

Peripartum hysterectomy trends and influencing factors: 7 years of experience in a tertiary center in Türkiye

Peripartum histerektomi eğilimleri ve etkileyen faktörler: Türkiye'deki bir üçüncü basamak merkezde 7 yıllık deneyim

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ABSTRACT

Aim: This study aimed to investigate the incidence and clinical characteristics of peripartum hysterectomy (PPH) cases performed at a tertiary care center in Türkiye between 2017 and 2023. The comparison of emergency and elective PPH cases was also targeted.

Material and Methods: In this retrospective study, 94 PPH cases out of 69.100 births between January 1, 2017, and December 31, 2023, were analyzed. Cases were divided into two groups based on the causes: placental invasion anomalies and atony/uterine rupture. Preoperative, intraoperative, and postoperative data were analyzed. Chi-square and Fisher's exact tests were used for categorical variables, while Kolmogorov-Smirnov and Mann-Whitney U tests were used for continuous variables.

Results: The incidence of PPH varied by year, with an average of %1.36. The highest incidence was observed in 2023 at %2.45. Emergency hysterectomy cases had higher complication rates than elective cases (57.1% vs. 42.9%). Significant differences were found between groups regarding the number of cesarean sections, gestational week, and platelet levels ($p<0.005$).

Conclusion: PPH incidence is associated with increased cesarean rates and placental invasion anomalies. Higher complication rates were observed in emergency cases. The experience of surgical teams and postpartum care processes are critical in reducing maternal mortality and morbidity. Prospective studies are needed to reduce cesarean rates and improve the management of high-risk pregnancies.

Keywords: Peripartum hysterectomy, postpartum atony, high-risk pregnancy.

ÖZ

Amaç: Bu çalışma, Türkiye'de 2017 ile 2023 yılları arasında bir üçüncü basamak sağlık merkezinde gerçekleştirilen peripartum histerektomi (PPH) vakalarının insidansını ve klinik özelliklerini incelemeyi amaçladı. Acil ve elektif PPH vakalarının karşılaştırılması da hedeflendi.

Gereç ve Yöntemler: Bu retrospektif çalışmada, 1 Ocak 2017 - 31 Aralık 2023 tarihleri arasında 69,100 doğumdan 94 PPH vakası analiz edildi. Vakalar, nedenlerine göre plasental invazyon anomalileri ve atoni/uterin rüptür olarak iki gruba ayrıldı. Preoperatif, intraoperatif ve postoperatif veriler analiz edildi. Kategorik değişkenler için Ki-kare ve Fisher'in kesin testi, sürekli değişkenler için Kolmogorov-Smirnov ve Mann-Whitney U testleri kullanıldı.

Bulgular: PPH insidansı yıllara göre değişiklik gösterdi ve ortalama %1,36 olarak hesaplandı. En yüksek insidans %2,45 ile 2023 yılında gözlemlendi. Acil histerektomi vakalarında komplikasyon oranı, elektif vakalara göre daha yüksekti (%57,1'e karşı %42,9). Gruplar arasında sezaryen sayısı, gebelik haftası ve trombosit düzeyleri açısından anlamlı fark bulundu ($p<0,005$).

Sonuç: PPH insidansı, artan sezaryen oranları ve plasental invazyon anomalileri ile ilişkilidir. Acil vakalarda daha yüksek komplikasyon oranları gözlemlendi. Cerrahi ekiplerin deneyimi ve postpartum bakım süreçleri, maternal mortalite ve morbiditenin azaltılmasında kritik öneme sahiptir. Sezaryen oranlarının düşürülmesi ve yüksek riskli gebeliklerin yönetiminin iyileştirilmesi için prospektif çalışmalara ihtiyaç vardır.

Anahtar Kelimeler: Peripartum histerektomi, postpartum atoni, yüksek riskli gebelik

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INTRODUCTION

Peripartum hysterectomy (PPH) is a surgical intervention that seriously threatens maternal health and has high mortality and morbidity rates. In the literature, it has been reported that the incidence of PPH varies worldwide. While the incidence is generally 0.7% of births in high-income countries, this rate can be up to 3% in low-income countries (1). The most common causes include previous uterine surgeries, especially previous caesarean sections, and placental invasion anomalies such as placenta previa and placenta accreta (2). In addition, uterine atony, uterine rupture and childbirth trauma may require hysterectomy (3). Complications of this operation include bladder injury, excessive bleeding, infection and other intraoperative and postoperative complications (4). Although the postoperative mortality rate is low, mortality and morbidity rates may be even higher in high-risk situations such as placental invasion anomalies and grand multiparity (5, 6).

Peripartum hysterectomies are usually performed in two ways: emergency or elective (7). Emergency PPH is usually performed when postpartum haemorrhage cannot be controlled and threatens the mother's life (8). Such operations require a sudden and vital intervention. Emergency PPH is especially performed as a result of complications such as uterine atony, uterine rupture or placenta accreta, and morbidity and mortality rates are higher in these cases than in elective PPH cases.

Elective PPH is usually performed as a planned operation in patients with known high risk factors. If invasion anomalies such as placenta previa or placenta accreta are diagnosed prenatally, a hysterectomy during caesarean section may be planned (9). As these operations are performed in a more controlled environment, the risk of complications is generally lower than in emergency hysterectomies (5). However, in both cases, an experienced surgical team and the necessary equipment are needed for successful management (10). This study aimed to retrospectively analyze the emergency and elective peripartum hysterectomies performed in our clinic.

MATERIALS AND METHODS

This retrospective study included PPH cases performed at Mersin City Training and Research Hospital between 1 January 2017 and 31 December 2023. A total of 2198 hysterectomies were performed during the study period and 94 of these cases were found to be PPH. These 94 patients were included in the study and patient data were analyzed in detail. The patients were divided into two main groups according to the causes of PPH: invasion anomaly group (n=70) (placenta previa or placenta accreta spectrum) and atony/uterine rupture group (n=24). Preoperative, intraoperative and postoperative general characteristics of the patients were evaluated and compared. Factors such as indications for caesarean section, indications for hysterectomy, placental location, duration of hysterectomy and intraoperative complications were also analyzed. Categorical variables were analyzed by Chi-square and Fisher exact test. The conformity of numerical variables to normal distribution was evaluated by Kolmogorov-Smirnov test. Age, preoperative platelet (PLT) and postoperative hemoglobin (HGB) values were found to conform to normal distribution. Mann-Whitney U test was used for variables that did not conform to normal distribution. The significance level was accepted as $p < 0.005$ in all statistical analyses. The study was approved by the Ethical Research Committee of Toros University (Date/Number: 26.01.2024/32). This study was carried out per the content of the Declaration of Helsinki.

RESULTS

During the period covered by this study, a total of 69,100 births occurred. Among these births, 36,091 were vaginal deliveries (52.2%), and 33,009 were cesarean sections (47.8%) (Table 1). In this period, a total of 94 peripartum hysterectomies (PPH) were performed. Of these hysterectomies, 39 (41.5%) were elective, and 55 (58.5%) were performed as emergency procedures. The fatality rate among patients who underwent PPH during the study period was recorded as 1.1% (1/94).

Table 1. Birth and Hysterectomy Rates by Year

Year	Vaginal		Cesarean		Total	
	Number of births (n)	PPH After Vaginal Delivery (n)	Number of births (n)	PPH After Cesarean (n)	Total births (n)	Incidence of PPH n (%)
2017	5341	2	4111	10	9452	12(1.27)
2018	6089	3	5290	14	11379	17(1.45)
2019	5505	1	5122	9	10627	10(0.90)
2020	5019	0	4121	8	9140	8(0.90)
2021	4988	4	4625	12	9613	16 (1.66)
2022	4692	0	4807	8	9499	8(0.84)
2023	4457	3	4933	20	9390	23(2.45)
Total	36091	13	33009	81	69100	94(1.36)

n: Number of patients.

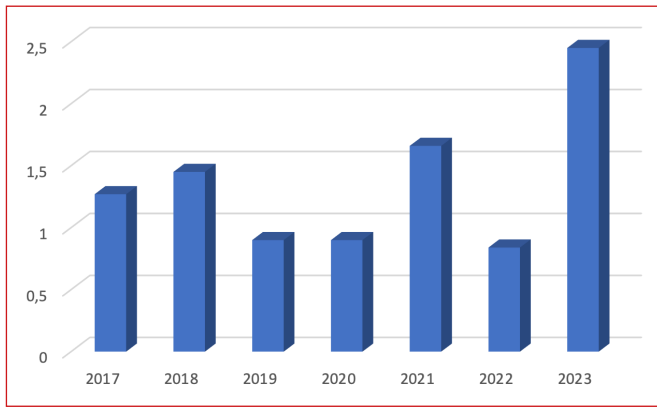


Figure 1. Annual Variation in PPH Incidence (%)

The incidence of PPH varied across the years. In 2017, there were 12 cases (%1.27); in 2018, 17 cases (%1.45); in 2019, 10 cases (%0.9); in 2020, 8 cases (%0.9); in 2021, 16 cases (%1.66); in 2022, 8 cases (%0.84); and in 2023, 23 cases (%2.45). Overall, the average annual incidence of PPH was found to be % 1.36 (Figure 1).

When examining patient characteristics, no significant differences were found between the invasion anomaly and atony/rupture groups in terms of age, gravida, parity, and preoperative hemoglobin levels ($p>0.005$). However, significant differences were observed between the groups regarding the number of previous cesareans ($p=0.001$), gestational week ($p=0.001$), preoperative platelet count ($p=0.001$), and postoperative platelet count ($p=0.033$). Furthermore, the duration of intensive care unit stay ($p=0.002$) and hospital stay ($p=0.022$) were significantly longer in the atony/rupture group. No significant differences were found between the two groups in terms of blood type, mode of delivery, nationality, use of uterotonic, surgical procedure, or intraoperative complications

Table 2. Mean Values of Hysterectomy Patients by Indications

	Invasion abnormality (Mean $\pm$ SD)	Atony / Rupture (Mean $\pm$ SD)	p
Count n (%)	70 (%74.5)	24 (%25.5)	NA
Age	32.89 $\pm$ 5.797	32.71 $\pm$ 5.614	0.897
Gravida	4.47 $\pm$ 1.808	4.17 $\pm$ 1.685	0.6
Parity	2.76 $\pm$ 1.096	2.75 $\pm$ 1.595	0.644
Number of Cesarean	2.54 $\pm$ 1.086	0.58 $\pm$ 0.974	<0.005
Delivery week	34.26 $\pm$ 5.081	35.83 $\pm$ 7.733	<0.005
Number of Antenatal Visits	3.56 $\pm$ 2.872	3.71 $\pm$ 3.641	0.844
Gestational Week of Abnormal Placenta Diagnosis	27.02 $\pm$ 6.823	N/A	N/A
Preoperative Hemoglobin (g/dL)	10.3271 $\pm$ 1.79467	8.8125 $\pm$ 2.75954	0.012
Postoperative Hemoglobin (g/dL)	9.5629 $\pm$ 1.52707	9.05 $\pm$ 2.25311	0.215
Hemoglobin Change (g/dL)	-0.2386 $\pm$ 8.72492	-0.2375 $\pm$ 4.16192	0.298
Preoperative Platelet ($\times 10^3$ /uL)	226.3143 $\pm$ 82.44639	163.4583 $\pm$ 66.84829	<0.005
Postoperative Platelet ($\times 10^3$ /uL)	252.7714 $\pm$ 109.30971	198.9583 $\pm$ 134.54027	0.033
Platelet change ($\times 10^3$ /uL)	-26.4571 $\pm$ 127.20185	-35.5 $\pm$ 146.9753	0.474
Length of Hospital Stay (days)	5.14 $\pm$ 2.911	10.04 $\pm$ 10.98	<0.005
Length of ICU Stay (day)	0.57 $\pm$ 1.084	2.79 $\pm$ 5.099	<0.005

ICU: Intensive care unit; N/A: Not applicable; SD: Standart deviation

($p>0.005$). However, the rate of postoperative complications was significantly higher in the atony/rupture group compared to the invasion anomaly group ($p=0.046$) (Tables 2, 3).

Table 3. Demographic and Clinical Characteristics of PPH Cases

		Invasion abnormality Count (%)	Atony/Rupture Count (%)	p
Mode of delivery	Vaginal	0 (0.0%)	13 (100.0%)	<0.005
	Cesarean	70 (86.4%)	11 (13.6%)	
Nationality	Republic of Türkiye	36 (67.9%)	17 (32.1%)	0,098
	Asylum seeker	34 (82.9%)	7 (17.1%)	
Uterotonic use	Administered	2 (14.3%)	12 (85.7%)	<0.005
	Not administered	68 (85.0%)	12 (15.0%)	
Surgical procedure*	Performed	11 (52.4%)	10 (47.6%)	0,008
	Not performed	59 (80.8%)	14 (19.2%)	
Blood product(s)	Administered	35 (68.6%)	16 (31.4%)	0,157
	Not administered	35 (81.4%)	8 (18.6%)	
Intraoperative Complication	Occured	9 (69.2%)	4 (30.8%)	0,641
	Did not occur	61 (75.3%)	20 (24.7%)	
Relaparotomy	Performed	1 (50.0%)	1 (50.0%)	0,422
	Not performed	69 (75.0%)	23 (25.0%)	
Postoperative Complication	Occured	3 (42.9%)	4 (57.1%)	0,046
	Did not occur	67 (77.0%)	20 (23.0%)	
Mortality	Yes	1 (100.0%)	0 (0.0%)	0,556
	No	69 (74.2%)	24 (25.8%)	

*Uterus-sparing procedures (Hypogastric artery ligation, Uterin artery ligation, B-Lynch suture etc.)

In our study, a total of 94 hysterectomies were performed, with 52 (55.3%) conducted by perinatologists and 42 (44.7%) by general gynecologists. Among these, hysterectomies due to invasion anomalies were more commonly performed by both perinatologists (36 cases, 69.2%) and general gynecologists (34 cases, 80.9%). In contrast, hysterectomies due to uterine atony or rupture were less frequent, accounting for 16 cases (30.8%) by perinatologists and 8 cases (19.1%) by general gynecologists.

DISCUSSION

In our study, the incidence of PPH was determined to be %1.36 births between 2017 and 2023. Although this rate is slightly higher, it aligns with the globally reported average incidence of %1.1 births (10). Although the rate in Türkiye is higher compared to high-income countries, it is not as high as in low-income countries (11, 12).

The recent increase in PPH incidence is associated with the rise in cesarean delivery rates and the more frequent occurrence of risk factors such as placenta invasion anomalies (e.g., placenta previa and accreta). In cases like placenta previa or accreta, a hysterectomy may be required to prevent severe postpartum hemorrhage (13). In our study, these cases were found to hold a significant place. Additionally, according to our findings, emergency PPH accounted for a high rate of 58.5%. Emergency PPH is generally performed when postpartum hemorrhage cannot be controlled and life-threatening complications arise (14). Operations performed in this manner are generally more complex, carry higher risks, and have higher complication rates.

Our study observed significant differences between the groups in factors such as preoperative platelet count, gestational week, and postoperative platelet levels. Notably, the intensive care unit (ICU) stay in the atony/rupture group was significantly longer than in the invasion anomaly group, indicating that these cases are more complex and resistant to treatment. The lower preoperative platelet levels and longer ICU stay in the atony/rupture group emphasize that managing these cases is more clinically challenging and resource-intensive. These findings suggest that atony/rupture cases carry a higher risk of complications and require more intensive monitoring. The lack of a significant difference in preoperative and postoperative hemoglobin levels between the groups can be attributed to the adequate administration of blood product transfusions in both groups. This highlights the effectiveness of transfusion practices in controlling hemorrhage and shows that both groups received similar support in maintaining hemodynamic stability during the surgical intervention. In cases of uterine atony, our findings show that waiting too long to perform a hysterectomy, after trying other

treatments, can lower platelet levels (PLT) and lead to longer stays in the ICU. Delaying the decision allows more bleeding, increasing the risk of complications and the need for intensive care. This shows how important it is to act quickly when other treatments do not work to reduce risks and improve outcomes.

PPH is mostly performed as a last resort to control postpartum hemorrhage. However, surgical approaches aimed at preserving the uterus are also attempted beforehand. In some cases included in this study, uterus-sparing surgical techniques, such as hypogastric artery ligation, B-Lynch sutures, and uterine artery ligation, were applied; however, despite these techniques, hysterectomy became inevitable as the bleeding could not be stopped. In addition to these techniques, uterotonic drugs were also used concurrently to control the hemorrhage. Although the efficacy of uterotonic drugs was limited in some cases, these medications played an important role in managing bleeding in the early stages. Furthermore, concurrently using blood products also played a critical role in managing this risky and challenging situation. In cases where bleeding could not be controlled, blood products such as erythrocyte suspension, fresh frozen plasma, and platelets were frequently used to balance blood loss and ensure the patient's hemodynamic stability. Especially in patients experiencing massive bleeding, the timely and adequate administration of these products is vital in reducing mortality and morbidity.

In our study, the mortality rate following PPH was found to be 1.1%. This rate is consistent with the globally reported average rates, ranging from 1.0% in high-income countries to as high as 11.2% in low-income countries (10). Conditions such as placental invasion anomalies and uterine atony are the most common causes in cases requiring PPH, and it is known that mortality rates are higher in such cases. Emergency PPH generally carries a high risk of mortality and morbidity, as these operations are often performed to stop life-threatening postpartum hemorrhage. In elective cases, however, the risk of complications is generally lower, as the operation is planned.

In our study, a marked increase in the number of PPH cases was observed in 2023, despite no significant rise in the number of births. One of the main reasons for this increase is the damage to the healthcare infrastructure of approximately six provinces due to the earthquake that occurred on February 6, 2023. As we are neighboring the affected provinces and intervention in high-risk pregnancies was no longer possible in these areas, patients were referred to our institution. Consequently, the rate of high-risk PPH cases in our facility was found to be higher compared to previous years.

CONCLUSION

PPH stands out as a vital surgical intervention to protect maternal health, especially in high-risk situations such as severe postpartum hemorrhage and placenta invasion anomalies. In our study, surgical procedures applied prior to hysterectomy (B-Lynch sutures, uterine artery ligation, hypogastric artery ligation) were attempted in some cases to control bleeding; however, despite these measures, hysterectomy was unavoidable. Therefore, the experience of the surgical team and the ability to make quick decisions are crucial in the management of PPH cases. In particular, the possibility that conservative surgical techniques may fail in cases of invasion anomalies and uterine atony should be considered, and hysterectomy should be promptly performed when necessary. Going forward, reducing cesarean rates and early diagnosis of placenta invasion anomalies could be important strategies to lower PPH rates. Additionally, providing more effective antenatal care services may contribute to better management of both emergency and elective cases to improve maternal health. Rigorous prenatal monitoring, especially for women with risk factors, is essential to reduce the need for surgical interventions.

This study has contributed to a better understanding of PPH incidence, management processes, and maternal outcomes. However, more comprehensive, prospective studies are needed in the future. Such studies could provide important insights into the better management of PPH cases and reduction of maternal mortality rates. Mortality rates in PPH cases can be particularly high in emergency operations. The 1.1% mortality rate identified in our study aligns with global literature; however, it should be noted that mortality may be higher in cases with risk factors such as placenta invasion anomalies and atony.

Strengths and Limitations

One of the strengths of this study is its inclusion of a large patient population, with a comprehensive analysis of PPH cases conducted over 69,100 births across a seven-year period. Comparing the clinical differences between emergency and elective PPH cases and evaluating how factors such as cesarean rates and placenta invasion anomalies impact surgical needs provide significant contributions to the literature. Furthermore, findings related to surgical techniques and the use of blood products offer guidance for clinical practice. However, the retrospective design of the study opens it to potential biases, as there is a risk of some data being incomplete or inaccurately recorded. The fact that the study was conducted in a single hospital also limits the generalizability of the results. Additionally, a more detailed analysis of the biological and clinical differences between elective and emergency operations was not conducted. Despite these limitations, the study contributes to understanding PPH incidence and management processes.

Conflict of Interest: The authors declare no conflict of interest.

Author Contributions: SK: Conceptualization, Methodology, Validation, Formal analysis, Investigation, Resources, Data curation, Writing - Original draft, Writing - Review & Editing, Visualization, Supervision, Project administration, CT: Methodology, Software, Validation, Investigation, Writing - Review & Editing, Visualization

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