

Evaluation of Parameters that Influence Morbidity in Peripartum Hysterectomy

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ABSTRACT

Objective: To evaluate which factors affect the intraoperative and postoperative morbidity in cases of peripartum hysterectomy.

Study design: A retrospective study of all cases of peripartum hysterectomy performed during a 5-year period (January 2008–June 2013) in a tertiary maternity hospital.

Results: A total of 22,437 deliveries were reviewed and 63 cases of peripartum hysterectomy (2.8/1000) were identified. The indications for peripartum hysterectomy included: uterine atony (10 cases—15.9%), placenta accreta (21 cases—33.3%), placenta previa (30 cases—47.6%) and cervical pregnancy (2 cases—3.2%). Significantly higher rates of perioperative blood transfusion were noted in the emergency cases group, compared to the elective hysterectomies. Hypogastric artery ligation did not have any significant impact on the outcome. Preoperative bilateral ureteral catheterization was associated with lower need for blood transfusion ($p < 0.001$), and with less complications, although this was not statistically significant.

Conclusion: Maternal morbidity is significantly higher in emergency cases of peripartum hysterectomies compared to expected-planned cases.

Keywords: Morbidity, Obstetrical hysterectomy, Peripartum hysterectomy, Placenta accreta.

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INTRODUCTION

Peripartum hysterectomy (PH) is defined as a hysterectomy performed within the first 24 hours of delivery of the fetus. It was first introduced at the end of the 19th century as a surgical procedure in order to manage

severe postpartum hemorrhage (PPH) following cesarean section. The incidence of PH varies worldwide, ranging from 0.04 up to 0.85%.¹⁻⁵ Peripartum hysterectomy is more frequently performed in developing countries, due to lack of other resources that could have prevented or reduced PPH.⁶ The most common reasons for PH are uterine atony and abnormal placentation, such as placenta previa or percreta-accreta, when both medical and surgical manipulations prove insufficient to control obstetric hemorrhage.^{7,8}

Peripartum hysterectomy is a major surgical procedure with significant maternal morbidity and also increased perioperative mortality. Morbidity is intensified compared to classic hysterectomy occasionally rendering these operations 'near miss' events.⁹ The main factors related to the severe morbidity of PH are the increased uterine perfusion because of pregnancy changes in the blood supply of the uterus and the distorted anatomy because of placental invasion and of course the fact that these cases are often emergency operations.⁹⁻¹¹ Peripartum hysterectomy is a major operation with significant morbidity, mainly because of the excessive blood loss and the limited time within which the surgeons should act and should be performed by experienced surgeons in appropriately equipped units. In these cases, early involvement of an experienced consultant obstetrician or if possible a gynecological oncologist is critical. It is essential for all maternity units to organize drills and be prepared for the management of such cases. The aim of this study was to identify which factors influence the intraoperative and postoperative morbidity in cases of PH.

MATERIALS AND METHODS

We studied all cases of PH which in our hospital, which is a tertiary university maternity hospital, in a 5-year period (January 2008–June 2013). All cases were identified retrospectively from the maternity database. Information was obtained from medical records, operating theater book and anesthetic registry. The study was approved by the institutional review board and ethical committee of our hospital.

Cases were compared in terms of number of blood units and fresh frozen plasma needed for transfusion, the amount of colloids or crystalloids infused intra-

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operatively, the mean operating time and the length of hospital stay, the need for additional measures applied to control hemorrhage, such as factor VII administration, bilateral hypogastric artery ligation or arterial embolization, preoperative ureteral stent placement, and finally damage of intra-abdominal organs. As severe perioperative complications we defined cases that required massive blood transfusion (> 10 units of blood), cases that were admitted in intensive care unit (ICU) and cases with any perioperative abdominal organ injury.¹²

All PHs were divided into expected and emergency cases. As expected cases were characterized those that had a known diagnosis of placenta previa or percreta-accreta, based on sonographic findings. It is our policy to hospitalize all these women for several weeks prior to a scheduled cesarean section. Women were also subgrouped according to prophylactic ureteral stenting. The same applied for cases where hypogastric artery ligation was carried out in order to control severe hemorrhage. Finally stratification of women per reason of PH was carried out in order to investigate possible differences in perioperative morbidity.

Statistical analysis was performed with SPSS ver. 20.0 (IBM SPSS Statistics for Windows, Version 20.0. Armonk, NY: IBM Corp). The Chi-square test was used for analysis of dichotomous variables and the Mann-Whitney nonparametric test was used for analysis of continuous variables (data expressed in median and range values). Kruskal-Wallis analysis was used in order to test differences of continuous variables among women offered the procedure for reasons of uterine atony, placenta accreta or placenta previa (data expressed in mean ranks). In all applied statistical tests the level of significance was set to $p < 0.05$ (two tailed). For dichotomous variables that were represented with less than five cases per group, Fishers exact test using the Monte-Carlo approach was applied.

RESULTS

A total of 22,437 deliveries were analyzed retrospectively and 63 cases of PH (2.8/1000 deliveries) were identified among them. The indications for the procedure included uterine atony (10 cases), placenta percreta-accreta (21 cases), placenta previa (30 cases) and cervical pregnancy (2 cases). In all but one case delivery of the fetus was carried out by cesarean section. Prior to surgery, all women had an ultrasound scan in order to define placental location and to detect possible myometrial invasion. In two cases, the operation was performed even before 20 weeks due to cervical pregnancy, which explains the two fetal deaths in our study.

Women were initially categorized in two groups: the expected PH group, which included women who had an elective cesarean delivery, which was followed by PH (34 cases) and the emergency PH group, including those women who had an unexpected hemorrhage or surgical findings during the cesarean section which ended in an emergency PH (29 cases).

Maternal demographic characteristics are shown in Table 1. No statistically significant differences existed between the two groups. Moreover, there was not any difference in the indication for the procedure between the two groups (Table 2). Table 3 shows a comparison of the perioperative characteristics and the perinatal outcome of both groups. Significantly higher need for blood transfusion, fresh frozen plasma, colloids and crystalloids was observed as expected among emergent PH cases.

Table 1: Maternal demographics

Maternal characteristics	Expected group (34 cases)	Emergent group (29 cases)	p-value
Maternal age (years)	35 (26–46)	37 (18–46)	0.86
Gestational age (days)	252 (126–277)	231 (112–273)	0.43
Parity	2 (1–9)	2 (1–4)	0.946
Primigravidas	2	5	0.233
Prior cesarean section	25	19	0.490

Table 2: Indication for the procedure in expected and emergent cases

Indication for PH	Expected group (34 cases)	Emergent group (29 cases)	p-value
Placenta accreta	12	9	0.721
Placenta previa	19	11	0.155
Uterine atony	3	7	0.165
Cervical pregnancy	0	2	0.208

Table 3: Perioperative outcome

Perioperative characteristics	Expected group (34 cases)	Emergent group (29 cases)	p-value
Blood transfusion (units)	3 (2–12)	6 (2–11)	<.001
Plasma transfusion (units)	2 (0–4)	4 (1–5)	<0.001
Colloids (ml)	0 (0–1500)	1000 (0–1000)	<0.001
Crystalloids (ml)	3000 (2000–8000)	4000 (2000–6800)	0.009
Hypogastric artery ligation	2/34	7/29	0.068
Operative duration (minutes)	142.5 (90–200)	210.0 (120–300)	<0.001
Hospitalization after PH (days)	4.5 (4–10)	6.0 (4–7)	0.001
Birth weight (gm)	2855 (550–3910)	2570 (1060–3720)	0.424
Apgar score	8 (0–9)	8 (5–9)	0.883

Similarly, the operative time and the hospitalization were significantly prolonged in these cases.

All women during the immediate postoperative period were transferred for at least 24 hours in our high dependency unit, for observation. A total of 29 intraoperative complications were reported. Among them, we observed five cases that required massive transfusion (>10 blood units) and two cases that had significant urinary bladder injury. Between the five massive blood transfusion cases, one patient experienced postoperatively abdominal compartment syndrome, while another one was treated with chemoembolization in order to control persisting bleeding. Both women required transfer from the high dependency unit (HDU) to ICU. Finally, one of those who had an unintentional urinary bladder rupture experienced a simultaneous damage to the left ureter. This ultimately resulted in a ureteral fistula which was managed by a second look surgery. Hypogastric artery ligation was rarely needed and it was performed by gynecologic oncologists. When we examined the impact of hypogastric artery ligation on PH outcome, we found that hypogastric artery ligation was not associated with a significant difference of blood transfusion units among women offered the procedure (median 5 units, range 3–11) and those that were not (median 4 units, range 2–12) ($p = 0.148$). Moreover, operative time, was significantly prolonged in patients who had the procedure (median 240 minutes, range 140–300) compared to those that did not (median 150 minutes, range 90–300) ($p = 0.017$). In contrary, women who had bilateral ureteral stents insertion preoperatively, required fewer blood transfusions (median 2.0 units, range 2–3) as opposed to non-stented ones (median 4.5 units, range 2–8) ($p < 0.001$). Total and urological complications were also fewer in this group although not statistically significant. However, stents placement had no influence on the operative time (median 140 min, range 120–170 minutes *vs* median 150 minutes, range 90–200 minutes, $p = 0.186$).

COMMENT

Peripartum hysterectomy rates vary greatly depending on the country and the institutions, ranging from a minimum of 0.36–6.2/1000 deliveries.^{6,13} The incidence of PHs performed in our institution (2.8/1000 deliveries) is explained by the wide population coverage that our hospital provides as a tertiary center for the majority of Inland Greek areas (encompassing a population of more than 5 million people). Peripartum hysterectomies in developing countries that lack adequate resources for proper perinatal management are mostly performed for reasons of uncontrollable bleeding due to uterine atony or uterine rupture.^{14,15} In developed countries, PHs are

carried out mainly for reasons of abnormal placentation.¹⁶ In our series, PH were mostly performed for placenta previa (48%) and placenta percreta-accreta (33%). The main finding of this study was that the need for blood and fresh frozen plasma transfusion, for colloids and crystalloids administration as well as the operation and the hospitalization time were significantly higher in the emergency group compared to the expected PH group. Another important finding was that morbidity was more than double in the emergency group compared to the expected PH group (65.5% *vs* 29.4%, $p = 0.004$). The main difference was the need for transfusion of more than 4 units of blood, which was significantly more prevalent among emergent PH cases (19 out of 29 *vs* 10 out of 34, $p = 0.006$) (data not shown). The difference in the perioperative outcome between the two groups can be easily explained. First of all, in the expected cases the surgeons were prepared to manage such a condition with readily available blood, different incisions to both the skin and the uterus, and in many cases by leaving the placenta *in situ*. Secondly, in the expected cases a planned cesarean delivery was always performed by the same team of two out of three consultant obstetricians, with a personal obstetric experience of more than 15 years, while the emergent cases were treated by the consultant who was on duty the day of the operation, although in some cases one of the three consultants of the team was called to attend the procedure. An improvement on surgical skills over time as well as a better understanding and an increased interest in the pathology when the same group of surgeons deals with the same condition could probably lead to a better perioperative outcome.

The rate of severe morbidity was low in this study. This could be explained by the fact that our unit is a tertiary center with full anesthetic and hematological coverage and continuous senior obstetrician consultant/gynecologic oncologist on call. In our series, the majority of cases requiring PH were handled with total abdominal hysterectomy (58 cases). It is suggested that peripartum total hysterectomy is followed by greater intraoperative morbidity than subtotal hysterectomy. This morbidity refers mainly to extensive blood loss and urinary tract injuries (urinary bladder and ureters).¹⁷ Knight et al suggested that performing a total hysterectomy for cases of placenta accreta at full dilatation of the cervix may prove extremely demanding.⁹ They did not identify statistically significant differences regarding bladder damage among women offered total or subtotal hysterectomy. However, the counterproposal of total hysterectomy provides higher rates of control of bleeding sites and is considered to be the standard care for reasons of placenta previa and placenta accreta.¹⁸ Previous studies reported rates of subtotal hysterectomies that



vary from 6.7% to as high as 81.8%.^{6,13,15} This discrepancy could possibly be explained from differences in the amount of resources provided to surgical teams among different institutions around the world. In a recent study, Wright et al specifically reported that maternal perioperative outcomes are greatly influenced by the level of organization and the experience of the institution that carries out this procedure.¹⁹

In our study, hypogastric artery ligation was performed at five out of 21 PH (23.8%) in cases that were complicated by placenta accreta, in three out of 30 PH (10.0%) of cases with placenta previa and in one out of two PH (50%) of cases with cervical pregnancy. We did not observe any positive influence of this procedure either on the amount of blood transfusion, or on the operative time. Hypogastric artery ligation had been previously investigated by Eller et al as a prophylactic procedure prior to the onset of hysterectomy.¹⁰ They came to the conclusion that even as a preventive measure it did not reduce the mean amount of blood loss. Although it seems like a straightforward and simple method to be performed, it involves major pelvic vessels and it must be carried out by experienced physicians, usually gynecologic oncologists.

Other potential medical and radiographic manipulations during PH involve administration of recombinant factor VII²⁰ and prophylactic preoperative hypogastric artery balloon catheters.²¹ In our series, we administered recombinant factor VII at a dose of 90 mcg/kg in two patients (data not shown). Both of them required massive transfusions of blood (11 units of blood each) and plasma (5 units of plasma each). Another case of this group, who suffered from persisting hemorrhage necessitated hypogastric artery embolization. On the contrary, all preoperative ureteral stent placements were performed in expected cases and this may be contributed to the better perioperative outcome in these cases.

It would be reasonable to assume that neonatal outcome would be more favorable among expected PH cases. However, in our study similar results of 5 minutes Apgar scores were observed in expected and unexpected PH cases alike. No differences were observed among cases of uterine atony, placenta previa and placenta accreta. This is mainly due to the fact that gestational age at delivery did not differ significantly between groups.

Peripartum hysterectomy is an extremely challenging procedure with high rates of both intraoperative and postoperative complications. It is our belief that at least cases of abnormal placentation that are recognized during planned antenatal visits should be handled in tertiary centers in order to ensure the highest possible amount of resources. This study shows that in high-risk cases of possible PH, ureteric catheterization, constant

hospital alertness and availability of a multidisciplinary task force are essential parameters in order to avoid maternal mortality and keep severe morbidity in fairly low levels. However, even in well-organized institutions emergency peripartum hysterectomies entail a higher risk for perioperative complications leading to higher severe and total morbidity.

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