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Elective versus Emergency Obstetric Hysterectomy: A Prospective Comparative Observational Study from a Tertiary Care Center in North India

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ABSTRACT

Background and Objectives: Obstetric hysterectomy (OH) is a life-saving surgical procedure performed for catastrophic obstetric complications such as placenta accreta spectrum (PAS), postpartum hemorrhage (PPH), and uterine rupture. Outcomes differ significantly depending on whether the procedure is elective (planned) or emergency (unplanned). This study aimed to compare the indications, perioperative variables, and maternal outcomes of elective versus emergency OH at tertiary referral center in North India.

Methods: A prospective, comparative, observational study was conducted at Government Medical College and Rajindra Hospital, Patiala, from February 2023 to January 2024. All women undergoing OH following both caesarean & vaginal deliveries, mid-trimester and within 42 days of delivery or termination of pregnancy were included. Demographic, clinical, anaesthetic, intra-operative, & post-operative details were recorded. Statistical analysis was performed using appropriate tests, with p <0.05 considered significant.

Results: A total of 37 women underwent OH during the study period. PAS was the most common indication (62.2%), observed more frequently in elective cases (15 vs. 8, p = 0.017). Intractable PPH & uterine rupture were predominantly associated with emergency procedures. Emergency OH was linked to higher intraoperative blood loss, greater need for total blood & blood products (145 vs. 199, p = 0.007) & ICU admission (10 vs. 4, p = 0.091), increased inotropic requirements (13 vs. 6, p = 0.071), & more postoperative complications compared with elective OH. Maternal mortality was also higher in emergencies (4 vs. 1, p = 0.340).

Conclusions: Emergency OH, though linked with higher morbidity and mortality, remains a crucial life-saving procedure in catastrophic situations like uncontrolled hemorrhage or uterine rupture. Elective OH allows better preparedness and improved outcomes, but strengthening antenatal care and referral pathways while maintaining readiness for emergencies is vital to optimize maternal safety.

Keywords: Obstetric hysterectomy; Placenta accreta spectrum; Postpartum hemorrhage; Elective surgery; Emergency surgery; Maternal morbidity; Maternal mortality

INTRODUCTION

Obstetric hysterectomy (OH) remains one of the most critical life-saving surgical interventions in modern obstetrics, performed when conservative measures fail to control severe complications such as placenta accreta spectrum (PAS), intractable postpartum hemorrhage (PPH), uterine rupture, or overwhelming uterine infection [1,2]. Although it may be planned electively in women identified antenatally with high-risk conditions such as PAS, OH is more commonly performed as an emergency procedure in the setting of catastrophic hemorrhage or uterine rupture, where timely intervention is essential to prevent maternal death [3].

Over the past two decades, the incidence of OH has increased globally, with a major contributory factor being the rising rate of cesarean deliveries. Previous cesarean section is a well-recognized risk factor for abnormal placentation, and the increasing burden of PAS has now overtaken uterine atony and rupture as the principal indication for OH in many tertiary centers [4–7]. PAS presents significant surgical challenges because abnormal adherence of the placenta to the uterine wall often results in massive hemorrhage, complex dissection, and increased perioperative morbidity and mortality [8,9].

The clinical distinction between elective and emergency OH is particularly relevant. Elective OH, typically planned in cases with antenatally diagnosed PAS, allows for multidisciplinary preparation, optimized anaesthesia and surgical planning, and availability of adequate blood and critical care resources. Such preparation has been associated with improved outcomes and lower maternal mortality [10–12]. Conversely, emergency OH is performed under pressing circumstances, often in hemodynamically unstable women with uncontrolled hemorrhage. These situations are marked by higher transfusion requirements, greater surgical complexity, and poorer maternal outcomes, as highlighted by several institutional and multicenter studies [13–15].

Against this background, the present study was undertaken to evaluate and compare the clinical characteristics, surgical details, transfusion needs, perioperative management, and maternal outcomes of elective and emergency OH performed at a tertiary referral center in North India. By delineating the differences between these groups, the study aims to provide insights that may contribute to improved risk stratification, better preparedness, and more favorable maternal outcomes in women requiring OH.

MATERIALS AND METHODS

This prospective observational study was conducted over a one-year period, from February 1, 2023, to January 31, 2024, in the Department of Obstetrics and Gynecology at Government Medical College and Rajindra Hospital, Patiala, a large tertiary referral center catering to both rural and urban populations. All pregnant women who underwent OH mid-trimester, at the time of delivery, within 42 days of delivery or termination of pregnancy during the study period were included. OH was defined as the surgical removal of the uterus performed at the time of cesarean section, or after vaginal delivery, or during the puerperium. Hysterectomies conducted for non-obstetric indications or beyond the 42-day postpartum period were excluded from the analysis. In subtotal hysterectomy, the surgeon removed uterine corpus but left the cervix intact; whereas in total hysterectomy, the surgeon removed entire uterus including the cervix.

Comprehensive data were collected prospectively using standardized proformas. Demographic characteristics included maternal age, parity, socioeconomic status, literacy, and booking status. Obstetric history was documented with special attention to prior cesarean deliveries and intra-uterine surgical procedures. Clinical details comprised antenatal diagnosis of PAS, indication for hysterectomy, timing of surgery categorized as elective or emergency,

and type of procedure (subtotal or total hysterectomy). Intraoperative variables included type of anaesthesia, estimated blood loss, transfusion requirements, and intraoperative complications. Postoperative data encompassed the need for inotropic support, admission to the intensive care unit (ICU), duration of ICU stay, postoperative complications, and maternal outcomes, including survival or mortality.

Elective obstetric hysterectomy (OH) was defined as a planned surgical removal of the uterus performed during pregnancy or at the time of delivery, based on antenatal risk assessment and diagnosis, most frequently in cases of placenta accreta spectrum (PAS). Emergency OH was defined as an unplanned, life-saving surgical removal of the uterus undertaken urgently in response to uterine atony, uncontrolled hemorrhage or other life-threatening complications occurring during or immediately after delivery, when conservative measures failed to achieve hemostasis or in the event of uterine rupture. Maternal near-miss events, defined as a woman who nearly died but survived a complication that occurred during pregnancy, childbirth, or within 42 days of termination of pregnancy, were classified according to the World Health Organization (WHO) criteria [3]. Admission to the intensive care unit (ICU) was considered when postoperative intensive monitoring and/or organ support were required.

All women were managed according to standardized institutional protocols for obstetric hemorrhage. Initial management included the administration of uterotonics, intrauterine tamponade, compression sutures, and uterine artery ligation. Hysterectomy was undertaken when conservative measures failed to control bleeding or when abnormal placentation was irreversibly diagnosed intraoperatively. Blood products were administered as per clinical and laboratory criteria, and patient care involved a multidisciplinary team comprising obstetricians, anaesthesiologists, transfusion medicine specialists, and intensivists.

STATISTICAL ANALYSIS

Data was entered in Microsoft Excel and analyzed using SPSS version 21.0 (IBM Corp., Armonk, NY, USA). Continuous variables were compared using the independent Student's *t* test for normally distributed data and the Mann–Whitney U test for non-normal distributions. Categorical variables, including surgical indications, intraoperative complications, and maternal outcomes, were analyzed using the Chi-square test or Fisher's exact test, as appropriate. A *p-value* <0.05 was considered statistically significant.

RESULTS

Indications of obstetric hysterectomy: Placenta accreta spectrum (PAS) was the most frequent indication overall, with 23 cases. Placenta accreta accounted for the majority (n = 17), followed by placenta increta (n = 4) and placenta percreta (n = 2). PAS was significantly more common in elective cases compared to emergencies (15 vs. 8, $p = 0.017$) (Table 1). In contrast, intractable postpartum hemorrhage (PPH) (2 vs. 7, $p = 0.057$) and uterine rupture (1 vs. 3, $p = 0.604$) were more frequently associated with emergencies (Table 1). A single cesarean scar pregnancy required mid-trimester emergency obstetrical hysterectomy for uncontrollable bleeding.

Clinical and maternal characteristics: No significant differences were found between groups regarding advanced maternal age (≥36 years) (4 vs. 4, $p = 1.000$) or high parity (≥3) (6 vs. 7, $p = 1.000$). Prior lower segment cesarean sections (LSCS) were present in most cases i.e. 89.18%, with a slightly higher frequency in elective procedures (16 vs. 12, $p = 0.124$). PAS was significantly associated with elective hysterectomy (15 vs. 8, $p = 0.017$), whereas other indications were more frequent in emergencies (11 vs. 3, $p = 0.017$) (Table 2). Subtotal hysterectomy was the predominant procedure in both groups (Table 2).

Table 1. Indications of obstetric hysterectomy (n=37; Elective OH= 18, Emergency OH= 19)

S. No.	Indication	Elective n (%)	Emergency n (%)	p-value
1.	Placenta accreta spectrum (PAS)	15 (83.3)	8 (42.1)	0.017*
	Placenta accreta (PAS)	11 (61.1)	6 (31.6)	0.358
	Placenta increta (PAS)	2 (11.1)	2 (10.5)	1.000
	Placenta percreta (PAS)	2 (11.1)	0	0.488
2.	Intractable postpartum hemorrhage	2 (11.1)	7 (36.8)	0.057
3.	Rupture uterus	1 (5.5)	3 (15.7)	0.604
4.	Caesarean scar pregnancy	0	1 (5.2)	1.000
	Total	18	19	

(*p <0.05 considered statistically significant. PAS= Placenta accreta spectrum; PPH= Postpartum hemorrhage)

Table 2. Clinical and Maternal Characteristics (n=37; Elective OH= 18, Emergency OH= 19)

S. No.	Characteristic / Variable	Elective n (%)	Emergency n (%)	*p-value*
1.	Age ≥ 36 years	4 (22.2)	4 (21.1)	1.000
2.	Parity ≥ 3	6 (33.3)	7 (36.8)	1.000
3.	Prior LSCS ≥ 1	16 (88.9)	12 (63.2)	0.124
4.	Gestational age ≥ 37 weeks	6 (33.3)	6 (31.6)	1.000
5.	Subtotal hysterectomy	12 (66.7)	16 (84.2)	0.269
6.	Total hysterectomy	6 (33.3)	3 (15.8)	0.269

(LSCS= Lower segment cesarean section; *p* <0.05 considered statistically significant.)

Anesthetic and perioperative management: Regional anesthesia alone (spinal/CSEA) was more frequent in elective cases (7 vs. 3, $p = 0.151$), while emergency procedures more often required conversion from spinal to general anesthesia (4 vs. 10, $p = 0.091$) or exclusive general anesthesia (2 vs. 6, $p = 0.232$) (Table 3). Intra-operative complications that were noted include hypotension, hemorrhagic shock & bladder injury. Intra- and postoperative complication rates were comparable (11 vs. 13, $p = 0.904$, and 7 vs. 11, $p = 0.408$, respectively). However, the need for inotropic support (13 vs. 6, $p = 0.071$) and ICU stay of more than 24 hours (10 vs. 4, $p = 0.091$) was greater in the emergency group (Table 3). Maternal deaths were also concentrated in emergencies mainly due to associated medical complications like Dengue NS1Ag positive status, cardiomyopathy, etc. (4 vs. 1, $p = 0.340$).

Table 3. Anesthetic and perioperative management (n=37; Elective OH= 18, Emergency OH= 19)

S. No.	Variable	Elective n (%)	Emergency n (%)	p-value
1.	Spinal / CSEA only	7 (18.91%)	3 (8.10%)	0.151
2.	Converted SA to GA	4 (10.81%)	10 (27.02%)	0.091
3.	General anesthesia only	2 (5.40%)	6 (16.21%)	0.232
4.	Intra-op complications	11 (29.72%)	13 (35.13%)	0.904
5.	Post-op complications	7 (18.91%)	11 (29.72%)	0.408
6.	Inotropic support required	6 (16.21%)	13 (35.13%)	0.071
7.	ICU stay > 24 hrs	4 (10.81%)	10 (27.02%)	0.091
8.	Maternal outcome (maternal mortality)	1	4	0.340

(p <0.05 considered statistically significant; SA= Spinal anesthesia; GA = General anesthesia; CSEA= Combined spinal epidural anesthesia; ICU = Intensive care unit)

Since intraoperative blood loss and transfusion requirement formed a crucial determinant of maternal outcome, a detailed comparison of blood and blood product utilization between elective and emergency OH cases were undertaken and is summarized in table 4. The mean number of packed red blood cell (PRBC) units transfused was 3.22 ± 1.26 in elective and 4.58 ± 1.64 in emergency OH cases, showing a statistically significant difference ($p = 0.007$).

Although the mean number of RDP and FFP units transfused was found to be higher in

emergency OH cases (RDP = 2.42 ± 1.71 vs 2.22 ± 1.56, FFP = 3.47 ± 0.91 vs 2.61 ± 2.06), the differences were statistically insignificant ($p > 0.05$).

Overall, the total blood product utilization was markedly greater in emergency cases (199 units) compared with elective cases (145 units), reflecting the increased intraoperative blood loss and hemodynamic instability encountered in unplanned surgeries.

Table 4. Blood transfusion dynamics in elective and emergency OH cases.

Blood product	Elective (Mean ± SD)	Emergency (Mean ± SD)	*p*-value
PRBC (units)	3.22 ± 1.26	4.58 ± 1.64	0.007*
RDP (units)	2.22 ± 1.56	2.42 ± 1.71	0.713
FFP (units)	2.61 ± 2.06	3.47 ± 0.91	0.116
Total blood products (units)	145	199	—

(*p <0.05 considered statistically significant. PRBC = packed red blood cell; RDP = random donor platelet; FFP = fresh frozen plasma)

Postoperative complications: Elective cases had fewer adverse postoperative outcomes. Wound infection/ SSI (3 vs. 2, $p = 0.660$), anemia (2 vs. 5, $p = 0.405$), and paralytic ileus (1 vs. 2, $p = 1.000$) were more common in emergencies (Table 4). Shock-related complications (TRALI/cardiomyopathy) were exclusive to emergencies (n = 3, $p = 0.230$). A higher proportion of elective cases had uneventful recovery compared to emergencies (10 vs. 6, $p = 0.255$) (Table 5).

Table 5. Postoperative complications (n=37; Elective OH= 18, Emergency OH= 19)

S. No.	Complication	Elective n (%)	Emergency n (%)	p-value
1.	Wound infection/SSI	3 (16.7)	2 (10.5)	0.660
2.	Anemia	2 (11.1)	5 (26.3)	0.405
3.	Blood transfusion reaction	1 (5.5)	0	0.486
4.	Paralytic ileus	1 (5.5)	2 (10.5)	1.000
5.	Pulmonary edema	1 (5.5)	1 (5.2)	1.000
6.	Shock- related complications	0	3 (15.8)	0.230
7.	None	10 (55.6)	6 (31.6)	0.255

(p <0.05 considered statistically significant; SSI = Surgical site infection, Shock-related complications e.g., TRALI, cardiomyopathy; TRALI= Transfusion-related acute lung injury)

DISCUSSION

The findings of this study emphasize the distinct clinical characteristics and outcomes associated with elective and emergency obstetric hysterectomies. Placenta accreta spectrum (PAS) emerged as the most frequent indication for hysterectomy, particularly in elective cases (Table 1), highlights the value of antenatal diagnosis and multidisciplinary planning. Conversely, emergency hysterectomies were mainly performed for intractable postpartum hemorrhage (PPH) and uterine rupture (Table 1) - conditions that typically occur in hemodynamically unstable patients, as similarly documented in previous reports [1,2,5]. Elective procedures demonstrated a more favorable clinical course, characterized by fewer postoperative complications, lower rates of ICU admission, and reduced inotropic requirements compared with emergency surgeries (Table 3). Maternal deaths occurred almost exclusively in the emergency group (Table 2), supporting the consistent observation in the literature that delayed or unplanned hysterectomy following uncontrolled hemorrhage carries a significantly poorer prognosis [5,9,16].

Anesthetic choices further reflected this clinical disparity. Regional anesthesia was achievable in most elective cases, while a large proportion of emergency cases required conversion to or induction with general anesthesia due to hemodynamic instability (Table 3). This trend aligns with earlier multicenter data demonstrating similar

anesthetic challenges in emergency obstetric hysterectomy [16].

The analysis of transfusion dynamics revealed a considerably greater blood requirement in emergency hysterectomies. Women in this group received significantly more packed red blood cells (PRBCs) than those in the elective group, highlighting their higher intraoperative blood loss and unstable clinical condition. Although random donor platelet (RDP) and fresh frozen plasma (FFP) use was also elevated among emergencies, these differences were statistically insignificant, possibly due to the smaller cohort size and patient-specific transfusion protocols guided by coagulation profiles. The overall blood product utilization was substantially higher in emergency cases (199 units) than in elective procedures (145 units), emphasizing the magnitude of hemorrhage and the need for prompt transfusion support in unplanned surgeries. These results are in line with prior studies that identified emergency obstetric hysterectomy as a major blood loss event, frequently requiring massive transfusion protocols and close coordination among obstetricians, anesthesiologists, and transfusion services. Comparable findings were reported by Nambiar et al. and Shamsa et al. [17,18], who noted that emergency hysterectomies required significantly more blood and blood components than planned interventions. In contrast, elective procedures performed for antenatally diagnosed PAS benefited from preoperative optimization, scheduled cross-matching, and ready blood bank availability, leading to reduced transfusion needs and improved maternal stability.

Postoperative morbidity was also predominantly observed among emergency cases, with shock-related complications being more frequent, while most elective procedures resulted in uneventful recoveries (Table 4). These observations are consistent with previous studies showing that planned hysterectomy for PAS results in markedly lower maternal morbidity and mortality compared to emergency surgeries [7,13].

The strong association between prior cesarean delivery and PAS observed in this study mirrors the global trend, where increasing cesarean rates have led to a rise in PAS incidence and, consequently, in obstetric hysterectomy rates [6–9,11,12]. Early identification of PAS and timely elective intervention have been shown to improve maternal survival and minimize complications [10,13].

In summary, the current study reaffirms that emergency obstetric hysterectomy remains linked with higher morbidity and mortality, primarily due to uncontrolled hemorrhage and delayed surgical intervention (Tables 2–5). Strengthening antenatal screening for PAS, enhancing referral systems, and promoting a planned multidisciplinary surgical approach are pivotal to improving maternal outcomes in high-risk pregnancies [3,14,15].

CONCLUSION

This study provides prospective data comparing elective and emergency obstetric hysterectomies at a tertiary care center, highlighting the impact of multidisciplinary planning on maternal outcomes. Elective procedures, often for placenta accreta spectrum, were associated with lower blood loss, fewer complications, less ICU admissions and better outcomes, whereas emergency hysterectomies carried higher morbidity and mortality, especially where blood availability is critical and ICU management is a game changer. As a tertiary center, our institute manages more complicated cases, which may introduce a referral bias. Strengthening antenatal screening, timely referral, adequate blood bank support, and planned multidisciplinary interventions can improve maternal safety. However, as a single-center observational study, findings may not be generalizable, and further multicenter research is needed to validate these findings.

Declaration by Authors

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