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Analysis of Risk Factors for Uteroplacental Apoplexy Complicating Placental Abruption: A Systematic Review

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Abstract. The paper explored risk factors for uteroplacental apoplexy complicating placental abruption, the condition's clinical characteristics, and maternal and fetal outcomes.62 pregnancies of placental abruption were collected from Second Hospital Jilin University during Jan. 2007-Dec. 2012.According to uteroplacental apoplexy occurred,20 cases with uteroplacental apoplexy fall into observational group whereas others fall into the control group.A retrospective study was conducted to explore the risk factors of uteroplacental apoplexy.Risk factors for uteroplacental apoplexy complicating placental abruption consist mainly of pre-eclampsia, duration of the condition and placental location at uterine cornu and fundus of uterus. Maternal and fetal outcomes for patients with uteroplacental apoplexy are adverse.

Introduction

Placental abruption refers to the separation of a normally sited placenta from the uterine wall after 20 weeks of gestation and prior to birth[1]. Abruption is the most common cause of late pregnancy bleeding[2], and is associated with significant perinatal mortality and morbidity[3]. It is characterized by acute onset, fast development, and high risk for the mother and infant. Due to the risk factors of preterm placenta can be attributed to the differences in the socio-cultural and economic backgrounds. The prognosis of placental abruption is related to early diagnosis, the presence of uteroplacental apoplexy, and on-time management. Therefore,the current study retrospectively reviewed clinical data of placental abruption patients accepted by our hospital, analyzed risk factors and clinical characteristics of uteroplacental apoplexy complicating placental abruption, the result is presented here.

Data and Method

General data

21203 pregnant women were admitted into from Jilin University Bethune Second Hospital from Jan. 2007-Dec. 2012. during which period the perinatal mortality rate was 0.36%. Of the 62 placental abruption patients, the incidence was 0.16%. Patient's ages ranged between 23-40, averaged at 28, among which 24 cases 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), 19 term births(gestational age: 37-41 weeks). All placentas had gone through pathological scrutiny. Diagnosis criteria for placental abruption and uteroplacental apoplexy followed *Obstetrics and Gynecology*edited by Feng Youji.

Methods

62 pregnancies 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, clinical characteristics, maternal and fetal outcomes and result of placenta pathological examination.

Statistical Methodology

All data were processed using SPSS 12.0, *t* test and $\chi 2$ *test*were chosen to compare the two groups.

Results

Comparison on General Conditions, Delivery Mode, Diagnosis Time and Gestational Age

No statistically significant difference was found on the average age and body weight between the two groups (P>0.05); there is however, significant difference on the pregnancy history, delivery mode, diagnosis time and gestational age. The incidence of premature delivery in the observational group was 85 %(17/20), significantly higher than the control group's 50 %(21/42), demonstrating statistical significance (P<0.01). Prenatal diagnosis rate of the observational group was significantly higher than that of the control group, showing statistical significance (P<0.01). See Table 1.

Table 1. Comparison on general conditions, delivery mode, diagnosis time and gestational age

Groups			Observational Group	Control Group
Total Cases			20	42
Average age(Year)			28	28
Body weight index(kg/m^2)			28	28
First pregnancy		Case	15	23
		Percentage	75	55
Sequential pregnancy		Case	5	19
		Percentage	25	45
Vaginal delivery		Case	0	17
		Percentage	0	40
Cesarean section delivery		Case	20	25
		Percentage	100	60
Prenatal diagnosis		Case	20	30
		Percentage	100	71
During-labor diagnosis		Case	0	12
		Percentage	0	29
Gestational age	<28weeks	Case	2	3
		Percentage	10	28
	28-36weeks	Case	17	21
		Percentage	85	50
	>37weeks	Case	1	18
		Percentage	5	43

Comparison on Risk Factors for Placental Abruption Incidence

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). See Table 2.

Table 2. Comparison on risk factors for placental abruption incidence

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

Comparison on Clinical Characteristics

Incidence of abdominal pain, vaginal bleeding and abdominal tensions of the two groups showed no significant difference (P>0.05). Incidence of bloody amniotic fluid, fetal distress, hematometra and postpartum hemorrhage of the observational group was significantly higher than that of the control group, demonstrating statistical significance (P<0.01). See Table 3.

Table 3. Comparison on clinical characteristics

Group		Observation groups	Control group
Total cases		20	42
Abdominal pain	Case	12	30
	Percentage(%)	60[a]	71
Vaginal bleeding	Case	8	14
	Percentage(%)	40[a]	33
Bloody amniotic fluid	Case	17	11
	Percentage(%)	85[b]	26
Abdominal tension	Case	6	10
	Percentage(%)	30[a]	24
Fetal distress	Case	13	12
	Percentage(%)	65[b]	14
Hematometra	Case	8	2
	Percentage(%)	40[b]	5
Postpartum hemorrhage	Case	12	4
	Percentage(%)	60[b]	10

Note:In comparison over the observational group, 'a' represents P> 0.05, 'b' represents P<0.01.

Comparison on Placental Location and Abruption Area

In the observational group, 6 placentas located at anterior uterine wall and posterior uterine wall, 14 were at fundus of uterus and uterine cornu; in the control group, 27were at anterior uterine wall and posterior uterine wall, 15 were at fundus of uterus and uterine cornu; there were significant differences between the two groups in terms of placental locations at fundus of uterus and uterine cornu ($P<0.01$). In the observational group, all abruption areas exceeded 1/3, of which 9 cases showed abruption areas≥ 2/3, in the observational group, 30cases showed abruption areas ≤ 1/3, 12 cases showed abruption areas at 1/3- 2/3. There was significant difference ($P<0.01$).

Comparison on Maternal and Fetal Complications and Prognosis

There were a total of 4 perinatal deaths in the two groups; the mortality rate was 6.5% (4/62). 4 hemorrhagic shocks, 4 DIC cases, 2 hysterectomy, 3 stillbirth , 6 neonatal asphyxia and 1 neonatal death occurred in the observational group, while in the control group, except for 6 neonatal asphyxia , other indexes were 0. There were significant differences ($P<0.01$).

Comparison on Results of Placental Pathological Examination

The observational group showed greater abruption area and blue-violet ecchymosis at perimetrium membranes. In addition, the observational group's vascular changes in placenta including spasms in spiral arterioles in myometrium anddecidua locations, uneven vascular width, narrowing of blood vessels, and acute atherosclerosis, were all at significantly higher levels over controls.

Discussion

Placental abruption is a common yet serious complication in obstetrics and gynecology, if left unrecognized or uncontrolled, it will pose great threat to both the mother and the infant. The incidence of placental abruption was reported1% by foreign literature[4]. However, in recent years there has been reports showing declined incidence: The current study shows an incident of 0.29%. This declining trade can be attributed to the rapid development of economy, strengthened pregnancy care, enhanced health care awareness among citizens and increased number of pregnancies who take regular examinations at hospitals. However, there are cases that mild placental abruption were misdiagnosed or ignored[5].

Conditions Inducing Uteroplacental Apoplexy Complicating Placental Abruption

Uteroplacental apoplexy comes after the placental abruption, the mechanism is: after the placental abruption, cumulated blood between placenta and uterine wall, under intensified local tension, permeates into myometrium, causing separation, rupture or change in the muscle fibers, and the uterine surface shows blue-violet ecchymosis as blood permeates into uterine serous layer, this process is called uteroplacental apoplexy. Uteroplacental apoplexy reflects the extent of placental abruption. Incidence of uteroplacental apoplexy complicating placental abruption was inconsistent in previous reports: Liang Hui [6]reported 6.9%, Li Caijuan [7] reported

11.9%, Ye Qiao and Huang Yuling[8] reported 58.3%, the current study reported 32.2% (20/62), and the condition was only present in serious placental abruption cases. Since the diagnosis is only possible during cesarean section operations, the possibility that some vaginal delivery-treated patients with mild conditions have uteroplacental apoplexy can not be ruled out.

Effect of Uteroplacental Apoplexy Complicating Placental Abruption on Maternal and Fetal Prognosis

Uteroplacental apoplexy complicating placental abruption has a significant impact on maternal and fetal prognosis [9,10]. It often causes serious antepartum hemorrhage, postpartum hemorrhage, dysfunctional blood coagulation, and threatens lives of mothers, leading to premature delivery, low birth weight, fetal distress, stillbirth, dead birth, and increased new-born mortality rate. The current study suggests that, the incidence of cesarean section, postpartum hemorrhage,DIC, hysterectomy, premature delivery, and perinatal death in the observational group were all higher than that of the control group. The current study reported a 9.7% perinatal mortality rate incidence under placental abruption, 26-fold that of general perinatal mortality rate(0.38%). It is significantly lower than the 20‰ -35‰[11]incidence in previous domestic reports, yet very close to the 9.1% incidence reported by Jia Junheng[12]. This can be attributed to the prevalence of newborn ICU in recent years, advanced technology in newborn revival, enhanced prenatal collaboration between obstetric, ultrasound department, newborn department, anesthesia department, etc. These have combined to enhance maternal and fetal prognosis greatly.

Risk Factors for Uteroplacental Apoplexy Complicating Placental Abruption

The cause of abruption is truly unknown, but there are many conditions highly associated with uteroplacental apoplexy.

Pre-Eclampsia.

Although many factors account for placental abruption, an overriding pathological mechanism for placental abruption is high blood pressure patients' vascular spasm during pregnancies. The high blood pressure incidence during pregnancy among placental abruption patients was 21.37% [13] in Shanghai, and Liang Hui[6] reported a figure of 49.4% in her report. The current study showed an incidence of 38.7%(24/62), further study showed that, pre-eclampsia incidence in the observational group was 75%(15/20), which was significantly higher than the control group's 21.4%(9/42), and serious pre-eclampsia suffers constituted a large proportion. Placenta pathological examination also showed that, the observational group demonstrated greater pathological changes in blood vessels over controls, indicating that pre-eclampsia is an important pathological mechanism for placental abruption, also the seriousness of pre-eclampsia directly dictates the progression of uteroplacental apoplexy.

Placental Locations.

In the observational group, most of the placentas were at fundus of uterus or uterine cornu(14/20), whereas in the control group, the majority were at anterior uterine walls or posterior uterine walls. The fundus of uterus and uterine cornu have thick tissues, and the uterine cornu have abundant blood supplies, therefore once placental abruption occurs, placentas at uterine cornu will induce greater bleeding. Furthermore, fundus of uterus or uterine cornu have strong contractility during uterine contraction, leading to greater local tension and greater risks of blood permeating into muscular layers, causing uteroplacental apoplexy[14].

Duration.

Average duration in the observational group was 6.8h, significantly longer than the control group's 4.0 h, indicating that if the prolonged placental abruption was left unrecognized and untreated, uteroplacental apoplexy may follow. Xie Tuqiang *et al.*[15] reported that about 29.3% placental abruption was misdiagnosed as threatened preterm labor in the initial diagnosis. This reminds us that for threatened preterm labor diagnosis with indefinite reasons, we should carefully differentiate it with placental abruption.

Delivery Mode of Pregnancies with Uteroplacental Apoplexy Complicating Placental Abruption and Cesarean Section

For mild placental abruption, vaginal delivery can be adopted for patients; for serious placental abruption, to save lives of the mother and infant, most of the situations cesarean sections are adopted[16]. Although uteroplacental apoplexy complicating placental abruption can only be confirmed during operation, it should be noted in some uncommon cases, mild placental abruption suffers can perform vaginal delivery as well, therefore misdiagnosis should be cautioned against. Uteroplacental apoplexy is not the indication of cesarean section. For women in the observational group, hot compress and massage were applied on the uterus, and uterotonic was injected into muscular layers of the uterus, hemostasis effect was obvious in most cases. Future treatment may include ligating uplink arteries of uterus to ease bleeding. If DIC is complicated, coagulation factors should be supplied immediately. If the above measures fail to contract the uterus and stop the bleeding, cesarean section should be applied decisively to save the mother's life. In the current study, 3 patients suffered DIC complication; we treated them with coagulation factors replenishment and other measures and successfully retained their uteruses. Another woman suffered ante partum hemorrhage of 1000 ml, the heart of the fetus stopped beating, DIC was observed. We therefore immediately executed cesarean section, during the operation we observed uteroplacental apoplexy. After delivery, the uterus bled heavily, and the above measures yielded no effect, therefore subtotal hysterectomy was immediately executed to save the mother's life.

Summary

Uteroplacental apoplexy complicating placental abruption poses great threat to both the mother and the infant. For patients confirmed with placental abruption, pre-eclampsia complication, and placental locations at fundus of uterus or uterine cornu, we should be highly vigilant on a possible uteroplacental apoplexy, and treat them in an proactive manner. Pregnancy may be halted, if necessary, to improve maternal and fetal outcomes.

Conclusions

A case-controlled study using matched pairs was designed to identify risk factors for uteroplacental apoplexy complicating placental abruption taking into consideration confounders associated with pre-eclampsia, duration of the condition and placental location at uterine cornu and fundus of uterus. Maternal and fetal outcomes for patients with uteroplacental apoplexy complicating placental abruption are adverse. Although these variables continue to have limitations in predicting placental abruption, we believe that our results will improve the management of high-risk pregnant women with placental abruption, further forecast the occurrence of uteroplacental apoplexy complicating placental abruption,and improve maternal and fetal outcomes . Research needs also to continue about causes so that more can be done for prevention. Awareness needs to be amongst these women and health providers for early health seeking, early diagnosis and timely appropriate management.

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