


Cesarean Hysterectomy due to Abnormal Placentation: Mortality and Morbidity in a Tertiary Center

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ABSTRACT

Background & Objective: Due to increased rate of risk factors, the incidence of placenta accreta (PA) is increasing worldwide. This study aimed to investigate the important factors regarding the occurrence of PA, as well as outcomes and complications of Trans Abdominal Hysterectomy (TAH) in the patients with PA.

Materials & Methods: The study was performed as an observational cross-sectional study. Between March 2011 and March 2017, 177 patients, known cases of PA that undergone TAH, were enrolled in our study. Extracted data include demographic characteristics, patient's medical history, surgical approach and complications, such as blood loss and urologic problems.

Results: The average of maternal age and gestational age were 33.6 ± 4.70 (range= 22-43) years and 34.6 ± 3.16 weeks, respectively. Neither maternal age ($P=0.652$) nor BMI ($P=0.659$) had significant association with abnormal placentation. Previous history of dilation & curettage (D&C) was found in 34 patients that was not related to the occurrence of the PA ($P=0.508$). Twenty-one (11.9%) of the patients needed urological intervention that did not associated with placental position, skin and uterine incision ($P=0.258$, 0.410 and 0.219). There is no relation between amount of blood loss with gestational age ($P=0.7$) and number of C/S ($P=0.4$), gestational age ($P=0.7$), anesthesia ($P=0.2$), and curettage history ($P=0.3$).

Conclusion: Our mortality and morbidity rate is much lower than reported ones, indicating the high-level ability, skill and knowledge of the surgeons.

Keywords: Peripartum hysterectomy; Placenta accreta; Risk factor;

Introduction

As one of the most severe complications of pregnancy, placenta accreta (PA) may lead to massive, life-threatening and fatal intraoperative and post-operative hemorrhage (1). The incidence of PA is increasing worldwide (2) due to increased rate of the risk factors, most importantly cesarean section (C/S) (3,4). Increasing demand for C/S, as an elective procedure plays an important role for the emersion of the placental abnormalities; therefore, recognizing the alarm signs and symptoms in cases with previous history of C/S is necessary. Controlling massive hemorrhage, emergency hysterectomy is considered as the definite treatment for this condition (2); moreover, women diagnosed with the placenta Accreta/Previa during the prenatal period are mostly candidate for the hysterectomy, as an elective procedure. On the other hand, many complications, such

as massive blood loss, urinary complications caused by placenta invasion or the surgical technique, premature birth, low birth weight and low Apgar score are occurred as a result of PA and its management. This study aimed to investigate the important factors regarding the occurrence of PA, as well as outcomes and complications of Trans Abdominal Hysterectomy (TAH) in the patients with PA.

Materials and Methods

The study was performed as an observational cross-sectional study. Between March 2011 and March 2017, 177 patients, known cases of PA who underwent TAH, were enrolled in our study. Inclusion criteria were defined as the all cases with PA, undergone TAH, as well as maternal consciousness and stable mental status to render

accurate information about demographic and previous medical histories. Medical conditions which are known to be associated with abnormal hemostasis were considered as confounders, since maternal demographic characteristics were considered in this study. The definite diagnosis of the PA was done using the following criteria, considered positive if one or more exists: (1) Difficult manual, piecemeal removal of the placenta, at least 20 minutes after parturition without any evidence of placental separation; (2) retained placental fragments requiring curettage diagnosed by sonography; (3) massive hemorrhage from implantation site after removing the placenta during conservatively managed C/S; (4) obvious abnormal placental invasion observed by the surgeon during the laparotomy; plus post-operative histopathological assessment of the placenta (5-7) and their previous ultrasonography or Magnetic Resonance Imaging (MRI) suggesting the probable invasive placenta. The extracted data consist of maternal age, number of gravida and parity, history of abortion, mode of previous delivery, number of cesarean sections, Body Mass Index, blood group, hemoglobin (Hb) level, gestational age at the time of surgery, primary chief complaints. The surgical data included the used surgical incision on abdominal wall (midline or Pfannenstiel) and uterus (Kerr or classic) and the applied type of anesthesia (general vs. spinal), the numbers of administered packed red blood cells, fresh frozen plasma (FFP), platelets and cryoprecipitate. The blood loss volume could not be measured accurately; therefore, the amount of used blood product was considered for the estimation of the amount of the blood loss. The type of the anesthesia was selected based on the patient preference, obstetrics & gynecology surgeon and anesthesiologist opinion. The indicators of complicated surgery were numbers of administered packed red blood cells, fresh frozen plasma (FFP), platelets, cryoprecipitate, fibrinogen, patients' Hb levels before and after operation, need for reoperation, and urologic complications.

The study was approved by our institutional review board and informed consent was obtained from all participants. All participants consented for their information to be used on this project.

Categorical and continuous variables were expressed by frequency (and percentages) and mean \pm standard deviation. Independent t-test and One-way analysis of Variance (ANOVA) were used to compare means between subgroups. The relationships between continuous variables were assessed using bivariate correlation test. All analysis was performed using SPSS 21 (IBM Corporation, USA). The $P < 0.05$ was considered as statistically significant.

Results

Of total 177 recruited cases, TAH was performed as an emergency procedure for 93 (52.5%) and as an elective procedure, based on the previous imaging modalities indicating invasive placenta, for 84 (47.5%) cases. The TAH was done following the 4 (2.3%) Normal Vaginal Delivery (NVD) and 173 (97.7%) Cesarean section. The

average of maternal age and gestational age were 33.6 ± 4.70 (range: 22-43) years and 34.6 ± 3.16 weeks, respectively. The mean BMI was 26.8 ± 3.9 with range of 18-36.44. Neither age ($P=0.652$) nor BMI ($P=0.659$) had significant association with abnormal placentation (Table 1). The chief complaints for the patients admitted emergently were abnormal vaginal bleeding (38%), pain (30%) or both of them (32%). The most prevalent blood group was O+ in 57 patients (32.3%) and the least was AB- in 2 patients (1.1%). The average number of gravida was 3.35 ± 1.2 (1-8) and number of previous C/S was 2.02 ± 0.25 (0-5). History of previous C/S preterm and term history is summarized in Table 2. Previous history of dilation & curettage (D&C) was found in 34 patients that was not related to the occurrence of the PA ($P=0.508$). General and spinal anesthesia were performed for 92 (53.8%) and 79 (46.2%) of the cases; however, 4 patients undergone with spinal anesthesia that converted to the general anesthesia due to prolonged surgical duration or non-sufficient obtained anesthesia.

Urological consultant was demanded during the TAH for 28 (15.8%) patients of which 21 (11.9%) needed urological intervention, including repair of 18 ureters, 3 bladders and 1 both ureter and bladder. Urinary fistula was noted in 8 (4.5%) patients within the first year following the TAH; all of them underwent successful urologic repair. Urological intervention did not associate with placental position, skin and uterine incision ($P=0.258$, 0.410 and 0.219). No intestinal perforation was observed in our patients. Pfannenstiel and midline surgical incision on skin were performed in 31 (17.5%) and 146 (82.5%). Uterine vertical, and transverse incision were done in 120 (67.8%) and 55 (32.2%) of cases. Transvers uterine cut and phan incision of skin resulted in more need for blood products, reflecting more blood loss ($P=0.002$, 0.008). Internal iliac artery ligation was performed on 5 (2.8%) of our patients without any significant change in amount of blood loss. Also, 18 patients (10.2%) underwent laparotomy within the first week following the TAH, due to abnormal bleeding and hematoma. Three (1.69%) patients had DIC postoperatively that one patient deceased as a result of it.

The amount of the administered packed red blood cells were 2.75 ± 2.9 units (0-30), other blood products are summarized in Table 3. The average Hb level before and after TAH was 10.3 ± 2.23 (4.5-13.5) and 11.73 ± 1.36 (6.8-16.5), respectively.

History of previous C/S and number of the curettage had no relationship with placental position ($P=0.677$ and 0.510). Previous C/S, was performed as an elective procedure, without obstetrical indication for 60 (57.7%) of cases and as an emergency procedure with obstetrical indication for 44 (42.3%) patients. Data was not available regarding the previous C/S history for 73 cases due to the lack of accessibility to the previous medical record. Previous sonography of these patients in the second trimester revealed placenta previa in 166 (94.9%) patients 68 (38.9%) cases with anterior extension of more than 2/3 of the placenta, 13 (7.4%) with posterior extension of

more than 2/3 of the placenta and 85 (48.6%) with complete placenta Previa) and PA without previa in 9 (5.1%) patients.

No association found between kind of anesthesia and Apgar score ($P=0.8$) of the infants. There is no relation between amount of blood loss with gestational age

($P=0.7$) and number of C/S ($P=0.4$), gestational age ($P=0.7$), anesthesia ($P=0.2$), and curettage history ($P=0.3$). Maternal variables including age, blood group, gestation age, history of term and preterm pregnancies and history of abortion were not related to the number of required packed red blood cells during TAH ($P=0.773$, 0.757, 0.757, 0.681, 0.911 and 0.827 respectively).

Table 1. Distribution of the age and BMI subgroups

Age		BMI	
Subgroups (years)	percent	Subgroups(Kg/m ²)	percent
20-30	17.5	<25	36.9
30-40	74.6	25-30	46.4
40-50	7.9	>30	16.7
P-value:			
0.665		0.659	

Table 2. History of previous C/S preterm and term history

Nulligravida		5	
Frequency of previous Preterm history	number	Frequency of previous term history	number
1	9	1	63
		2	69
		3	21
2	2	4	5
		5	1
3	1	6	1

Table 3. The amount of the administered blood products

Used Blood Product	Mean \pm Standard deviation	Range
Packed red blood cells	2.75 \pm 2.9	0-30
fresh frozen plasma (FFP)	1.44 \pm 2.44	0-20
platelets	0.5 \pm 1.75	0-11
cryoprecipitate	0.14 \pm 0.82	0-8

Discussion

The incidence of the PA is augmenting globally (2); the incidence has risen up from 0.04% to 0.9 % (3,4,8), highlighting the importance of its fast diagnosis and optimal management. The reported incidence ranges from 1:540 to 1:93000 deliveries; the difference is due to the different definitions (clinical or histopathological), race and studied population and periods in which the study was performed (9,10). The increasing rate of PA could be attributed to the growing number of C/S each year. Our findings indicated that previous history of C/S is the most important risk factor for PA occurrence, which brings

about considerable morbidity and mortality in the following pregnancy. Patients with history of previous C/S should be considered high risk for it, though further diagnostic evaluations are required. Sonography and anomaly scan during the first and second trimester are acceptable tools for determination of the position of the placenta. Observation of complete previa in the aforementioned tools puts more light on the probable occurrence of the PA.

According to O'Brien *et al.* 93% of the PA cases have hemorrhage necessitating delivery, after 35 weeks of gestation (11). On the other hand, because of the abnormal placentation, massive postpartum hemorrhage causes increased risk of maternal mortality and morbidity (12). The time for conservative management of this phenomenon is limited due to a short interval between the diagnoses of the placental accreta/increta/percreta and critical blood loss, therefore hysterectomy is performed directly as the treatment.

Most cases of the PA have no preceding symptoms, therefore the presence of the risk factors could be useful for the early diagnosis of the condition. Mechanical factors (such as history of a local trauma to the uterine), or biological factors (such as abnormal maternal response to trophoblaste invasion) or both of them, could play a role in its pathogenesis (13). History of caesarean section is considered as a great predisposing factor, as it causes uterus scarring (4). A 2-fold increased risk among those with one history of cesarean section and an 8-fold increased risk among those with two or more history of cesarean section, have been reported (3). As the National Institute of Health reported 0.3%, 0.6% and 2.4% of those who have had one, two and three cesarean deliveries, had PA (14). The average number of previous C/S in our study was 2; based on our findings, it could be deduced that patients with 2 previous history of C/S are more prone to develop PA. Our study confirmed the results of the previous studies, demonstrating the C/S as the major risk factor for the occurrence of the PA; besides, elective previous C/S, with no obstetric indication and as a result of mother demand, had greater proportion. This indicates that the scar of the uterus, resulted from the previous C/S disturbed the normal implantation and increased the risk of PA. Other risk factors are progressive vascular endothelial damage, caused by aging (15), abnormal reaction of the decidua in the lower segment (16) and genetic factors (17,18); however, according to our findings, aging did not have association with PA occurrence; similarly, there was no relationship between maternal age and amount of the blood loss. It indicated that the ageing did not aggravate the surgical outcomes. Previous uterine surgery, other than cesarean section, is associated with a higher incidence of PA (12,13,19,20). As opposed to these studies, based on our study, history of D&C did not have association with the PA. The average Hb level before TAH in our patients were 10.3, indicating the fact that most of our patients had been anemic. Therefore, Hb level correction in high risk patients for reaching the hematocrit level above 34% is recommended.

Clinical signs of uterine rupture, including vaginal bleeding, hemodynamic instability, abdominal pain, weakening contractions and fetal heart rate (FHR) abnormalities necessitate the urgent management, as in 2006 Landon *et al.* have emphasized on abdominal pain, FHR and hemodynamic instability (21). The imaging modalities include 2-dimonsional trans-abdominal and transvaginal US, color Doppler US, 3-dimonsional power Doppler, and magnetic resonance imaging (MRI) (22-24); although the definitive diagnosis is by histopathological investigations. Our results indicated that complete placenta previa had been more prevalent finding in the second trimester sonography. It shows that the PA should be anticipated in high risk patients, while observing such findings in sonography. Some studies have performed based on clinical criteria, whereas some others on histopathology (4,25). Since our institution is a tertiary referral center, all the cases with abnormal prior sonography or MRI or high-risk patients for the PA, are referred to our center; therefore, the leading complaint of our cases were abnormal bleeding and pain. The diagnosis was based on the both clinical and histopathological evaluations.

As most of the patients desire to have fertility in future, the management of the PA has become a challenging issue. Cesarean hysterectomy, as recommended by American College of Obstetricians and Gynecologists, is considered as the gold standard and definite treatment (26). Generally, the main indication of the peripartum hysterectomy is severe uterine hemorrhage, uncontrolled by conservative therapies (27). Putting all together, Hysterectomy is known as a radical surgery, decreases the maternal mortality and morbidity caused by PA (28) and was performed for all of our recruited cases, as the definite treatment. Peripartum hysterectomy due to PA accounts for 45% to 73.3% (29). In order to decrease the intraoperative blood loss and transfusion requirements, several alternative therapies have been suggested beside the surgery, such as preoperative placement of internal iliac artery balloon catheters for occlusion and/or arterial embolization (13,30); however, hemostatic interventions in these patients is associated with adverse effects. Thrombosis, ischemia and neurological complications are reported as the adverse effects of radiological balloons, embolization (31). Transverse uterine incision and phan incision of the skin were performed in cases with lower risk factors or in those who insisted on preservation of the future fertility. Interestingly, our study indicated that vertical uterine cut and midline incision of skin resulted in less blood loss; this could be highly useful in choosing the best surgical approach, as it can lead to lower blood loss and consequently lower future morbidities. Moreover, although the difference between the spinal and general

anesthesia was not statistically significant, based on our experience, the spinal anesthesia resulted in better outcome, thus the difference is clinically significant.

Massive blood loss has come up as a substantial challenge, as it is at least double of the amount of routine cesarean section, with a reported range of 2-5 liters and required transfusion of up to 5 units (12,32). Internal iliac artery ligation has been indicated as a method for its management; however, studies showed that it has been useful in 50% of the cases and have had no advantages (33,34), maybe because of considerable collateral blood supply. This procedure had been performed on 5 of our cases without any significant changes in blood loss. Our findings showed maternal age, blood group, gestation age, previous history of D&C, history of term and preterm pregnancies and history of abortion were not related to the amount of blood loss.

Most likely, urinary bladder could be affected by PA (35). Urinary fistula, urethral transection, and bladder laceration requiring partial or total hysterectomy, might have occurred as a result of PA invasion to urinary bladder (35). In this regard, bladder and ureter injuries were happened in 21 of our cases, all of which underwent bladder or ureter repair; also, urinary fistula was noted in 4.5% of the cases in the first year after TAH.

Based on the findings of Smith *et al.* (36) 8 out of 18 studied patients had encountered the post-operative morbidities, including cardiac arrest, (DIC), pulmonary edema, septicemia, and bladder injury. Previous studies have demonstrated the mortality rate of 6-7% in the cases of PA (11,35).

Conclusion

According to our study 3 (1.7%) of the patients had DIC, 21 had urological complains that 18 and 1 needed bladder and ureter repair respectively. The mortality rate was 0.56% (one patient) due to DIC; the leading cause can be attributed to late referral of the patient. It seems that the only mortality case could be prevented in case the patient had referred earlier. Our mortality and morbidity rate is much lower than reported ones, indicating the high-level ability, skill and knowledge of the surgeons.

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Conflict of Interest

Authors declared no conflict of interests.

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