ, Jeremiah I, Ekine AA. Risk factors and pregnancy outcome of placental abruption at the Niger delta university teaching hospital, okolobiri, south-south Nigeria. *Br J Med Med Res* 2015;5:1000–6.
- [2] Ananth CV, Keyes KM, Hamilton A, Gissler M, Wu C, Liu S, et al. An international contrast of rates of placental abruption: an age-period-cohort analysis. *PLoS One* 2015;10, e0125246.
- [3] Ruiter L, Ravelli AC, de Graaf IM, Mol BW, Pajkrt E. Incidence and recurrence rate of placental abruption: a longitudinal linked national cohort study in The Netherlands. *Am J Obstet Gynecol* 2015;213:573. e1–8.
- [4] Ananth CV, Lavery JA, Vintzileos AM, Skupski DW, Varner M, Saade G, et al. Severe placental abruption: clinical definition and associations with maternal complications. *Am J Obstet Gynecol* 2016;214:272. e1–9.
- [5] Ananth CV, Oyelese Y, Yeo L, Pradhan A, Vintzileos AM. Placental abruption in the United States, 1979 through 2001: temporal trends and potential determinants. *Am J Obstet Gynecol* 2005;192:191–8.
- [6] Pariente G, Wiznitzer A, Sergienko R, Mazor M, Holcberg G, Sheiner E. Placental abruption: critical analysis of risk factors and perinatal outcomes. *J Matern Fetal Neonatal Med* 2011;24:698–702.
- [7] Sheiner E. *Textbook of perinatal epidemiology*. Nova Science; 2010.
- [8] Igwegbe AO, Eleje GU, Okpala BC. Management outcomes of abruptio placentae at nnamdi azikiwe university teaching hospital, Nnewi, Nigeria. *Niger J Med* 2013;22:234–8.
- [9] Tikkanen M, Nuutila M, Hiilesmaa V, Paavonen J, Ylikorkala O. Clinical presentation and risk factors of placental abruption. *Acta Obstet Gynecol Scand* 2006;85:700–5.
- [10] Du Toit MM, Smith M, Odendaal HJ. The role of prenatal alcohol exposure in abruptio placentae. *S Afr Med J* 2010;100:832–5.
- [11] Tikkanen M. Placental abruption: epidemiology, risk factors and consequences. *Acta Obstet Gynecol Scand* 2011;90:140–9.
- [12] Ananth CV, Getahun D, Peltier MR, Smulian JC. Placental abruption in term and preterm gestations: evidence for heterogeneity in clinical pathways. *Obstet Gynecol* 2006;107:785–92.
- [13] Ananth CV, Oyelese Y, Prasad V, Getahun D, Smulian JC. Evidence of placental abruption as a chronic process: associations with vaginal bleeding early in pregnancy and placental lesions. *Eur J Obstet Gynecol Reprod Biol* 2006;128:15–21.
- [14] Oyelese Y, Ananth C. Placental abruption. *Obstet Gynecol* 2006;108:1005–16.
- [15] Morgan K, Arulkumaran S. Antepartum haemorrhage. *Curr Obstet Gynaecol* 2003;13:81–7.
- [16] Lindqvist PG, Happach C. Risk and risk estimation of placental abruption. *Eur J Obstet Gynecol Reprod Biol* 2006;126:160–4.
- [17] Hung TH, Hsieh CC, Hsu JJ, Lo LM, Chiu TH, Hsieh TT. Risk factors for placental abruption in an Asian population. *Reprod Sci* 2007;14:59–65.
- [18] Tikkanen M, Luukkaala T, Gissler M, Ritvanen A, Ylikorkala O, Paavonen J, et al. Decreasing perinatal mortality in placental abruption. *Acta Obstet Gynecol Scand* 2013;92:298–305.
- [19] Glantz C, Purnell L. Clinical utility of sonography in the diagnosis and treatment of placental abruption. *J Ultrasound Med* 2002;21:837–40.
- [20] Shinde GR, Vaswani BP, Patange RP, Laddad MM, Bhosale RB. Diagnostic performance of ultrasonography for detection of abruption and its clinical correlation and maternal and foetal outcome. *J Clin Diagn Res* 2016;10:QC04–7.
- [21] Elsasser DA, Ananth CV, Prasad V, Vintzileos AM. New Jersey-Placental Abruption Study Investigators. Diagnosis of placental abruption: relationship between clinical and histopathological findings. *Eur J Obstet Gynecol Reprod Biol* 2010;148:125–30.
- [22] Kayani SI, Walkinshaw SA, Preston C. Pregnancy outcome in severe placental abruption. *BJOG* 2003;110:679–83.