Emergency Peripartum Hysterectomy In Mendefera Hospital-Case Control Study

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Research Article

Keywords: Eritrea, Mendefera, Hemorrhage, Emergency peripartum hysterectomy, Incidence, Indication, Feto-maternal outcome.

Posted Date: July 12th, 2021

DOI: <https://doi.org/10.21203/rs.3.rs-620623/v1>

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Abstract

Background

Emergency peripartum hysterectomy is a life-saving procedure which involves the surgical removal of uterus and is usually performed for uncontrollable maternal haemorrhage when all other conservative management has failed. The aim of this study was to determine the incidence, indication, risk factors and perinatal/maternal outcome related to EPH performed in Mendefera Regional Referral Hospital

Methods

Case-control study was carried out in women, who underwent EPH over a period of almost 8 years. Controls were women, who had spontaneous vaginal delivery or were delivered by Caesarean section, without EPH. The findings were analyzed using Stata 14.

Results

During the study period, there were a total of 15,527 deliveries and 31 cases of emergency peripartum hysterectomies, giving an incidence of 2 per 1000 deliveries. The mean age, parity, and hospital stay of the cases was 31.5, 4.0 and 5.5 respectively. The main indications for the procedure were uterine atony (38.7%) and uterine rupture (25.8%). Factors showing a significant association with EPH were: being 40+ years of age (OR 10.6; 95%CI 1.5–76.1), being grand multiparous (OR 8.0; 95%CI 2.1–30.4) and CS on the index pregnancy (OR 16.6; 95%CI 7.80–35.95). Subtotal hysterectomy was performed in majority (74%) of cases. The case fatality rate and stillbirth rate was 13% and 34.4% respectively.

Conclusion

The incidence of EPH in our institution is very high and fetal outcome was poor. The commonest indication for EPH was severe hemorrhages most notably caused by uterine atony or uterine rupture, which are largely preventable.

Background

Emergency peripartum hysterectomy (EPH) is a life-saving surgical removal of the uterus performed to stop uncontrollable bleeding at the time of delivery or in the immediate postpartum period. [1–3]. It is a “near-miss” maternal morbidity event [4, 5]. EPH includes both Cesarean hysterectomy and hysterectomy following vaginal birth [1, 2, 4].

Worldwide, the rate of EPH varies widely. The range of its estimated rate in high income countries (HIC) varies from 0.2 to 5 per 1000 births, whereas the in low income countries (LIC) incidence varies from 4 per

1000 in Nigeria to 11 per 1000 deliveries in Pakistan [1, 4–6, 9]. Several studies have shown that the incidence of EPH has been increasing over time, possibly due to an increase in the rate of Cesarean section (CS) [1–3, 6–10]. Evidence also showed that primary and repeat CS, as well as vaginal birth after CS was associated with higher rates of EPH [1–3, 7, 8–12].

The main risk factor for EPH is uncontrollable hemorrhage, most commonly associated with uterine rupture, retained placenta, morbidly adherent placenta or uterine atony not treatable by more conservative measures [1–5, 11–13]. Other risk factors are advanced maternal age, higher parity, and Cesarean delivery of previous or current pregnancy [5, 13–16]. Indications for EPH have changed throughout the years. According to systematic review study on EPH in HIC by Rossi et al, the commonest indications for EPH are abnormal placental attachment (38%), uterine atony (29%), uterine rupture (12%) and others (21%)[1]. In LIC, uterine atony and ruptured uterus are the most common indication for EPH [16, 18, 27].

EPH is rare, but is associated with increased rates of maternal and perinatal morbidity and mortality, and procedural complication [1–3, 17–19, 24]. It is arguably one of the most devastating complications in obstetrics, resulting in adverse outcomes for women desiring to maintain their fertility [1–3, 17–19, 24]. The main issues related to EPH include persistent blood loss, need for blood transfusion, febrile morbidity, conducting a major surgical procedure, end to maternal fertility and higher rate of maternal death [17–26]. The rates of stillbirth, neonatal death, preterm delivery and admission to the neonatal intensive care unit are also higher in babies of women, who undergo peripartum hysterectomy than babies of women, who do not undergo hysterectomy [3].

There is a lack of data on EPH in Eritrea. To our knowledge, there is no published information on EPH in Eritrea. The purpose of this study is to collect baseline data on the incidence, indication, risk factors and perinatal/maternal outcome related to EPH performed in Mendefera Regional Referral Hospital (MRRH). This would help to identify avoidable factors, and stress the need to organize health care services so as to improve maternal and fetal outcomes.

Methods

Study Design and Setting

This is a retrospective and institution-based, case-control study. The study was conducted at MRRH on women, who were managed by EPH. The Hospital accommodates the National Fistula Center and the Departments that handle Medical, Surgical, Pediatric and Obstetrics/Gynecological problems, including the provision of 24-hour emergency obstetric care services. It is situated in the Southern Region of Eritrea at the city of Mendefera, about 50 Km south of the capital city of Asmara. The hospital handles, on average, 2200 deliveries per year.

Study Participants and Study Period

Case selection

The study cases were women, who underwent hysterectomy at the time of delivery and the immediate peripartum period. The cases were retrospectively collected from the maternity ward and operating theatre registers, as well as from the patients' case files at the hospital medical records office, from January 1, 2013 to August 31, 2020.

Selection of controls

Controls were women, who had spontaneous vaginal delivery or were delivered by CS at gestational age of 28 weeks or more and did not have EPH. For every case, four consecutive in-patient chart numbers were picked and used as controls.

Data collection

Data was abstracted from the maternity ward and operating theatre registers, as well as from the patients' case files at the hospital medical records office, using a structured checklist. Medical records were reviewed and pertinent maternal and newborn information was recorded starting with socio-demographic characteristics and going through obstetric, gynecological, medical and surgical history. This includes the women's age, address, obstetric and surgical history; indication for surgery; type of surgical intervention (total or subtotal hysterectomy); maternal and fetal outcome; length of hospital stay; and other relevant information. The primary indications for EPH were recorded under the following headings: uterine atony, uterine rupture, placenta accreta, placenta previa and others. The term placenta accreta encompasses all cases of morbidly adherent and invasive placenta. The collected data were cleaned and checked for completeness and reliability before data entry.

Data Processing and Analysis

Statistical analysis was performed using Stata 14. Numerical data were analyzed using mean $\pm$ standard deviation. Frequencies and percentages were used to describe the characteristics of the study population. To determine the strength of the associations among the variables Odds Ratios along with 95 percent confidence intervals were calculated. In addition, t-test was employed for the quantitative data to determine the differences between cases and controls. The p-value of less than 0.05 was considered statistically significant.

Results

During the study period, there were a total 15,527 deliveries at MRRH, out of which 12,320 (79%) were vaginal deliveries and 3,207 (21%) were deliveries by CS. There were a total of 31 mothers who had EPH, giving an overall incidence rate of 2/1000 deliveries. Of the 31 EPH, 84% (n = 26) were performed after delivery by CS and 16% (n = 5) had EPH following vaginal birth, giving an incidence rate of 8/1000 Cesarean deliveries and 0.4/1000 vaginal deliveries respectively (OR 20, P 0.000, 95% CI 7.6–75.8).

The maternal and delivery characteristics of women, who underwent EPH during the study period, are presented in Table 1. The mean maternal age of the cases was 31.5 ± 7 (range 18–43). The most common age group for women having EPH was 30–39 (48.4%) followed by 20–29 (29%). Women

undergoing EPH were over represented in the 30–39(OR 3.4; 95%CI 0.69–16.3) and 40 and over age groups (OR 10.6; 95%CI 1.5–76.1), compared with the respective age groups for the control.

The range of parity is 0 to10, with mean parity of 4 ± 2.6 . There were 9.7% (n = 3) primgravida and 12.9% (n = 4) primiparous women. The proportion of grand multiparas was 48.4% (n = 15). The odds of requiring EPH in grand multiparous (≥ 5) were 2 times higher than para 2–4; and 4 times higher than primiparous women. There is significant association between parity and EPH ($p < 0.005$), which shows that the incidence of EPH increases as parity increases.

The majority (84%) of women, who underwent EPH gave birth by CS, whereas in the control group the majority (76%) of them gave birth by vaginal delivery. In this study, CS was a strong risk factor for EPH in the index pregnancy (OR 16.6; 95%CI 7.80-35.95). There was no difference in proportion of history of previous Caesarean section delivery in the EPH and control group. In this study association of history of previous Caesarean delivery and EPH was not observed.

Table 1
Maternal and delivery characteristics of cases of EPH

Characteristics	Cases N = 31(%)	Controls N = 124(%)	OR (95% CI)	P
<i>Age (years)</i>				
< 20	2(6.5)	17(13.7)	1	
20–29	9(29.0)	65(52.4)	1.2(0.23–5.96)	0.844
30–40	15(48.4)	38(30.7)	3.4(0.69–16.3)	0.130
≥ 40	9(16.1)	4(3.2)	10.6(1.5–76.1)	0.019
Mean ± SD	31.5 ± 7	27 ± 6.5	0.9 (0.852–0.961)	0.003
<i>Previous Pregnancy</i>				
0	3 (9.7)	40 (32.2)	1	
1	4 (12.9)	25 (20.2)	2.1(0.44–10.3)	0.347
2–4	9 (29)	34 (27.4)	3.5(0.88–14.1)	0.074
≥ 5	15 (48.4)	25 (20.2)	8.0(2.1–30.4)	0.02
Mean ± SD	4 ± 2.6	2 ± 2	0.73 (0.618–0.860)	0.001
<i>Mode of Delivery</i>				
Caesarean	26 (84)	30 (24)	16.6(7.80-35.95)	0.000
Vaginal	5 (16)	94(76)	1	
<i>Previous Caesarian Delivery</i>				
Yes	3 (9.7)	12 (9.7)	1	1.000
No	28 (90.3)	112 (90.3)	1	
<i>Hospital Stay (from day of labor) in days</i>				
≥ 4	27 (87.1)	18 (14.5)	39.8 (30.5–51.8)	0.000
< 4	4 (12.9)	106 (85.5)	1	
Mean ± SD	5.5 ± 3.3	1.8 ± 1.7		
<i>Birth Weight</i>				
< 2500	8 (29.6)	8 (6.5)	7.4 (2.4–22.6)	0.0001
2500–<4	15 (55.6)	111(89.5)	1	
≥ 4000	4 (14.8)	5 (4)	5.9(1.4–24.5)	0.014

Characteristics	Cases N = 31(%)	Controls N = 124(%)	OR (95% CI)	P
<i>Mean ± SD</i>	<i>3 ± 0.87</i>	<i>3.2 ± 0.48</i>	<i>3.3(1.61–6.89)</i>	<i>0.000</i>
<i>Neonatal Outcome</i>				
<i>Still birth</i>	<i>10 (34.5)</i>	<i>2 (1.6)</i>	<i>32 (19.40-57.79)</i>	<i>0.000</i>
<i>Alive</i>	<i>19 (65.5)</i>	<i>122 (98.4)</i>	<i>1</i>	
<i>OR: Odds Ratio</i>				
<i>P: p value</i>				

The mean birth weight for the cases was 3 ± 0.87 kg (range 1.5-4.4kg), whereas the mean birth weight for the controls was 3.2 ± 0.48 kg (1.5-4kg). The odds of getting low birth weight are 7 times higher in EPH group than the control. The study showed that the majority (87%) women who underwent EPH stayed for more than four days in the hospital.

As shown in Table 2, uterine atony (38.7%) was the most common indication for the procedure, followed by ruptured uterus (25.8%) and placenta accreta (22.6%), which includes placenta previa accreta (16.1%) and isolated placenta accreta (6.5%). The rest 13% of the cases were due to placenta previa and leiomyoma of the uterus.

Table 2
Indications for emergency peripartum hysterectomy

Indications		Frequency	Percent
Uterine atony	Vaginal delivery	3	9.7
	Caesarean delivery	9	29
Ruptured uterus		8	25.8
Placenta accreta	Previa accreta	5	16.1
	Isolated accreta	2	6.5
Placenta previa		2	6.5
Leiomyoma		2	6.5
Total		31	100

In 75% of the cases, uterine atony occurred following Caesarean delivery and in 67% (n = 6) of post Caesarean atony, re-laparotomy (after 3-4hrs of Caesarean delivery) was done for uncontrollable haemorrhage. In 58.3% (7 out of 12) of the cases the uterine atony occurred in grand multiparous women. All patients but 2 with ruptured uterus, who had EPH were referral cases after the rupture occurred; all of

them occurred in an unsacred uterus and the majority (62.5%) of them occurred in grand multiparous. Of the seven cases of placenta previa/accreta, 42.9% (n = 3) occurred in women with a previous CS scar, and the rest four occurred in an unscarred uterus. In 71.4% (n = 5) of the cases, placenta accreta occurred associated with placenta previa (Table2).

As shown in Tables 3, there were 4 maternal deaths on women whom underwent EPH, giving a case fatality rate of 13%. All of them were referral cases from other facilities, which were brought in hemodynamically unstable condition. The causes of death were irreversible hemorrhagic shock with disseminated intravascular coagulation (DIC), sepsis, thrombo-embolism and ABO incompatible blood transfusion. Rate of stillbirth (34.5%) was higher in babies of women who undergone EPH (OR32;CI/ 19.40-57.79). In 80% (n = 8) of stillbirth babies, uterine rupture was the cause for it.

The commonest maternal complications were haemorrhage, which leads to 96.8% blood transfusion, followed by ureteral and bladder injury (6.45%). Twenty-three of the 31 cases underwent subtotal hysterectomy (74%), and total abdominal hysterectomy accounted for the remaining 8 cases (26%). Total hysterectomy was mainly performed in placenta previa, placenta accreta, extensive uterine rupture and leiomyoma cases, where removal of the cervix was considered mandatory for complete hemostasis.

Table 3
Feto-maternal complications and surgical procedures performed (n = 31)

Variable	Number	Percent
Maternal Complication		
Mortality	4	13
Sepsis	1	3.2
Ureteral and bladder injury	2	6.45
Vesico-Vaginal Fistula	1	3.2
Disseminated Intravascular Coagulation (DIC)	2	6.45
Re-Exploration	1	3.2
Blood transfusion	30	96.8
Fetal Outcome		
Perinatal death (still birth)	10	34.5
Type of hysterectomy		
Subtotal hysterectomy	23	74
Total hysterectomy	8	26

Discussion

Despite advances in medicine and surgery, postpartum haemorrhage remains one of the leading causes of maternal morbidity and mortality [29]. EPH is performed in the setting of life threatening haemorrhage and its incidence is considerably variable among countries and institutions. The incidence is very high in LIC countries, compared to HIC [2, 5]. The overall incidence of EPH at our hospital was 2/1000 deliveries, which is higher than those reported in HIC but is lower than the study done by Zeterogluet al in Turkey and in low-income countries [2, 5, 12, 22, 23].

In our study, the rate of EPH was higher among older women (age $\geq$ 30years) and in multiparous and grand multiparous women. This is in agreement with a study done in Norway [11], Nigeria [12] and Queensland [10]. A similar trend was observed in study done in Portugal [18] and Turkey [26]. Other risk factors for EPH include, current Caesarean delivery, uterine atony and abnormal placentation such as placenta previa and placenta accreta, were similar to the findings in the literature [1–3, 7–10]

Current delivery by CS is associated with increased EPH. In the present study, the rates were 20 fold higher among women, who delivered by CS than those who delivered normally. The association between current CS delivery and EPH is consistent with the findings of other studies [1–3, 6–10]. The relationship between CS and EPH may be due to the increased risk of severe post partum haemorrhage associated with this method of delivery or a CS may be performed due to high risk complications, such as ruptured uterus or placenta accreta, a condition that can deteriorate and necessitate hysterectomy. The decision to perform EPH may also be more easily made after Caesarean delivery than after vaginal delivery [1, 10]. However, prior CS delivery seems to be unrelated with EPH.

There is a significant difference in indications related to EPH in HIC and LIC. The most frequent indication in the present study was uterine atony followed by uterine rupture and morbidly adherent placenta with or without placenta previa. This could be attributed to the high incidence of multiparity and present Caesarean delivery, which may have contributed to the impairment of uterine contractility. Atony was also the most common reason for EPH in LIC [2, 19, 20], Turkey [17, 26] and UK [27]. Conversely, in HIC, abnormal placentation has been found as the primary etiological causes for EPH [1–3, 6–10].

Uterine rupture is the second most frequent indication for EPH in this study. Advanced maternal age, multiparity and late referrals may be considered as the underlying factors for the relatively higher rate of uterine rupture in this study. Uterine rupture has been reported as the second most common indication for EPH in similar studies done in Nigeria [23] and Turkey [17]. However, statistics reported from Nigeria by Omiole-Ohons et al [12] and from Pakistan by Korejo et al [28], the commonest cause of EPH was uterine rupture.

Although EPH is lifesaving, it carries a high risk of maternal and fetal mortality and procedural complications. The case fatality rate of 13% and the still birth rate of 34% is evidence to this. Maternal mortality in our series is very high as compared to the studies in HIC [1–3], whereas it is very low as compared to studies done in Africa [5, 23], India [20] and Turkey [26]. Although a high proportion of

women who underwent EPH were delivered by CS, 34% of them incurred fetal lose. This outcome is lower than studies done in LIC [2, 23, 28] and comparable to results of studies done India [20], but it is significantly higher than the studies done in HIC [2, 18, 21]. These could be explained by high rates of ruptured uterus in these studies, which is known to have a detrimental effect on perinatal outcome [20, 23, 28]. The other complications reported in this study were similar to other reports [12, 13, 23, 26].

There is often a debate regarding the benefits of subtotal vs. total hysterectomy. The present study has found a preference for subtotal hysterectomy. This could be because most of the patients were hemodynamically unstable at the time of the operation and it is safer, faster, and easier to perform as compared to total hysterectomy [13, 25]. Comparable incidences have also been reported in findings of various studies [12, 13, 17, 23, 26].

The major limitation of this study was being a retrospective study. The study was also limited in that the data collected were from a single institution and relatively its small cohort size.

Conclusion

EPH is a life-saving surgical removal of the uterus performed to stop uncontrollable bleeding in the immediate postpartum period. Although EPH nullifies the future child bearing potential of the woman, in many cases it saves the life of the mother. In the present study, the incidence of EPH in our institution was 2/1000 deliveries, which is lower than LIC, but it has higher incidence and poor maternal fetal outcome as compared to HIC. Uterine atony, ruptured uterus and abnormal placentation were linked to EPH. Other factors were advancing maternal age, grand multiparity and current Caesarean delivery. Antenatal identification of high risk patients, proper management of labor, timely referrals to a higher level of service and improving access to comprehensive emergency obstetric care facilities are important factors in decreasing the incidence of EPH; and improving maternal and fetal outcomes.

Abbreviations

CI Confidence Interval

CS Caesarean section

DIC Disseminated Intravascular Coagulation

EPH Emergency peripartum hysterectomy

HIC High Income Countries

LIC Low Income Countries

MRRH Mendefera Regional Referral Hospital

Declarations

Ethics Approval and Consent to Participate

The study obtained permission from Ministry of Health Ethical and Research Committee; and Mendefera Regional Referral Hospital. Each participant's record was checked. The procedure of the study was confidential. The cards of the participants were reviewed and recorded by the medical doctor, who works as an obstetrician and Gynecologist in the hospital. This approach ensures confidentiality of information.

Consent for Publication

Not applicable

Availability of Data and Materials

The datasets used and/or analyzed during the current study are available from the corresponding author on reasonable request.

Conflict of Interests

The authors declare that they have no competing interests.

Funding

No funding.

Authors Contributions

DS was involved in the design and proposal writing of the study, clinical record reviewing for data collection, data analysis and interpretation of the study findings, report writing, report reviewing and final paper preparation. HH was involved in clinical record reviewing for data collection, report reviewing and final paper preparation. OG was involved in report writing, report reviewing and final paper preparation. ZA was involved in data analysis and interpretation of the study, report reviewing and final paper preparation

Acknowledgements

The authors are thankful to Dawit Estifanos and Elias Teages Adgoy on reviewing the paper.

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