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Maternal and fetal outcomes following emergency obstetric hysterectomy in a tertiary care center- A cross-sectional study.

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Abstract

Background: When choosing to perform an emergency obstetric hysterectomy, the surgeon faces more challenges than in any other obstetrical or gynecological procedure. It is frequently a very tough choice that calls for sound professional judgment. However, due to the growing frequency and trend of Caesarean deliveries worldwide, placenta accreta has been highlighted in more recent reports as the most common indication.
Objectives- To assess the incidence, demographic profile, indications, risk factors, fetomaternal outcome, and problems related to emergency obstetric hysterectomy.

Materials and methods: The study was a prospective, cross-sectional study. The study was carried out at Baba Raghav Das Medical College in Gorakhpur, Uttar Pradesh, India, a tertiary referral hospital, for a period of two years, from August 2019 to August 2021. A total of thirty-six cases of emergency obstetric hysterectomy were enrolled during the study period.

Results: The study observed an overall incidence of 3.48 per 1000 deliveries for emergency obstetric hysterectomy, with a higher rate following caesarean sections (5.70 per 1000 deliveries). Most women were aged 21–30 years (50%) and were multigravida with a parity of 1–2. The majority (69.5%) underwent surgery at term (≥37 weeks). Placenta accreta spectrum (47.22%) and atonic postpartum hemorrhage (25%) were the most common indications. Significant maternal complications, including maternal mortality and notable neonatal morbidity, including NICU admissions and two neonatal deaths, were also recorded.

Conclusion: Only in cases where it's life-threatening, near-miss cases, and preventive measures fail to arrest bleeding, an emergency obstetric hysterectomy needs to be performed. Placenta accreta spectrum is the most common indication noted recently.

Recommendations: Further investigation and the development of guidelines and protocols for high-risk cases require a greater number of participants and a multicenter study approach.

Keywords: *Pregnancy, Emergency Obstetric Hysterectomy, Atonic, Postpartum hemorrhage, Placenta Accreta Spectrum, Life-threatening complications*
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Introduction

In an emergency obstetric hysterectomy (EOH), the uterus is surgically removed after a cesarean section or after vaginal delivery, or within 42 days of delivery. The procedure is typically carried out when a potentially fatal obstetric hemorrhage persists despite the use of medical and surgical techniques. Cesarean hysterectomy can be considered an elective procedure for the treatment of incidental conditions such as cervical intraepithelial neoplasia (CIN); nonetheless, it is typically scheduled as an emergency and is often life-saving [1, 2, 3].

When choosing to perform an EOH, the surgeon faces more challenges than in any other obstetrical or gynecological procedure. Although it is the last option to preserve a woman's life, her potential to procreate is also forfeited. It is frequently a very tough choice that calls for sound professional judgment [4]. Despite having a low prevalence, peripartum hysterectomy is a major procedure in contemporary obstetrics and is linked to a high rate of morbidity and mortality [5].

It was generally observed that case of prolonged or obstructed labor is followed by uterine sepsis or uterine atonicity, or even rupture uterus, leading to uncontrollable hemorrhage [6].

In the past, rupture of the uterus and atony were thought to be the most frequent reasons for an emergency hysterectomy. However, due to the growing frequency of Caesarean deliveries worldwide, placenta accreta has been highlighted in more recent reports as the most common indication.

A rare pregnancy condition that can have disastrous effects on both the mother and the unborn child is uterine rupture. It has been said that the nulliparous uterus is "rupture to immune virtually," particularly before the commencement causing contractions. Caesarean sections, hysterotomies, myomectomy, placenta percreta, uterine mullerian abnormalities, and prior severe curettage of the uterus exacerbating perforation are the six factors of the risk for rupture of the uterus during the antepartum period [7].

To assess the incidence, demographic characteristics, indications, risk factors, fetomaternal outcome, and problems related to obstetric hysterectomy, the study was carried out.

Methodology

Study design

The study was a prospective, cross-sectional study.

Study setting

The study took place at a tertiary care referral centre, Baba Raghav Das Medical College in Gorakhpur, Uttar Pradesh, India. The study duration was two years, that is, from August 2019 to August 2021.

Study population

The study population comprised a total of 10,344 women who delivered at the BRD Medical College during the study period. Women who had a hysterectomy for obstetric reasons, either intrapartum or later within the designated puerperium period, and gave birth after 28 weeks of gestation were included. Women who had a hysterectomy for non-obstetrical causes, delivered birth before 28 weeks of pregnancy, or had the procedure done after the 42-day postpartum period were not included in the study.

Data collection

A collection of data, including sociodemographic details such as age, parity, and gravida, was conducted. Relevant obstetric and medical history, including antenatal care, previous cesarean sections or uterine surgeries, and complications in the current pregnancy, were also documented. Delivery details, such as the mode of delivery, were recorded. The various indications, preventive measures taken were listed. Maternal outcomes were assessed in terms of ICU admission, duration of hospital stay, postoperative complications such as bladder injury, fever, wound infection, Disseminated Intravascular Coagulation (DIC), blood products needed, need for vasopressor, and maternal mortality. Neonatal complications were noted in the form of SNCU/NICU admission and mortality.

Efforts to reduce bias

Strict inclusion criteria and systematic data gathering techniques were employed to lessen bias. To maintain uniformity, every case was handled at a single facility.

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However, as many patients were late referrals from other clinics, referral bias might be present.
Study Procedure- Every case was thoroughly examined, paying particular attention to the maternal and fetal outcomes, maternal profile, indication of surgery, complications, morbidity, and mortality of the mother and fetus.

Sample size

Based on previous regional studies and available literature, the estimated prevalence of EOH was assumed to be approximately 15%. With a 95% confidence level and an absolute precision (margin of error) of 5%, the sample size was calculated using the formula:
$n=d2Z2\times p\times(1-p)$
Where:
n = required sample size
Z = 1.96 (standard normal deviate at 95% confidence level)
p = estimated prevalence (0.15)
d = margin of error (0.05)

Statistical analysis

Excel 2010 was used to record the data. Software called SPSS (version 20.0) was used for statistical analysis. Data were presented as the number of participants and the percentage of participants.

Ethical clearance

The study protocol was reviewed and approved by the Institutional Ethics Committee of Baba Raghav Das Medical College in Gorakhpur, Uttar Pradesh, India.

Informed consent

Written informed consent was obtained from all participants before their enrolment in the study.

Results

36 women who had an emergency obstetric hysterectomy after 28 weeks of gestation were included in the study, which comprised 10,344 deliveries. No instances were lost to follow-up, and all 36 were monitored while they were in the hospital. The results for both the mother and the fetus were examined.
The analysis of the mode of delivery and its association with Emergency Obstetric Hysterectomy (EOH) among 10,344 deliveries revealed that the overall incidence of EOH was 3.48 per 1000 deliveries. Of the total 36 cases of EOH, 13 (36.11%) occurred following normal vaginal delivery (6310), with an incidence rate of 2.06 per 1000. In contrast, 23 cases (63.89%) followed caesarean sections (4034), reflecting a higher incidence of 5.70 per 1000 deliveries. These findings indicate that EOH was more frequently associated with caesarean sections than with vaginal deliveries, suggesting a higher risk of severe obstetric complications necessitating hysterectomy in surgical births (Table 1).

Table 1: Incidence of mode of delivery and emergency obstetric hysterectomy (N = 36)

Mode of Delivery	Frequency	Emergency Obstetric Hysterectomy	Percentage (%) of total EOH	Incidence of EOH per/1000
Normal Vaginal Delivery	6310 (61%)	13 (0.2%)	36.11%	2.06
Caesarean Section	4034 (39%)	23 (0.57%)	63.89%	5.70
Total	10344	36	100%	–

Table 2 shows that most women were aged 21–30 years (50%) and were multigravida with a parity of 1–2. The majority (69.5%) underwent surgery at term (≥37 weeks). Emergency obstetric hysterectomy was most frequently performed during intrapartum (around 64%) and within 24 hours postpartum (around 25%)

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Table 2. Demographics of participants

Parameters	Frequency	Percentage
Age (in years)		
< 20	580	5.6%
21–30	5172	50.0%
31–40	3731	36.1%
> 40	860	8.3%
Gravida		
G1	1724	16.7%
G2–G3	5754	55.6%
≥G4	2866	27.7%
Parity		
P0	1438	13.9%
P1–P2	6610	63.9%
≥P3	2296	22.2%
Gestational Age at Surgery		
28–32 weeks	1148	11.1%
33–36 weeks	2006	19.4%
≥37 weeks	7190	69.5%
Timing of Hysterectomy		
Within 24 hours postpartum	9	25 %
2–7 days postpartum	3	8.3 %
>7 days postpartum	1	2.8 %

The analysis of indications for Emergency Obstetric Hysterectomy (EOH) among 36 patients revealed that Placenta Accreta Spectrum was the most common cause, accounting for 47.22% of cases, with a significantly higher occurrence following caesarean section (15 out of 17 cases). Atonic postpartum hemorrhage was the second most frequent indication, seen in 25% of cases, more commonly associated with vaginal deliveries. Uterine rupture accounted for 19.44% of the EOH cases, distributed across both modes of delivery. Less common indications included Traumatic PPH and Broad ligament hematoma, each comprising 2.78%, while Abruption placentae did not contribute to any cases. One case was attributed to uterine inversion (Table 3).

Table 3. Several indications were observed among participants

Indications for Obstetric Hysterectomy	Vaginal Delivery (N=13)	Caesarean Section (N=23)	Total (N=36)	Frequency (%)
Placenta Accreta Spectrum	2	15	17	47.22%
Atonic Postpartum Hemorrhage	5	4	9	25%
Traumatic PPH	1	0	1	2.78%
Abruption Placentae	0	0	0	0%
Uterine Rupture	4	3	7	19.44%
Broad Ligament Hematoma	0	1	1	2.78%
Uterine inversion	1	0		2.78
Total	13	23	36	100%

Table 4 highlights the uterine-sparing interventions used in both modes of deliveries(13 vaginal, 23 caesarean). Uterine artery ligations were the most common method used among both groups. (76% in vaginal and 56% in caesarean section) followed by internal artery ligation and Foley's tamponade. B-Lynch and modified B-Lynch sutures were most common,

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used in 16 and 2 cases, respectively. Despite these measures, hysterectomy was ultimately necessary in all cases.

Table 4: Measures taken to arrest bleeding and prevent obstetric hysterectomy (N = 36)

Measures Taken to Prevent Obstetric Hysterectomy	Vaginal Delivery (n = 13)	Caesarean Section (n = 23)
Foley's catheter tamponade	7 (53.85%)	2 (8.70%)
Bilateral uterine artery ligation	10 (76.92%)	13 (56.52%)
Bilateral Internal Iliac artery ligation	7 (53.85%)	9 (39.13%)
B-Lynch suture	6 (46.15%)	10 (43.48%)
Modified B-Lynch suture	0 (0%)	2 (8.70%)
Medical management	8 (61.54%)	4 (17.39%)

Table 5 shows that packed red blood cells (RBCs) and fresh frozen plasma were the most frequently used blood products, especially in placenta accreta and atonic PPH cases. Platelets and cryoprecipitate were used selectively in abruption and uterine rupture. Whole blood was rarely administered alone, indicating a preference for component therapy.

Table 5: Number of patients requiring blood products in emergency obstetric hysterectomy (N = 36)

Indications for Obstetric Hysterectomy	Whole Blood	Packed RBCs	Fresh Frozen Plasma	Platelets	Cryoprecipitate
Placenta Accreta Spectrum	10	14	12	4	2
Atonic Postpartum Hemorrhage	4	8	6	3	1
Abruption Placentae	1	1	1	0	0
Uterine Rupture	3	3	2	1	1
Broad Ligament Hematoma	1	1	1	0	0

Table 6 presents the maternal complications observed among 36 patients who underwent emergency obstetric hysterectomy. Fever was the most common complication, affecting 27.78% of patients, followed by the need for vasopressor support in 22.22% of cases. ICU admission was required in 16.67% of patients, while disseminated intravascular coagulation (DIC) occurred in 13.89%. Less frequently observed complications included wound sepsis and gaping (8.33%), relaparotomy (5.56%), and mortality (5.56%). These findings highlight the significant morbidity associated with obstetric hysterectomy, emphasizing the need for close postoperative monitoring and timely critical care support.

Table 6: Maternal complications observed following obstetric hysterectomy (N = 36)

Adverse Effects	Number	Percentage (%)
Fever	10	27.7
Disseminated Intravascular Coagulation (DIC)	5	13.8
Wound sepsis and wound gaping	3	8.3
Need for a vasopressor	8	22.2
ICU admission	6	16.6
Mortality	2	5.5
Relaparotomy	2	5.5
Total	36	100

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Fetal outcomes associated with the 36 obstetric hysterectomy cases revealed that 52.78% of the deliveries resulted in healthy newborns. However, 22.2% of the neonates required SNCU (Special Newborn Care Unit) admission, and 19.4% were admitted to the NICU, indicating significant neonatal morbidity. There were two cases of neonatal mortality (5.56%), underscoring the potential risk to fetal well-being in situations necessitating maternal hysterectomy (Table 7).

Table 7: Neonatal outcomes associated with obstetric hysterectomy Cases (N = 36)

Fetal Outcome	Number	Percentage (%)
Healthy newborn	19	52.78
SNCU admission	8	22.2
NICU admission	7	19.4
Mortality	2	5.56

Table 8 compares the incidence rate of EOH observed in the present study with that of earlier studies.

Study	Incidence of EOH (%)	Common indication	Maternal mortalities
Present Study	0.34	Placenta Accreta Spectrum	5.55 %
Dani et al. [1]	0.17	Placenta pervia	15.38%
Chawla et al. [10]	0.08	Atonic postpartum hemorrhage	17.7%
Nwobodo et al. [11]	0.51	Ruptured uterus	16.3%
Hota & Swain [14]	1.9	Uterine rupture	5.3%
Deb et al. [15]	0.76	Ruptured uterus	11.11%

Discussion

Emergency obstetric hysterectomy (EOH) has evolved significantly since Porro of Milan first reported the successful procedure in which both mother and child survived, a milestone that led to the naming of the operation as the "Porro procedure" [8]. Despite advancements in surgical techniques, anesthesia, and uterotonic agents, postpartum hemorrhage (PPH) remains a leading cause of maternal morbidity and mortality globally. With the rise in caesarean deliveries, myomectomy, cerclage, and morbid adherent placenta have become a challenging issue. While the relative importance of some traditional warning signs has diminished with modern clinical practices, the complexity and variability in the presentation of PPH in contemporary obstetrics have contributed to an increased number of hysterectomies as a life-saving measure [9].

In the study, the incidence of emergency obstetric hysterectomy was 0.34%, which aligns almost nearly with previously reported rates by Dani et al. (0.17%) and Chawla et al. (0.08%) [1, 10]. The little higher incidence was due to being a tertiary referral centre getting complicated cases with late referrals and poor maternal demographic backgrounds, and an advanced obstetrics score. However, this incidence is notably lower than those reported in studies from Nigeria (0.51%) and India (0.52%) [11]. This difference can be attributed to our study setting—a centrally located metropolitan tertiary care centre with ICU and blood bank backup with critical care setups, where the majority of deliveries are institutional and planned, thereby allowing for better prenatal and intranatal management and timely interventions.

Consistent with findings from studies conducted in China and India, our results indicate a strong association between EOH and caesarean section, with 63.89% of cases occurring following caesarean delivery and only 36.11% after vaginal birth [12, 13]. This highlights a critical area for public health intervention: increasing awareness of the potential long-term risks associated with caesarean sections. Reducing the rate of unnecessary elective caesareans may play a key role in lowering the incidence of EOH and improving maternal outcomes.

Advancements in uterine-sparing techniques, such as bilateral uterine artery and internal iliac artery ligation, balloon tamponade, B-Lynch, and modified B-Lynch sutures, have shown promise in managing atonic uterus-related hemorrhage. These interventions have likely contributed to a decline in EOH cases, primarily attributed to uterine atony [10]. In our findings as well, uterine atony accounted for 25% of EOH cases, whereas morbidly

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adherent placenta and placenta previa with accreta together accounted for over 58%, underscoring the shifting trend in primary indications for EOH from atony to abnormal placentation [14, 15].

Despite the use of multiple conservative interventions before hysterectomy, such as bilateral uterine artery ligation, internal iliac artery ligation, and uterine compression sutures, EOH remained necessary in cases of uncontrolled bleeding. The associated maternal complications observed in our study were substantial. These included the need for vasopressor support (71.4%), fever (57.1%), ICU admission (28.6%), DIC (21.4%), and one case of maternal death (7.1%). These findings reinforce the severity of the clinical scenarios in which EOH is performed and highlight the importance of timely decision-making and multidisciplinary management in improving maternal outcomes.

Generalizability

This study's single-center design, small sample size, and emphasis on high-risk subjects referred to a tertiary care hospital limit its generalizability. The results might not apply to groups with distinct demographics or profiles of healthcare access, or to primary or secondary care settings.

Conclusion

The study concluded that although rare, emergency obstetric hysterectomy is a critical life-saving surgical procedure done in extreme situations during or after childbirth when severe bleeding can't be controlled, or in near-miss situations. Early intervention and timely decision-making improve fetomaternal outcomes. It requires a skilled surgical team and ICU support. Despite timely surgical intervention and supportive measures like blood products and ICU care, a considerable proportion of patients experienced intraoperative and postoperative complications. Although maternal and fetal mortality rates were low, the high incidence of maternal and neonatal morbidity underscores the critical need for early risk identification, multidisciplinary preparedness, and robust obstetric care protocols. Emotional care post-surgery is crucial.

Limitations

One of the drawbacks of the study was that we only collected data from one center. Presenting the results in the context of a quickly developing nation with access that can be easy to hospitals, scheduled cases, and a high rate of institutional deliveries, however, is a noteworthy strength.

Recommendations

Emergency obstetric hysterectomy is expected to become more common in the future due to the rising rates of high-risk pregnancies, multiple pregnancies, and caesarean sections. Sound clinical judgment, timely action, fast decision-making, and good surgical skills are essential to the mother's well-being. Further investigation and the development of guidelines and protocols for high-risk cases require a greater number of participants and a multicenter study approach.

List of abbreviations

EOH- Emergency obstetric hysterectomy
ICU- Intensive care unit
NICU- Neonatal Intensive Care Unit
CIN- Cervical intraepithelial neoplasia
DIC- Disseminated Intravascular Coagulation
RBCs- Red Blood Cells
PPH- Postpartum Hemorrhage

Source of funding

There was no external funding; the study was self-funded by the department.

Conflict of interest

The authors declare no conflict of interest.

Author contributions

All authors contributed to the study design, data collection, analysis, and manuscript preparation.

Data availability

The data generated during this study are available from the corresponding author upon reasonable request.

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