

Clinical analysis of emergency peripartum hysterectomies in a tertiary center

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Summary

Objective: To investigate the incidence, indications, complications, and risk factors associated with increased mortality and morbidity of emergency peripartum hysterectomy (EPH). **Materials and Methods:** The authors retrospectively analyzed 48 cases of EPH performed within six-year interval at Ondokuz Mayıs University Hospital. EPH was defined as the operation performed for life-threatening hemorrhage which could not be controlled with conservative treatment modalities within 24 hours of a delivery. **Results:** The incidence of EPH was 5.03 per 1,000 deliveries. The most common indication for EPH was abnormal placental adherence (n = 22, 45.8%), followed by uterine atony (n = 19, 39.6%). All the patients with placenta accreta had a history of repeat cesarian section (CS) and placenta previa. Total hysterectomy was performed in almost all of the patients (n = 47, 97.9%). All women required blood transfusions. Maternal morbidity was significant, with bladder injury (31.3%) and disseminated intravascular coagulation (18.7%) among the most common complications. There were one maternal (2.1%) and five neonatal deaths (10.4%). **Conclusion:** Since most of the EPH cases are associated with prior cesarean delivery, decision of the first CS should be made for true obstetrical indications. If conservative treatments fail to control massive obstetrical bleeding, blood products and an experienced obstetrician should be ready to perform EPH to decrease the maternal morbidity and mortality.

Key words: Emergency peripartum hysterectomy; Placenta accreta; Uterine atony.

Introduction

Emergency peripartum hysterectomy (EPH) is a life-saving procedure performed as a last resort for controlling massive obstetric hemorrhage when all conventional treatments have failed to achieve hemostasis. EPH is defined as a cesarean hysterectomy or hysterectomy performed within 24 hours of a vaginal or cesarean delivery. The incidence of EPH ranges between 0.2 and 5.4 per 1,000 deliveries [1, 2]. Due to the increasing rates of cesarean delivery and the developing pharmacologic agents to prevent atony, abnormal placentation (placenta accreta and/or placenta previa) has replaced uterine atony as the most common indication for EPH [3].

The aim of this retrospective study was to investigate the incidence, indications, complications, and the risk factors associated with increased morbidity and mortality of EPH in a tertiary center.

Materials and Methods

Between June 2006 and June 2012, 48 cases underwent EPH at Ondokuz Mayıs University Medical Faculty Hospital. Some of these patients were referred to the authors from other clinics due to intractable postpartum hemorrhage. This retrospective clinical study was approved by the local ethics committee of the hospital. Written informed consent was taken from all the patients before the operative procedures.

EPH was defined as a hysterectomy carried out at the time of delivery or within 24 hours of delivery due to life-threatening obstetrical hemorrhage which could not be controlled by conservative treatment modalities, including both medical and surgical interventions such as: fundal or bimanual massage, administration of uterotonic agents (oxytocin, prostaglandin, methylergonovine), use of blood products, curettage of the uterine cavity, ligation of the pelvic vessels (uterine or hypogastric artery). Following cases beyond the definition of EPH were excluded from the study: elective hysterectomies performed for an associated gynecologic condition (one case), women delivering with a gestational age less than 24 weeks (two cases), patients who underwent hysterectomy due to massive late postpartum bleeding (two cases), woman with an uncontrollable postpartum bleeding after myomectomy operation at the time of cesarean section (CS) (one case), patients who underwent EPH at other clinics and referred to the authors for blood product requirement or intensive care unit facilities (three cases).

Data were extracted from peripartum hysterectomy forms filled for these patients based on medical, anesthetic, and surgical records. In these forms; age, gravidity, parity, mode of delivery (vaginal delivery or CS), gestational age, history of previous uterine surgery apart from CS, indication of the current CS, number of previous CSs, history of previous uterine curettage, antepartum hemorrhage during the current pregnancy, presence of labor induction, conservative treatment attempts prior to operation, the last comprehensive ultrasound scan in the third trimester, intraoperative organ sparing surgical attempts (hypogastric artery ligation, uterine artery ligation, compression sutures), indication of hysterectomy, type of hysterectomy (total or subtotal), preoperative and postoperative hemoglobin values, the amount and type of transfused blood products, perioperative complications, duration of surgery, duration of postoperative hospitalization, fetal weight, and maternal and fetal outcomes were noted.

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Table 1. — General characteristics of women with emergency peripartum hysterectomy.

Characteristics	Mean level or frequency
Age (years)	31.9 ± 5.2 (21-41)
Gravidity	3.6 ± 1.4 (1-7)
Parity	2.1 ± 1.1 (0-4)
Gestational age (weeks)	36.4 ± 3.4 (26-40)
Fetal weight (gr)	2907.2 ± 821.3 (730-4470)
Route of delivery (n %)	
Vaginal delivery	7 (14.6%)
Cesarean section	41 (85.4%)
Previous CS (n %)	33 (69%)
Mean number of previous CSs	2.2 ± 0.8 (1-4)
Previous hysterotomy (n %)	1 (2%)
Previous curettage (n %)	9 (18.7%)
Preoperative hemoglobin (g/dl)	8.6 ± 2.8 (3.2-14.1)
Postoperative hemoglobin (g/dl)	8.3 ± 1.7 (5.6-12.2)
Total transfused whole blood (units)	0.5 ± 1.8 (0-8)
Total transfused ES (units)	7.5 ± 4.9 (0-24)
Total transfused FFP (units)	6.8 ± 7.9 (0-31)
Total transfused TS (units)	3.8 ± 8.1 (0-40)
Duration of surgery (minutes)	124.0 ± 44.4 (40-240)
Duration of hospital stay (days)	8.7 ± 5.6 (4-29)
Total hysterectomy (n %)	47 (97.9%)
Hypogastric artery ligation (n %)	25 (52.1%)

Results are expressed as mean ± standard deviation (minimum-maximum) unless specified otherwise.

CS: Cesarean section; ES: Erythrocyte suspension; FFP: Fresh frozen plasma; TS: Thrombocyte suspension.

The operation and pathology reports were used to determine the indication of hysterectomy. Duration of operation were obtained from anesthetic records. Febrile morbidity was defined as a temperature of 38°C measured at least 24 hours after hysterectomy and repeated at least once.

Statistical analyses were performed using Statistics Package for Social Sciences version 16.0. Each continuous variable was tested to check the normality distribution with the Kolmogorov-Smirnov test. All values were expressed mean ± SD unless stated otherwise. For comparison of rates between independent groups Chi-Square or Fisher's Exact test was used. Mann-Whitney-U test or independent samples t test was used for two group comparisons where appropriate. A *p* value < 0.05 was considered statistically significant.

Results

During the six-year study period, a total of 9,535 women delivered at the present hospital; 1,803 (18.9%) of them delivered vaginally and 7,732 (81.1%) by CS. Forty-eight women were identified who underwent EPH, giving a rate of 5.03 per 1,000 deliveries.

The mean age of the patients was 31.9 ± 5.2 years (range; 21-41). The median parity was 2.0 (range 0 - 4), and 91% of women (n = 44) were multiparous. The route of delivery was vaginal in seven patients (14.6%) and CS in 41 patients (85.4%). The mean gestational age was 36.4 ± 3.4 weeks (range 26 - 40) with a mean birth weight of 2,907 ± 821

Table 2. — Indications for emergency peripartum hysterectomy.

Indication	n (%)
Abnormally adherent placenta	22 (45.8)
Uterine atony	19 (39.6)
Abruptio placenta	3 (6.3)
Placenta previa (without accreta)	2 (4.2)
Uterine rupture	1 (2.1)
Cervical laceration	1 (2.1)
Total	48 (100)

Placenta accreta, increta, and percreta were all classified as abnormally adherent placenta.

grams (range 730 - 4,470). Total abdominal hysterectomy was performed in 47 cases (97.9%), whereas only one patient had subtotal hysterectomy (2.1%). The mean duration of surgery was 124.0 ± 44.4 minutes (range 40 - 240). The mean duration of postoperative hospitalization was 8.7 ± 5.6 days (range 4-29) (Table 1).

The indications for current CS were 32 repeat CS (78.1%), two abruptio placenta (4.9%), two fetal distress (4.9%), one breech presentation (2.4%), one placenta previa (2.4%), and three other indications (severe pre-eclampsia, eclampsia, and cephalopelvic disproportion) (7.3%). Twenty-seven patients (56.3%) were delivered at the present hospital, whereas 21 patients (43.7%) were referred to us from other clinics. The most common indication of EPH was abnormally adherent placenta (placenta accreta, increta or percreta) (n = 22, 45.8%), followed by uterine atony (n = 19, 39.6%). Other indications are shown in Table 2. Uterine atony was the most frequent indication (n = 2, 50%) in primiparous, whereas placenta accreta (abnormally adherent placenta) (n = 22, 50.0%) was more common, and only encountered in the multiparous. All the patients with placenta accreta (n = 22, 100%) had a history of repeat CS and placenta previa. Moreover, six of them (27.3%) had either a history of previous curettage or myomectomy operation. Twenty-five women (52.1%) had bilateral hypogastric artery ligation, and the procedure was more often performed in patients with placenta accreta (n = 15, 68.2%) than uterine atony (n = 5, 26.3%) which was statistically significant (*p* = 0.024).

Table 3 shows general characteristics and maternal and fetal outcomes of the present patients (patients delivered at the present center and evaluated at least once antenatally prior to the delivery) and the patients referred to our clinic from other hospitals. The most common indication of EPH was abnormally adherent placenta (74.1%) in the present patients, whereas it was uterine atony (76.2%) in patients referred from other hospitals (*p* < 0.001). The rate of bilateral hypogastric artery ligation, bladder injury, previous CS, and history of antepartum bleeding were significantly higher in our patients (*p* = 0.022, 0.025, 0.022, and 0.001, respectively), however, mean transfused blood products,

Table 3. — Comparison of our patients with the patients referred from other hospitals

	Present patients (n = 27, 56.3%)	Referred patients (n = 21, 43.7%)	p
Age (years)	32.8 ± 4.6	30.7 ± 5.7	0.172
Gravidity	3.7 ± 1.4	3.4 ± 1.4	0.639
Parity	2.2 ± 1.0	2.1 ± 1.1	0.836
Gestational age (weeks)	35.5 ± 3.6	38.2 ± 2.0	0.001
Fetal weight (grams)	2,594.0 ± 753.1	3,429.3 ± 663.0	0.001
Route of delivery (n, %)			0.110
Vaginal	2	5	
CS	25	16	
Previous CS (n, %)	22/27 (81.5%)	10/21 (47.6%)	0.022
Number of previous CSs with a positive history	2.2 ± 0.9	2.1 ± 0.7	0.819
History of antepartum bleeding (n, %)	11/27 (40.7%)	0/21 (0%)	0.001
Indication for EPH			
Abnormally adherent placenta (n, %)	20 (74.1%)	2 (9.5%)	< 0.001
Uterine atony(n, %)	3 (11.1%)	16 (76.2%)	< 0.001
Abruptio placenta (n, %)	2 (7.4%)	1 (4.8%)	
Placenta previa without accreta (n, %)	2 (7.4%)	0	
Uterine rupture (n, %)	0	1 (4.8%)	
Cervical laceration (n, %)	0	1 (4.8%)	
Hemoglobin (g/dl)			
Preoperative	10.6 ± 1.6	6.2 ± 1.7	< 0.001
Postoperative	8.2 ± 1.6	8.4 ± 1.9	0.693
Transfused blood products (units)			
ES	5.7 ± 3.8	9.8 ± 5.3	0.002
FFP	3.9 ± 6.6	10.6 ± 7.9	< 0.001
TS	2.9 ± 8.2	4.9 ± 7.9	0.074
Operation time (minutes)	125.7 ± 48.5	122.2 ± 40.4	0.797
Hospitalization days (days)	9.2 ± 5.5	9.1 ± 3.7	0.500
Ligation of hypogastric artery	18/27 (66.7%)	7/21 (33.3%)	0.022
Bladder injury	12/27 (44.4%)	3/21 (14.3%)	0.025
DIC	2/27 (7.4%)	7/21 (33.3%)	0.022

CS: Cesarean section; EPH: Emergency peripartum hysterectomy; ES: Erythrocyte suspension; FFP: Fresh frozen plasma; TS: Trombocyte suspension; DIC: Disseminated intravascular coagulation.

gestational week, and fetal weight were significantly higher in referral patients ($p = 0.002$, 0.001 , and 0.001 , respectively). Preoperative hemoglobin values were significantly lower and the rate of disseminated intravascular coagulation (DIC) was significantly higher in referral patients ($p < 0.001$; $p = 0.022$, respectively). Demographic parameters, route of delivery, duration of surgery, and postoperative hospitalization were comparable between the groups ($p > 0.05$, Table 3).

Table 4 shows the complications associated with EPH. All women required blood transfusions. The most common operative complication was bladder injury in 15 patients (31.3%). Thirteen of these bladder injuries (86.7%) had occurred in patients with placenta accreta with a statistically significant difference than other indications ($p = 0.001$). Other complications were listed in Table 4. Four patients (6.3%) were re-operated due to ongoing intraperitoneal bleeding. All of these four patients were referred from other hospitals with the diagnosis of atony and three of them had also DIC. There was one maternal death (2%). She was delivered at outside clinic by CS for the indication of previ-

ous CS, and referred to the authors for postpartum atony and intractable bleeding. On admission, she had a hemorrhagic shock and secondary DIC. Although prompt resuscitation and EPH was performed at the present clinic, she died due to hemorrhagic shock and cardiac arrest just after the operation. Also, there were five neonatal deaths (10.4%): three of these cases were due to very preterm delivery and massive antenatal bleeding; one with placenta previa and accreta (26 week), two with abruptio placenta (26 and 29 weeks), fourth one was due to preterm delivery, severe pre-eclampsia, IUGR, and uterine atony (35 weeks) and the last one due to a complete uterine rupture at term.

Discussion

Despite advances in obstetrical care, postpartum hemorrhage continues to be the leading cause of maternal morbidity and mortality worldwide [4, 5]. EPH is usually performed to prevent maternal mortality when all conservative treatments failed to control massive obstetrical bleeding [6]. The overall incidence of EPH varies from 0.2

Table 4. — Complications associated with emergency peripartum hysterectomy.

Complication	n (%)
Blood transfusion	48 (100)
Bladder injury	15 (31.3)
DIC	9 (18.7)
Acute renal insufficiency	6 (12.5)
Febrile morbidity	5 (10.4)
ARDS	4 (8.3)
Re-operation	4 (8.3)
Hematoma of the subcutaneous tissue	3 (6.3)
Pulmonary infection	3 (6.3)
Urinary tract infection	1 (2.1)
Maternal death	1 (2.1)
Neonatal death	5 (10.4)

DIC: disseminated intravascular coagulation;

ARDS: adult respiratory distress syndrome;

Some of the patients have more than one complication.

to 5.4 per 1,000 deliveries, but there are inconsistent rates in different parts of the world, even in different regions of the same country [1, 2, 7, 8]. In the present study, the incidence of EPH was 5.03, whereas it was reported as 0.37 and 5.09 per 1,000 deliveries by another two studies from Turkey [7, 8]. Also, Umezurike *et al.* reported the incidence of EPH as 5.4 per 1,000 deliveries in Nigeria, but it was only 0.2 per 1,000 deliveries in Norway, and 0.8 per 1,000 deliveries in USA [1, 3]. This is attributed to the different definitions of EPH, duration of the studies, the incidence of CS, facilities of the antenatal care, and availability of the contraceptive methods in various populations.

In recent years, placenta accreta has become a more common indication for EPH [9,10]. This is mainly explained by the increasing rates of cesarean deliveries and more successful management of uterine atony with uterotonic agents, embolisation, and surgical procedures as the B-Lynch technique [11]. In the study of Bodelon *et al.*, which was a population-based case-control analysis of 896 peripartum hysterectomies, it was shown that hemorrhage related factors as placenta previa, abruptio placenta, adherent placenta, uterine atony, uterine rupture, vasa previa, and coagulation defects were strongly related to peripartum hysterectomies. For cesarean deliveries, the risk increased as the number of CS increased, with the risk of primary cesarean delivery being more than four times the risk of vaginal delivery [12]. In addition, other studies revealed that a previous cesarean delivery was associated with an increased rate of abnormal placentation (placenta accreta and/or placenta previa) in subsequent pregnancies [13, 14, 15]. In the study of Karayalcin *et al.*, 75.8% of patients with placenta previa and 75% of women with placenta accreta had previously had CSs [12]. In agreement with the recent literature, the authors found that placenta accreta (45.8%) was the most common indication for EPH. Furthermore, all the patients with abnormally adherent placenta (n = 22,

100%) had a history of repeat CS and placenta previa. Although indications of all cesarean deliveries were not shown, since the present hospital served as a last step in the obstetrical care network of the geographical area, the cesarean delivery rate was higher than the average of the country. Moreover, increasing nationwide CS rates led to an increase in the rate of abnormal placentation, which in turn gave rise to the present high rate of EPH compared with the literature [7, 8].

In the present study, 25 women (52%) had bilateral hypogastric artery ligation before proceeding to hysterectomy. In the study of Gayat *et al.*, it was stated that abnormality of placental implantation increased sevenfold the risk of failure of either medical or surgical conservative management in patients with postpartum hemorrhage [16]. In agreement with this study, ligation of hypogastric artery was more often performed and failed in patients with abnormally adherent placenta (n = 15, p = 0.024). In the present series, total hysterectomy was preferred in most of the patients (97.9%) due to the high rate of placenta accreta. Similarly, Karayalcin *et al.* suggested to perform total hysterectomy in placental invasion anomalies instead of subtotal hysterectomy [13]. Due to the fact that subtotal hysterectomy is associated with a decreased risk of visceral injury, blood loss, short operating time, and hospital stay, most of the authors suggest subtotal hysterectomy for hemodynamically unstable patients [13, 14].

The main complications associated with EPH include blood transfusions, urinary tract injury, DIC, need for re-operation, febrile morbidity, and maternal death. In the present series, all women required blood transfusions, similar with the results of Kayabasoglu *et al.* [17]. However, the rate of the bladder injury (31.3%) which was the major operative complication of this study, was relatively high compared with the literature [18,19]. In a systematic review by Rossi *et al.*, the rate of urinary tract injuries was reported as 16% [20]. As previous uterine scarring and abnormally adherent placenta causes distortion of the pelvic anatomy and obliteration of the vesicouterine space, in the present study, most of the bladder injuries occurred in patients with abnormal placentation (13/15, 86.7%). The high rate of the patients with abnormally adherent placenta which in turn contributing to high total hysterectomy rate might have lead to the present high percentage of bladder injury. The maternal mortality rate in the present study was 2%, which was comparable with the results of Awan *et al.*, and Kwee *et al.* [8,9]. However Kwame-Aryee *et al.* and Fatima *et al.* reported a higher incidence of maternal mortality (12.9% and 8.7%, respectively) as the main indication for EPH was uterine rupture in their series [18, 21]. To decrease the operation time and the possible morbidities, the operation should be performed by an experienced obstetrician. However, in the study of Kwee *et al.*, it was shown that a gynaecologist will on average encounter a peripartum hysterectomy once in 11 years. Therefore, the tertiary cen-

ters or university hospitals should arrange post-graduate training courses regularly for at least one obstetrician attending from each hospital.

During the study period, 43.7% (n = 21) of the patients were referred to the present center from other clinics. Zeteroglu *et al.* reported a similar referral rate of 45.8% and all of the maternal deaths were seen in that group. They concluded that the mortality and morbidity of performing EPH was elevated in critical patients referred from other hospitals [7]. Similarly, the only maternal mortality in the present study was seen in a referred patient from other hospitals. In addition, the comparison of the results of the present patients with the referred patients resulted in some positive and negative implications. Firstly, the main indication of EPH in the latter group was uterine atony (76.2%), and it can be speculated that the obstetricians had anticipated the complicated, hemorrhage-related conditions (placenta previa alone or combined with previous cesarean delivery, abnormally adherent placenta, etc.), and consulted them to the tertiary center before the onset of labor. However the bad implication was that preoperative Hb values were significantly lower, and the mean transfused blood products were significantly higher in the referred group ($p < 0.05$). Delay in transport or proper management of postpartum hemorrhage had caused a higher blood loss and DIC rate, increased the need for transfusion, and the maternal morbidity and mortality.

A potential limitation of this study was the relatively small number of the EPH cases and its retrospective nature. However, the authors highlighted the significant complications of the procedure and its relationship with the previous cesarean delivery.

In conclusion, since most of the EPH cases are associated with prior cesarean delivery, the decision of the first CS should be made for valid clinical conditions. Identification of the risk factors, especially abnormal placentation, antenatally can aid in predicting which patients would need hysterectomy, so suitable patients could be referred to a tertiary center before the onset of labor. If an uncontrollable massive obstetrical hemorrhage occurs, obstetricians should apply standard conventional treatments immediately. If these attempts fail to achieve hemostasis, blood products and an experienced obstetrician should be ready to perform EPH to decrease the maternal morbidity and mortality.

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