

Evaluation of Peripartum Hysterectomy; Ten Years of Experience of a Tertiary Center

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ABSTRACT

The objective of this study is to assess the 10-year incidence of peripartum hysterectomy that was performed in the province of Van, Turkey, as well as its clinical results.

In this study, we retrospectively examined all patients who underwent peripartum hysterectomy, which was performed at Van Yuzuncu Yil University Dursun Odabas Medical Center between 2010 and 2020. 99 patients who underwent hysterectomy due to severe bleeding, which could not be stopped despite conservative treatments within 24 hours following the delivery, were included in the study.

The overall rate of peripartum hysterectomy was 99 of 22242 or 4.4 per 1,000 deliveries. The mean maternal age was 31.98 ± 5.41 years. The most common indications for peripartum hysterectomy are placental adhesion disorders (70.7%), uterine atony (25.2%), and uterine rupture (4%).

Ultimately, the most common indication for peripartum hysterectomy is placental adhesion disorders. The rise in the number of cesarean section might have increased the incidence of placental adhesion disorders. Thus, patients should be provided with healthcare in centers that have adequate equipment and staff.

Key Words: Peripartum hysterectomy, maternal medicine, porpartum hemorrhage

Introduction

Peripartum hysterectomy can be described as the hysterectomy that is performed during delivery or within 24 hours after delivery. Peripartum hysterectomy is one of the most challenging operations in obstetrics and is typically performed in the event of life-threatening bleeding when the bleeding cannot be controlled despite all conservative measures (1); however, since it is an unscheduled and rapidly performed procedure, it ends up with maternal morbidity and it has a risk of death ranging between 1% and 6% (2, 3). If the vital signs of the patient are below a critical level due to acute blood loss, there is no any other alternative option but peripartum hysterectomy, and delaying intervention can be fatal for the patient. In addition to abnormal placentation, other important risk factors for peripartum hysterectomy include advanced maternal age and parity, multiple pregnancies, antepartum hemorrhage, preeclampsia, bleeding disorders, and the use of assisted reproductive technologies (4). While in the past, the most common indications for peripartum hysterectomy were uterine atony

and uterine rupture, in recent reports, abnormal placentation is the most common cause of hysterectomy, and advanced maternal age as well as cesarean delivery are the most remarkable risk factors for it (5). Patients with risk factors or a previous history of postpartum hemorrhage should give birth in a setting where a hysterectomy can be performed if necessary. Although EPH is sometimes an inevitable technique to prevent maternal mortality, it is very crucial for clinicians to find out the risks it brings.

In this study, we examined patients who underwent peripartum hysterectomy, which was performed in our clinic for a period of 10 years. We examined potential changes in our clinic over the years, and in order to discuss the place of postpartum hysterectomy in modern obstetric practice, we compared the results with other reports that have been revealed all around the world. Our objective is to make a contribution to the literature by examining the incidence, indications, demographic and clinical details related to the cases of peripartum hysterectomy, which were conducted in a university hospital

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Received: 15.12.2020, Accepted: 30.12.2020

located in the Eastern Anatolian Region of Turkey.

Material and Methods

This study was performed by examining retrospectively the obstetric and anesthesia patient files of 99 peripartum hysterectomies, which were performed in the Department of Obstetrics and Gynecology at Van Yuzuncu Yil University between 2010 and 2020. Peripartum hysterectomy was identified as hysterectomy, which is performed due to severe hemorrhage that could not be stopped despite the conservative treatments within 24 hours after delivery. Patients who underwent peripartum hysterectomy who did not respond adequately to more conservative treatment approaches, including both medical and surgical interventions such as fundal massage, bimanual uterine compression, administration of blood products and fluid replacements, administration of uterotonics and prostaglandins, curettage of the placental bed, application of uterine balloon tamponade, suturing the placental bed and hypogastric artery ligation were included in the study. Peripartum hysterectomies, which were performed for cancer and other medical indications, or peripartum hysterectomies, which were performed after deliveries and abortions before 24 weeks of gestation, were excluded from the study.

Maternal characteristics such as age, gravida, parity, gestational age, previous cesarean delivery, and type of delivery were recorded. The data related to the indications for surgery, the durations to make the hysterectomy decision, the types of hysterectomy, additional procedures, the duration of the operation, complications during and after the procedure, blood loss, need for blood transfusion, intraoperative-postoperative morbidity, and durations for postoperative intensive care unit and hospital stays were obtained.

Statistical analysis: Whether the data in the study were normally distributed or not was checked with Kolmogorov-Smirnov ($n > 50$) and Skewness-Kurtosis tests, and parametric tests were applied because of the measurements were normally distributed. Descriptive statistics such as average, standard deviation, minimum and maximum values was used for continuous variables, and number and percentage were given for categorical variables. Independent sample T-test and One-Way Analysis of Variance (ANOVA) were used to compare group means in terms of

continuous variables. Percentages were compared with the χ^2 -test. The statistical significance level was taken as 0.05 in the analysis and the SPSS (IBM SPSS for Windows, ver.23) statistics package program was used for data analysis.

Results

There were 22,242 deliveries during the study period that included 99 cases of PH (4.4/1000 deliveries) (Table 1). Only 12 patients (12.1%) did not have a history of previous cesarian. 87 patients (87.9%) had a history of previous cesarian and out of these, 70% (61 of 87 patients) had ≥ 2 cesareans. While 92 patients (92.9%) did not have previous curettage, seven (7.1%) had previous curettage. Only one patient had twins (7.1%). As related to mode of delivery, 39 patients had elective cesarean section (39.4%), 52 patients had emergent cesarean section (52.5%), and 8 patients had vaginal delivery (8.1%). Also, 79 cases had placenta previa (79.8%) and 20 cases did not have placenta previa (20.2%). While 77 patients (77.8%) had phanestiel scar, 22 patients (22.2%) had median scar. While 27 patients had subtotal hysterectomy operation (27.3%), 72 cases had been total hysterectomy (72.7%) operation. Ninety-four (94) cases (94.9%) did not have re-exploration and only five cases (5.1%) had re-exploration (Table 1). There were five maternal deaths in this cohort.

Some characteristics of patients were shown on table 2. The mean of maternal age was 31.98 ± 5.41 years. The mean of parity was 4.05 ± 1.62 . The mean of gestational age was 35.98 ± 1.88 weeks (range 31–40 weeks). The mean of previous cesarean section was 2.21 ± 1.36 . The mean of time of delivery to time of hysterectomy was 70.81 ± 175.71 (Min). While the mean of blood transfusions (units) was 4.77 ± 3.51 , the mean of fresh frozen plasma (units) was 3.20 ± 3.22 , the mean of platelet transfusions (units) was $.65 \pm 1.56$, and the mean of fibrinogen transfusion (units) was $.43 \pm 1.04$. The mean of postoperative intensive care unit days was 1.73 ± 1.83 . The mean of postoperative hospitalization days was 6.89 ± 5.33 .

The indications for peripartum hysterectomy in all patients were morbidly adherent placenta ($n=70$; 70.7%), uterine atony ($n=25$; 25.3%) and uterine rupture ($n=4$; 4%) (Table 3).

When the histology for peripartum hysterectomy was examined (Table 4), normal histology was 28 (28.3%), placenta accreta was 2 (2.0%), placenta increta was 17 (17.2%), placenta percreta was

Table 1. Peripartum hysterectomy incidence and characteristics

	Prevalence (n) (%)
Peripartum hysterectomy	99 (4.4/1000)
Previous cesarian	87(%87.9)
Previous cesarian >2	61/87 (%70)
Elective cesarian	39 (%39.4)
Emergent cesarian	52 (%52.5)
No history of cesarean section	12 (%12.1)
Vaginal delivery	8 (%8.1)
Placenta previa	79 (%79.8)
No placenta previa	20 (%20.2)
Phanestiel scar	77 (%77.8)
Median scar	22 (%22.2)
Total hysterectomy	72 (%72.7)
Subtotal hysterectomy	27 (%27.3)
No re-exploration	94 (%94.9)
Re-exploration	5 (%5.1)

Table 2. Demographic and clinical characteristics of women with peripartum hysterectomy

Characteristics	Mean	Std. Dev.	Min.	Max.
Age (years)	31.98	5.41	18.00	47.00
Parity	4.05	1.62	1.00	12.00
Gestational age (weeks)	35.98	1.88	31.00	40.00
Previous cesarean section	2.21	1.36	.00	6.00
Time of delivery to time of hysterectomy (Min)	70.81	175.71	10.00	1360.00
Blood transfusions (units)	4.77	3.51	.00	18.00
Fresh frozen plasma transfusions (units)	3.20	3.22	.00	17.00
Platelet transfusions (units)	.65	1.56	.00	7.00
Fibrinogen transfusions (units)	.43	1.04	.00	6.00
Postoperative intensive care unit days	1.73	1.83	.00	10.00
Postoperative hospitalization days	6.89	5.33	1.00	30.00

Table 3. Indications for peripartum hysterectomy

Indications	N	%
Morbidly adherent placenta	70	70.7
Uterine atony	25	25.2
Uterine rupture	4	4.0

n=49 (49.5%), uterine adenomyosis was 1 (1.0%), and uterine fibroids was 2 (2.0%).

There were three (3.0%) primiparous, 69 (69.7%) multiparous (parity 2-4) and 27 (27.3%) grandmultiparous (parity \geq 5) patients. However, only multiparous and grandmultiparous were compared in Table 5. Grandmultiparous patients' age and parity means were statistically significantly higher than multiparous patients' age and parity means. Morbidly adherent placenta was the most

common indication in both multiparous 49 (71.0%) and grandmultiparous 21 (77.8%) women. Also, there was no significant difference between multiparous and grandmultiparous patients' indications. As related to preoperative and postoperative platelets, there was no significant difference between multiparous and grandmultiparous patients. As related to transfusion of blood, fresh frozen plasma, platelet, fibrinogen, there was no significant difference

Table 4. Histology for peripartum hysterectomy

	N	%	
Uterus histology	Normal histology	28	28.3
	Placenta accrete	2	2.0
	Placenta increta	17	17.2
	Placenta percreta	49	49.5
	Uterine adenomyosis	1	1.0
	Uterine fibroids	2	2.0
Total	99	100	

Table 5. Comparison of multiparous and grandmultiparous women

	Multiparous 69 (69.7%)	Grandmultiparous 27 (27.3%)	P-value
Age (year) ^a	31.01± 5.10	35.33± 4.28	0.000
Parity ^a	3.47±.90	5.85±1.58	0.000
Gestational age (weeks) ^a	35.97±1.97	36.04±1.67	0.878
Indication			
Morbidly adherent placenta	49 (71.0%)	21 (77.8%)	
Uterine atony	17 (24.7%)	6 (22.2%)	0.244
Uterine rupture	3 (4.3%)	0 (0.0%)	
Preoperative Platelet (103/uL) ^a	193.87±68.78	195.48±48.28	0.912
Postoperative Platelet (103/uL) ^a	143.67±56.72	155.93±51.81	0.332
Blood transfusions (units) ^a	4.93±3.15	3.93±3.59	0.182
Fresh frozen plasma transfusions (units) ^a	3.36±3.08	2.41±2.42	0.152
Platelet transfusions (units) ^a	0.65±1.46	0.41±1.39	0.457
Fibrinogen transfusions (units) ^a	0.46±1.13	0.33±0.78	0.585
Hospitalization days ^a	7.16±5.34	6.26±5.50	0.464
Postoperative intensive care unit days ^a	1.77±1.89	1.26±1.22	0.509

^a Mean±standard deviation

between multiparous and grandmultiparous patients. Also, there was no significant difference between multiparous and grandmultiparous patients' hospitalization days and postoperative intensive care unit days.

There were statistically differences in patients' delivery mode based on their ages, gestational ages (weeks), pre and postoperative hemoglobine, blood transfusions (units), fresh frozen plasma (units), and platelet transfusions (units). Elective CS' age mean was statistically significantly higher than emergent CS' and vaginal delivery' age means. Vaginal delivery' gestational age was statistically significantly higher than emergent CS' and elective CS' gestational ages. Additionally, emergent CS' gestational age was statistically significantly lower than elective CS' and vaginal delivery' gestational ages. Elective CS' pre and postoperative hemoglobine values were

statistically significantly higher than emergent CS' and vaginal delivery' pre and postoperative hemoglobine values. Also, Elective CS' need of the transfusion of blood, fresh frozen plasma and platelet were statistically significantly lower than emergent CS' and vaginal delivery' need of the transfusion of blood, fresh frozen plasma and platelet. There were not statistically differences based on their parity, pre and pastoperative platelet, fibrinogen transfusion (units), hospitalization days and postoperative intensive care unit days (Table 6).

Seventy-two patients had total hysterectomy and in twenty-seven cases, subtotal hysterectomy was performed. There was no statistically significant difference in characteristics of patients based on the total hysterectomy and subtotal hysterectomy subgroups (Table 7).

Table 6. Comparison of patients based on mode of delivery

	Emergent CS (N=52)	Elective CS (N= 39)	Vaginal delivery (N = 8)	P-value
Age (year)	31.21±5.20b	33.54±5.39a-c	29.38±5.34b	0.045
Parity	3.78±1.30	4.43±1.99	3.87±1.24	0.163
Gestational age (weeks)	35.17±1.68b-c	36.38±1.36a-c	39.25±0.70a-b	0.000
Hemoglobin (g/dl)				
Preoperative Hemoglobine	10.98±2.27 c	11.66±1.69 c	9.00±1.96 a-b	0.004
Postoperative Hemoglobine	9.45±1.63	10.01±1.57 c	8.36±1.42 b	0.025
Preoperative Platelet (103/uL)a	195.73±78.26	192.95±54.86	172.63±47.05	0.670
Postoperative Platelet (103/uL)a	150.69±59.59	145.69±52.08	114.13±28.60	0.221
Blood transfusions (units)	4.96±3.30 c	3.90±3.11 c	7.75±5.09 a-b	0.014
Fresh frozen plasma transfusions (units)	3.42±3.27 c	2.31±2.76 c	6.13±3.27 a-b	0.006
Platelet transfusions (units)	.62±1.37 c	.36±1.36 c	2.25±2.60 a-b	0.006
Fibrinogen transfusions (units)	.42±1.17	.31±.61	1.13±1.55	0.129
Hospitalization days	1.26±0.44	1.10±0.30	1.37±0.51	0.080
Postoperative intensive care unit days	2.02±2.14	1.31±1.45	1.88±0.64	0.183

Differences between groups: a-Emergent CS, b-Elective CS, c-Vaginal delivery

More than half of patients (60%) did not have any intraoperative complications. The intraoperative complications in patients were bladder injury (n=29; 29.3%), ureter injury (n=3; 3.0%), pulmonary edema (n=1; 1%), vena cava inferior injury (n=1; 1%), hypogastric vena injury (n=1; 1%) and cardiac arrest (n=4; 4%). The number of patients who stayed at the hospital more than 7 days after operation was 21. There were only five re-exploration cases. The postoperative complications in patients were acute respiratory distress syndrome (n=2; 2%), acute renal failure (n=2; 2%), disseminated intravascular coagulation (n=5; 5%), ileus (n=1; 1%), deep vein thrombosis (n=1; 1%), wound Infection (n=12; 1%), multiple organ deficiency (n=1; 1%), hematoma (n=1; 1%), cerebral infarction (n=1; 1%). There was not post-operative morbidity in the most of patients (83.8%). There were five maternal deaths and four intrauterine deaths (Table 8).

Discussion

The most common causes of maternal deaths in Turkey are postpartum hemorrhage and maternal cardiovascular diseases (6). Whereas in countries where health care organizations are better equipped and well established, maternal health disorders are increasingly gaining importance, in Turkey, obstetric complications is still the primary cause of maternal mortality (7). In addition to other measures, medications such as misoprostol and uterine tamponade significantly reduced maternal mortality due to postpartum hemorrhage

throughout the active treatment of the third stage of labor. Peripartum hysterectomy is a life-saving surgery, which is performed on a woman with persistent obstetric hemorrhage. However, considering only maternal deaths after WHO underscores the concept of “near miss” is actually just like seeing the tip of the iceberg (8). Pregnant women who underwent peripartum hysterectomy but not timely and properly could be considered dead. Hence, the decision for hysterectomy should not be delayed.

In our study, the incidence of peripartum hysterectomy was 4.4 per 1000 deliveries, and this is in the range of incidences that have been revealed as 0.1 and 6.9 per 1000 deliveries in the literature (9, 10). The incidence of peripartum hysterectomy was reported to be 5.09 per 1000 deliveries in a study, which was performed in our clinic 15 years ago (11). The authors stated that, excluding referrals from other hospitals, the rate was 2.75 per 1,000 deliveries (11). Over the years the incidence of peripartum hysterectomy has increased substantially from 2.75% to 4.4%. This situation can be explained by the changing indications of peripartum hysterectomies that have been performed in our clinic and the increasing number of deliveries, as well as the fact that our clinic has become the main referral center for the surrounding district and provinces in the last 10 years and upon the diagnosis of placental adhesion disorder in the antenatal period, patients are referred to our clinic for elective surgery or upon having complications.

Table 7. Comparison of total abdominal and subtotal peripartum hysterectomies

	Total hysterectomy 72 (72.7%)	Subtotal hysterectomy 27 (27.3%)	P-value
Age (year) ^a	32.14±5.67	31.56±4.58	0.635
Parity ^a	4.13±1.59	3.81±1.71	0.380
Gestational age (weeks) ^a	35.94±1.90	36.07±1.83	0.762
Indication			
Morbidly adherent placenta	50 (69.4%)	20 (74.1%)	
Myomatozis Uteri	1 (1.4%)	0 (0.0%)	0.577
Uterine atony	19 (2.4%)	5 (18.5%)	
Uterine rupture	2 (2.8%)	2 (7.4%)	
Uterus histology			
Normal histology	20 (27.8%)	8 (29.6%)	
Placenta accrete	0 (0.0%)	2 (7.4%)	
Placenta increta	13 (18.1%)	4 (14.8%)	0.139
Placenta percreta	38 (52.8%)	11 (40.7%)	
Uterine adenomyosis	0 (0.0%)	1 (3.7%)	
Uterine fibroids	1(1.4%)	1 (3.7%)	
Hemoglobin (g/dl)			
Preoperative Hemoglobinea	11.15±2.24	10.92±1.83	0.637
Postoperative Hemoglobinea	9.51±1.63	9.79±1.69	0.456
Preoperative Platelet (103/uL) ^a	196.50±71.57	182.81±54.97	0.371
Postoperative Platelet (103/uL) ^a	148.79±59.27	137.70±42.69	0.377
Blood transfusions (units) ^a	4.65±3.17	5.07±4.34	0.598
Fresh frozen plasma (units) ^a	3.07±2.59	3.56±4.51	0.506
Platelet transfusions (units) ^a	.67±1.54	.59±1.63	0.835
Fibrinogen transfusion (units) ^a	.42±1.01	.48±1.12	0.784
Hospitalization days ^a	7.04±5.28	6.48±5.51	0.644
Postoperative intensive care unit days ^a	1.68±1.69	1.85±2.19	0.681

^a Mean±standard deviation

In our study, 87.9% of women had a history of previous cesarean section, and 70% of them had cesarean section of ≥ 2 . It has been revealed in recent studies that the incidence of peripartum hysterectomy is higher among women with a medical history of cesarean section. Placental adhesion disorders are the primary indication in these women, and placental adhesion disorders account for 38% to 50% of all peripartum hysterectomies (4, 5, 10, 12, 13).

While in our study, the most common indications for peripartum hysterectomy were placental adhesion disorders (70.7%), uterine atonia (25.2%), and uterine rupture (4%), in a similar study, which was conducted in our clinic fifteen years ago, the main indications were uterine atony (45.8%), placental adhesion disorders (25%), and uterine rupture (20.8%) (11).

In our clinic, the incidence of uterine rupture as an indication for peripartum hysterectomy has

significantly decreased from 20.8% to 4% (11). This remarkable decrease may be attributed to the decrease in our encounter with dystocia during deliveries, thanks to the increasing antenatal follow-up of the patients. Moreover, the increasing cesarean rates in recent years might be a significant factor for the decrease in the incidence of uterine rupture. 5 maternal deaths (5.1%) occurred in our study. All of these women were referred from external health care centers, and the causes of death were uterine atony in 60% (n=3) of them and placental adhesion disorder in 40% (n=2) of them. Two patients with placental adhesion disorder were the patients who underwent cesarean section in clinics where adequate equipment and blood products were not available. Thus, patients with risk factors or a history of previous postpartum hemorrhage should deliver in health care centers, which have blood transfusion centers and adequate surgical

Table 8. Intra- and postoperative complications in 24 peripartum hysterectomy patients

Complications	N	%	
	No intraoperative complications	60	60.6
Intraoperative complications	Ureter injury	3	3.0
	Bladder injury	29	29.3
	Cardiac arrest	4	4.0
	Pulmonary edema	1	1.0
	Vena cava inferior injury	1	1.0
	Hypogastric vena injury	1	1.0
Postoperative hospitalization days	7 days and lower	78	78.8
	8 days and upper	21	21.2
Re-exploration	There was not	94	94.9
	There was	5	5.1
	There was not	83	83.8
Postoperative complications	Acute respiratory distress syndrome	2	2.0
	Acute renal failure	2	2.0
	Disseminated intravascular coagulation	5	5.1
	Ileus	1	1.0
	Deep vein thrombosis	1	1.0
	Wounded Infection	2	2.0
	Multiple Organ Deficiency	1	1.0
	Hematoma	1	1.0
	Cerebral infarction	1	1.0
	Maternal death	There was not	94
There was		5	5.1
Intrauterine death	There was not	95	96.0
	There was	4	4.0

teams and equipment. Maternal mortality ranges between 1.2% and 19.4% in previous studies as well (11, 14). Although the incidence of uterine atony, as an indication for peripartum hysterectomy, has decreased, but it is still remarkable and was the major cause of maternal deaths in our study.

52.5% of the patients in our study were scheduled for elective cesarean section. The median incision was performed in all cesarean sections, which were scheduled for placenta percreta electively. Peripartum hysterectomy was performed immediately after the classical cesarean section to prevent hemorrhage. All patients required multiple perioperative blood transfusions. Pre and postoperative hemoglobin values were higher in patients who were scheduled for elective cesarean section, and the need for blood, fresh frozen plasma, and platelet transfusion was lower compared to those with emergency cesarean section. A study, which was conducted by Chestnut et al., revealed that the incidence rate of

hemorrhage in emergency hysterectomy were higher compared to the incidence rate of hemorrhage in elective procedure (15).

The decision to perform a subtotal hysterectomy rather than a total hysterectomy is frequently discussed in gynecology (16, 17). A Cochrane review revealed that there was no difference between total and subtotal hysterectomy, regarding the incidence rates of incontinence, constipation, or sexual function. Yet, subtotal hysterectomy has been associated with a shorter length of hospital stay and decreased intraoperative hemorrhage (16). Studies, which have smaller populations, on women who underwent peripartum hysterectomy found no difference between the two procedures, in terms of morbidity and duration of operation (2, 3). Total hysterectomy is preferred more commonly in women undergoing peripartum hysterectomy procedure in our clinic (Total 72 (72.7%) vs. Subtotal 27 (27.3%)). Essentially, the preference between subtotal and total hysterectomy should be

personalized based on the patients and the experience of the surgeon. Our study has some limitations. First, it was a retrospective study and has some bias regarding the data recording and missing information. Secondly, the relatively low number of cases included in the study was due to that we recruited the patients with complete data records and the patients which were operated only by the authors participated in the study

Peripartum hysterectomy indications in our clinic have changed over time. This situation can be attributed to the increasing number of deliveries and rates of cesarean. Furthermore, our incidence of peripartum hysterectomy has increased over the years. This situation can be attributed to the fact that our health care center is the main referral center of the district and surrounding provinces. The five maternal deaths in our study were attributed to the delivery of patients with risk factors in hospitals with an experienced team and inadequate equipment, and in hospitals where sufficient blood products were not available. This indicates to us that the decision for peripartum hysterectomy should not be delayed, and we should strengthen our team and equipment as we are more likely to encounter such patients in the clinics we work.

Conflict of interest: The authors declare that they have no conflict of interest

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