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Emergency peripartum hysterectomy: Five-year experience in a university hospital

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Ethics Committee Approval
Health Sciences University Bursa Yüksek İhtisas Training and Research Hospital ethics committee approved the study with the decision number 2011-KAEK-25 2021/04-25 on 14.04.2021. All procedures in this study involving human participants were performed in accordance with the 1964 Helsinki Declaration and its later amendments.

Conflict of Interest
No conflict of interest was declared by the authors.

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Abstract

Background/Aim: Postpartum hemorrhage (PPH) is an important cause of maternal death and morbidity worldwide. Its incidence is still increasing in some countries. This study aimed to evaluate the incidence, indications, risk factors, complications, maternal and fetal outcomes, mortality rates and management strategies of emergency peripartum hysterectomy (EPH) in women with life-threatening postpartum hemorrhage.

Methods: This retrospective cohort study included 94 cases of EPH performed at tertiary obstetric center between January 2016-January 2021. The demographic data, current pregnancy and delivery mode, hysterectomy indications, operative complications, postoperative conditions, and maternal and fetal outcomes were analyzed. EPH was performed for hemorrhage which cannot be controlled with other conventional treatments within 24 hours of delivery.

Results: The incidence of EPH was 1.71 per 1000 deliveries. In our study, the indications of hysterectomy were placenta previa in 47 cases (50%), placental insertion anomalies in 23 cases (24.5%), uterine atony in 22 cases (23.4%), and uterine rupture in 2 cases (2.1%). Hysterectomy was performed after vaginal delivery in 7 patients (7.4%) and during cesarean section in 87 cases (92.6%). Total and subtotal hysterectomy were performed in 88 (93.6%) and 6 cases (6.4%), respectively. Major complications occurred in 40 patients (42.6%). In total, 97.9% of the patients required a transfusion of blood and blood products. The mean postoperative hospital stay was 8.1 (6.1) days. There were two (2.2 %) maternal deaths due to pulmonary embolism and coagulopathy.

Conclusion: EPH operation has high maternal morbidity and mortality but is lifesaving when performed at the appropriate time. The most common indication for EPH was placental abnormality (74.5%), followed by uterine atony (23.4%). Together with a significant increase in cesarean rates, significant increases in the frequency of placental abnormalities are remarkable. Limiting the number of cesarean deliveries will have a significant impact on reducing the risk of EPH.

Keywords: Emergency peripartum hysterectomy, Placenta previa, Abnormal placentation, Uterine atony, Obstetric hemorrhage

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Introduction

Emergency peripartum hysterectomy (EPH) is a life-saving operation, performed as a last-line treatment in massive obstetric hemorrhage that does not respond to any conservative interventions within 24 hours of delivery. Hysterectomy was used only in emergencies in the 1950s, and in later years, it was also used as a sterilization method and prophylaxis in malignant diseases. The first cesarean hysterectomy was performed by Storer in 1966, but the patient died in the early postoperative period. The first known successful surgery was performed by Edward Porro in 1876 to prevent maternal death from obstetric hemorrhage and peritonitis [1].

The reported worldwide incidence of EPH ranges from 0.20 to 5.09 per 1000 deliveries. These rates may differ regionally and nationwide [2, 3]. The risk factors for peripartum hysterectomy (PH) include high parity, advanced maternal age, prolonged delivery, abnormal placentation and a history of one or more cesarean sections [4, 5]. The indications for PH may have changed in recent years, as there has been an increase in EPH rates due to high cesarean rates all over the world [6].

This retrospective study aimed to examine the incidence, indications, risk factors, complications, and maternal and fetal prognosis of patients who underwent EPH and to present our experience in the management of these cases.

Materials and methods

We retrospectively analyzed 94 EPH operations performed between January 2016 and January 2021 at Bursa Yüksek İhtisas Training and Research Hospital, Obstetrics and Gynecology Department. Health Sciences University Bursa Yüksek İhtisas Training and Research Hospital ethics committee approved this study with the decision number 2011-KAEK-25 2021/04-25 on 14.04.2021.

Maternal characteristics such as age, gravidity, parity, body mass index, gestational age and a history of previous cesarean section were recorded. The mode of delivery, incidence, indication and type of hysterectomy, peri-operative or post-operative complications, additional surgical procedures, need for transfusions, post-operative hospitalization days, maternal and fetal outcomes and mortality rate of the patients were noted. A gestational age of less than 24 weeks at delivery was the only exclusion criterion.

EPH was performed in case of massive vaginal bleeding that could not be stopped with other medical (uterotonic agents such as oxytocin, methergine and misoprostol) or conservative surgical (curettage, uterine tamponade (Bacri balloon) etc.) treatments within 24 hours of delivery. The operations were performed by the experienced surgeons of our clinic. Both operative notes and pathology reports were used to determine the precise indication for the procedure. The number of erythrocyte suspension and fresh frozen plasma units delivered during hospitalization were recorded.

Statistical analysis

Statistical analyses were performed with the Windows-based SPSS 24.0 statistical analysis program (SPSS Inc., USA). To determine whether the data were normally distributed, the variables were examined via visual (histograms, probability plots) and analytical methods (Shapiro-Wilk's test and Kolmogorov-Smirnov tests). Variables were descriptively specified as mean (standard deviation), median (min-max), frequency (n) and percentage (%).

Results

This retrospective study reviewed 54.897 deliveries at Bursa Yüksek İhtisas Training and Research Hospital over a 5-year period (2016-2021). Of these, 31.164 (57%) were delivered vaginally and 23.733 (43%) by cesarean section. The overall incidence of EPH was 1.71 per 1.000 deliveries. In our series, seven hysterectomies were performed after vaginal delivery (0.22/1.000 vaginal deliveries) and the remaining 87 hysterectomies were performed after cesarean section (0.36/1,000 cesarean sections). Of these 87 patients, 6 had given only one and 81 had given two or more previous cesarean deliveries.

The demographic and obstetric characteristics of the patients are shown in Table 1. The mean age of the patients was 35.57 (5.3) years. The median gestational age was 35 weeks (24-41 weeks) with a mean birth weight of 2627 (784) grams. The clinical condition of the newborns was good in all cases.

Table 1: Demographic and obstetric characteristics of the patients

Characteristics (n=94)	Mean (standard deviation) Median (Minimum – maximum)
Age (years)	35.57 (5.3)
Gravidity	3.5 (1.0-14.0)
Parity	2.0 (0.0-10.0)
BMI (kg/m^2)	26 (4.2)
Gestational age (weeks, n %)	<35w n=33 (35%)
	35-37w n= 37 (39.4%)
	>37w: n=24 (25.6%)
Mode of delivery (n %)	Vaginal: 7 (7.4%)
	Previous C/S: 6 (6.4%)
	Repeat C/S: 81 (86.2%)
Birth weight (g)	2627 (784)
APGAR 1st min.	7.5 (0.0-9.0)
APGAR 5th min.	8.5 (0-10)
Fetal gender (n, %)	Male n=51 (54.3%)
	Female n=43 (45.7%)

g: grams, kg: kilograms, min: minute, n: frequency, %: percentage. Descriptive analyses were presented using mean (SD) and median (min-max) for normally and non-normally distributed data, respectively

Analysis of indications for emergency hysterectomy, operation types and conditions are detailed in Table 2. Most cases (58.5%) were operated under emergency conditions and general anesthesia. The most common indication for hysterectomy was placental abnormality (74.5%) followed by uterine atony (23.4%) and uterine rupture (2.1%). In this study, all patients (n=23) with placental insertion abnormality and 42 of 47 patients (89.4%) with placenta previa had a history of previous cesarean section.

Table 2: Analysis of indications for emergency hysterectomy, operation types and conditions

Characteristics (n=94)	
Operation condition (n,%)	Elective: n=39 (41.5%)
	Emergency: n=55 (58.5%)
Operation types (n.%)	Total hysterectomy: n=88 (93.6%)
	Subtotal hysterectomy: n=6 (6.4%)
Indications (n,%)	Placenta previa: n=47 (50%)
	Placenta insertion abnormality n=23 (24.5%)
	Uterine atony: n=22 (23.4%)
	Uterine rupture: n=2 (2.1%)
Hypogastric artery ligation (n,%)	n=26 (27.7%)
Blood and blood products transfusion (n,%)	n=92 (97.7%)
Red cell transfusion (units) (n,%)	<2U: n=10 (10.6%)
	2-6U: n=70 (74.5%)
	>7U: n=14 (14.9%)

n: frequency, %: percentage. Descriptive analyses were presented using n and % for categorically distributed variables.

Table 3 defines the complete blood count characteristics of the patients and the quantity of blood and blood products transfused. In total, 97.9% of the patients required blood and

blood product transfusions. The mean unit of erythrocytes transfused to the patients was 5.1 (4.1). Only two patients did not need erythrocyte transfusion. Also, fresh frozen plasma (FFP) replacement was performed in 78 (83%) patients and 19 (22.3%) patients were given thrombocyte suspension. While fibrinogen treatment was not required in 76 patients, we administered 2 grams to 9 patients, 1 gram to 6 patients, and 6 grams to 1 patient. We observed that thrombocytes were not generally given to the patients (n=88).

Table 3: Table of hemoglobin and hematocrit characteristics of the patients, quantity of blood and blood products transfused

Characteristics (n=94)	Mean (standard deviation) Median (Minimum – maximum)
Erythrocyte transfusion (units)	4.0 (0.0-9.0)
Fresh frozen plasma transfusion (units)	2.0 (0.0-10.0)
Platelet transfusion (units)	0.0 (0.0-8.0)
Fibrinogen transfusion (units)	0.0 (0.0-6.0)
Preop. hemoglobin (g/dL)	10.89 (1.5)
Preop. hematocrit (%)	32.99 (4.0)
Postop. hemoglobin (g/dL)	9.15 (1.7)
Postop. hematocrit (%)	28.13 (5.2)

n: frequency, %: percentage, SD: standard deviation, min: minimum, max: maximum preop: Preoperative, postop: postoperative. Descriptive analyses were presented using mean (SD) and median (min-max) for normally and non-normally distributed data, respectively.

Table 4 shows the intra- and postoperative conditions, postoperative intensive care unit needs, complications, and mortality rate. Twenty-one patients were followed in the intensive care unit for a certain period, 5 patients were followed for 2 days, and 7 patients were followed for 3 days. One of the patients was followed up in the intensive care unit for 36 days and one for 22 days. Forty patients (42.6%) suffered major complications. In 12 cases (12.7%), a relaparotomy was performed. Seventy-three patients needed intensive care follow-up (77.7%). There were two (2.2 %) maternal deaths due to pulmonary embolism and coagulopathy.

Table 4: Intra and postoperative characteristics, complications, and mortality rate

Characteristics (n=94)	Mean (standard deviation) Median (Minimum – maximum)
Intensive care unit (ICU) admission	n=21 (22.3%)
ICU stay (days)	0.0 (0.0-36.0)
Postoperative hospitalization days	6 (3-120)
Mortality	n=2 (2.2%)
Complication rate	n=40 (42.6%)
Complications	Urinary injury: n=20 (21.3%) Ureter injury: n=4 (4.3%) Bladder injury: n=16 (17%) Bladder+ ureter injury: n=2 (2.1%) Intestinal injury: n=1 (1.1%) Re-laparotomy: n=12 (12.7%) DIC: n=4 (4.3%) Hematoma: n=3 (3.2%)

n: frequency, %: percentage, SD: standard deviation, min: minimum, max: maximum Descriptive analyses were presented using mean (SD) and median (min-max) for normally and non-normally distributed data, respectively.

Discussion

EPH is a life-saving surgery performed as a last resort in the treatment of massive obstetric hemorrhage. The incidence of EPH is reported between 0.20 and 5.09 per 1.000 deliveries worldwide. The median incidence was 0.61 per 1000 deliveries [7]. These rates may differ regionally and nationwide [5, 8]. The incidence of EPH in our country varies according to the regions. Akar et al. [9] reported this rate as 0.26/1000 when the population of the Middle Anatolia region was included. Zeteroğlu et al. [3] found this rate to be 5.09/1000 in Eastern Anatolia. These differences can be explained by the environmental and socioeconomic characteristics of different populations [10]. Our incidence was 1.17 per 1000 deliveries, consistent with the literature. Our hospital, located in West Anatolia, is a referral, tertiary care center with approximately 10.000 deliveries performed per year. Most patients (62.8%) were referred from other hospitals. If the patients had undergone routine antenatal follow-up, preventive measures could have been taken to reduce the rate of EPH.

In the past years, uterine atony was reported as the most common indication for a hysterectomy. Recent studies have shown that abnormal placentation replaced uterine atony as the most common indication for EPH [11]. This should be due to higher cesarean delivery rates and the development of conservative treatments for uterine atony [12]. Between 1985-1989, Zorlu et al. [13] reported that the incidence of EPH for placenta abnormality increased from 25.6% to 41.7% and the incidence of EPH due to uterine atony decreased from 41.9% to 29.2%. In 1984, Clark et al. [14] reported that the most common reason of EPH was uterine atony (43.4%). A study from the same institution in 1993 stated that their primary indication was placenta accreta (45%) followed by uterine atony (20%). Similarly, the indication rates of placental abnormality were reported as 46%, 42.4% and 47% by Kayabaşoğlu et al. [15] , Karayalçın et al. [16] and, Kwee et al. [17], respectively. Our findings also agreed with all these results. In this study, the most common placental abnormality was placenta previa (50%), which may be due to the high number of patients with previous cesarean section (92.6%). Current data show that placenta previa is a significant risk factor that increases the rate of post-cesarean hysterectomy [4, 7, 18]. Previous cesarean section and placenta previa are the main risk factors for the development of placental insertion anomaly, especially if both are combined.

Cesarean section became the most preferred surgical procedure in obstetrics at the end of the 20th century. High cesarean rates ranging from 23% to 60% in the literature, and the presence of uterine scarring are the most important reasons for the increased incidence of placental abnormalities [19, 20]. Therefore, cesarean delivery is strongly associated with emergency peripartum hysterectomy. Recently, Cara et al. [7], and Lone et al. [21] identified previous cesarean delivery as a risk factor associated with placental abnormality. According to our findings, 92.6% of our patients had a history of at least one cesarean section (n: 86/94). This ratio seems to be higher than the previous studies from Turkey [22, 23]. Cesarean delivery itself is also a risk factor for EPH. It is known that this risk increases with each additional cesarean section [7]. In this study, 81 of 94 patients (86.2%) had undergone two or more previous cesarean sections. The incidences of PH in the vaginal and cesarean delivery groups were 0.22 and 0.36 in 1000 deliveries, respectively. The risk of EPH increased approximately 13 times in our cases with previous cesarean section. Selo-Ojeme et al. [24] and Kwee et al. [17] found a roughly 10-fold increase in EPH after cesarean section. Every effort should be made to reduce the cesarean delivery rate by performing this operation only under essential clinical indications.

Subtotal hysterectomy rate was reported as 36% by Kayabasoğlu et al. [15] and 75% by Zeteroğlu et al [3]. Our subtotal hysterectomy rate was lower than these studies. We preferred total hysterectomy because of placenta previa in most our cases. In the case of uterine atony, subtotal hysterectomy may be safer and faster. However, it is not suitable for bleeding from the lower uterine segment associated with placenta previa

and/or accreta. Engelson et al. [2] preferred total hysterectomy if the patient is hemodynamically stable, especially in the presence of uterine atony or a low-implanted placenta. Clark et al. [14] suggested a total hysterectomy instead of a subtotal hysterectomy in placental invasion pathologies. In the literature, total hysterectomy was recommended instead of subtotal hysterectomy to prevent bleeding from the cervical branch of the uterine artery. In our opinion, the decision of subtotal or total hysterectomy should be individualized according to the patient's condition. Total hysterectomy is a more appropriate procedure in emergency situations, but subtotal hysterectomy may be a better choice in some cases where the surgery needs to be completed in a shorter time.

EPH is associated with excessive blood loss and the need for transfusion. Zeteroglu et al. [3] and Kayabasoglu et al. [15] reported the incidence of blood transfusion as 100%. In our study, 97.6% (n:92/94) of cases required blood transfusion. The mean amount of erythrocyte suspensions transfused to the patients was 5.1 (4.1) units. This finding is similar with recent reports. To achieve optimal outcomes, cases with risk factors for PH should be identified and transferred to appropriate tertiary centers with blood transfusion units.

EPH is associated with high rates of maternal morbidity and mortality. In our study, postoperative maternal morbidity was 42.6%. Karayalcin et al. [16] and Kayabaşoğlu et al. [15] reported postoperative complication rates of 31.5% and 54%, respectively. Al-Jallad et al. [25] reported complications in 44% of 61 PH cases. Our results confirm previous observations. Urinary complications were the most common (21.3%) complication in this study group. Bladder injury was found at a rate of 17%. The rate of bladder injury was 13% in the study of Yucel et al. [10], and 18% in that of Habek et al. [26]. In our study, 75% (n:12/16) of patients with bladder injury had a history of previous cesarean section. This is associated with secondary adhesions in the vesico-uterine space due to previous cesarean section operations. Only one case had bowel injury due to intense intra-abdominal adhesions (1.1%). Re-laparotomy was performed in 12 cases (12.7%). Zeteroglu et al. [3], and Kwee et al. [17] reported the rates of relaparotomy as 13% and 25%, respectively. There were two maternal deaths (2.2%). One was due to consumptive coagulopathy, and she was referred from another hospital. The other one was because of a pulmonary embolism. In the literature, rates of maternal mortality range from 0 to 16.7% [7].

The most common cause of maternal death is peripartum uterine hemorrhage, which is responsible for 27.1% of all maternal deaths in the world [27, 28]. Since this condition is preventable, early diagnosis and effective treatment are essential. Risk factors for peripartum hysterectomy must be determined antenatally. It should be noted that the probability of EPH is very high in cases of placenta previa and/or placenta accreta with previous cesarean sections. The operation should be performed under appropriate clinical settings by experienced surgeons when these risk factors are identified.

A potential limitation of this study is the retrospective design, which likely introduces some degrees of bias. The other limitation was the series' relatively small sample size. In our opinion, prospective case-control studies with larger number of patients are needed to clarify this issue.

Conclusion

Placental invasion abnormalities were the most common indication for EPH. Uterine atony and uterine rupture were identified as other risk factors and the obstetrician should bear in mind that PH may be required. Emergency postpartum hysterectomy is an intervention that requires rapid evaluation to reduce maternal morbidity and mortality. Timely recognition of the need for emergency hysterectomy in high-risk patient groups and poor prognostic deliveries will help improve the maternal outcomes of pregnancy.

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