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ORIGINAL ARTICLE

Emergency Peripartum Hysterectomy: Indications, Histopathological Patterns and Intraoperative Maternal Complications at Mwanza, Tanzania

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ABSTRACT

Background: This study explored the critical aspects of Emergency Peripartum Hysterectomy (EPH), a surgical procedure performed during childbirth to address life-threatening complications, such as excessive bleeding or severe uterine infections. Conducted in Mwanza, the research aimed to identify the indications for Emergency Peripartum Hysterectomy, examine histopathological patterns, and assess maternal complications during the procedure.

Methods: The study, conducted between May 2022 and May 2023, involved pregnant women beyond 28 weeks of gestation who required Emergency Peripartum Hysterectomy. Data collection included clinical and demographic information, intraoperative findings, and the preservation of samples in 10% Neutral Buffered Formalin (NBF) for morphological and pathological analysis. Analysis was carried out using STATA version 15.

Results: The findings were derived from 66 pregnant women who underwent Emergency Peripartum Hysterectomy, with 42 from Bugando Medical Centre (BMC) and 24 from Sekou Toure Regional Referral Hospital (SRRH). The participants had a median age of 30 years. Notably, 41(62.1%) of the women were referred from lower-level facilities due to labor complications, and 40(60.6%) had their hysterectomies performed within 24 hours post-delivery. The most common clinical indications for Emergency Peripartum Hysterectomy were septic uterus 24(36.4%), ruptured uterus 17(25.8%), and uterine atony 15(22.7%). Histopathological patterns revealed plasmatic endometritis 16(24.0%), placenta accreta spectrum 15(23.0%), and suppurative inflammation 12(18.0%) as the most frequent findings. Intraoperative complications included excessive hemorrhage requiring blood transfusion for 34(51.5%) participants, cardiac and respiratory arrest 5(7.6%), and ureteric injuries 2(3.0%) participants.

Conclusion: This study found that septic uterine infections and morbidly adherent placenta conditions were the most common clinical and histological findings, respectively. The research also highlighted that lower-level health facilities in the region experienced a higher incidence of labor complications, increasing the likelihood of patients undergoing EPH. These findings provide valuable insights into the challenges and trends in EPH cases, contributing to improved maternal care and clinical decision-making.

BACKGROUND

Emergency postpartum hysterectomy (EPH) is a surgical procedure primarily employed to save lives by controlling massive hemorrhage and severe sepsis during the postpartum period.[1,2]. This surgical intervention encompasses both caesarean hysterectomy and postpartum hysterectomy.[3] The exact definition of EPH varies among scholars based on the timing of the procedure; some define it as surgery performed within 6 weeks postpartum, while others consider it a procedure carried out at the time of, or within 24 hours of delivery.[3,4]

Emergency Peripartum Hysterectomy becomes necessary when conservative measures, including pharmacological interventions like oxytocin or prostaglandins, as well as surgical methods such as ballooning, b-lynch suture, uterine artery embolization, and iliac artery ligation, fail to achieve hemostasis.[1,4] It is also indicated when antibiotics prove ineffective in controlling infections.[2,5,6]

The prevalence of EPH varies globally, with rates ranging from less than 0.5 EPH per thousand deliveries to as high as 10.1 per thousand deliveries.[3,7] The risk of EPH is influenced by geographic location, with certain regions having a higher risk, particularly in Asia and Africa.[7] Additionally, social demographic factors, such as maternal older age, high parity, low education level, and low socioeconomic status, are associated with an increased risk of EPH.[3,8,9]

Recent trends in EPH indications have shifted from

uterine atony and uterine sepsis to morbidly adherent placentas in developed countries. [10,11,12] This shift is linked to the increased number of cesarean sections [13,14,15] In contrast, developing countries still contend with causes like ruptured uterus, uterine atony, and puerperal sepsis as the leading factors for EPH. [2,8,16] However, under-reporting of morbid adherent placenta cases in low-middle-income countries may contribute to the low reported cases.

Histopathological assessments of the uterus following EPH have proven valuable in determining the underlying causes of intractable hemorrhage and related complications[17] These assessments reveal a variety of pathological patterns, including placenta accreta spectrum, endometritis, fibroids, placenta previa, and uterine rupture. [12,17,18,19]

While EPH is a life-saving procedure, it is associated with significant intraoperative and postoperative complications. [20,21] These complications include hemorrhage requiring blood transfusion, peritoneal infections, urogenital injuries, hypovolemic shock, acute renal failure, pulmonary edema, disseminated intravascular coagulopathy, permanent infertility, and maternal and neonatal mortality. [21,22,23]

The global fatality rate for EPH is approximately 5.2 per 100 cases, [3] with higher mortality rates reported in Africa compared to Asia, Europe, and America. [7] In Tanzania, a retrospective study reported a fatality rate of 10.3% for EPH cases. [8] Unpublished hospital data from 2022 at BMC and SRRH indicated that, among 5,400 deliveries conducted annually at BMC, 46 cases (0.78%) involved EPH, while at SRRH, 27 cases (0.64%) were reported out of 4,200 deliveries. Previous studies conducted in our Lake Zone and Tanzania at large have been notably limited by the absence of histological analysis. This lack of histopathological data significantly hampers our ability to fully understand the underlying causes, pathological features, and clinical context of EPH in our setting. Therefore, there is an urgent need to address this research gap through a comprehensive investigation of EPH in our locality.

This study aimed to determine the indications, histopathological patterns, and intraoperative maternal complications associated with EPH at Bugando Medical Centre (BMC) and Sekou Toure Regional Referral Hospital (SRRH) in Mwanza from May 2022 to May 2023. The findings of this study shed light on the indications, histopathological patterns, and maternal complications, highlighting the need for improvements in obstetric care, especially in the detection and management of pregnant women with clinical indications or risk factors for EPH.

METHODS

Study Design

This was a hospital-based cross-sectional study conducted from May 2022 to May 2023 at Bugando Medical Centre (BMC) and Seke Touré Regional Referral Hospital (SRRH) among women who underwent pregnancy-related hysterectomy procedures.

Study Setting

Bugando Medical Centre (BMC) is a consultant and tertiary teaching hospital with a 1000-bed capacity, serving a catchment population of approximately 17 million people from the neighboring regions of the Lake Zone in Tanzania (24). SRRH serves as the Mwanza regional referral hospital with around 2.7 million population, 315 bed capacities, and approximately 200 deliveries per month.[25]

BMC and SRRH offer specialized Obstetrics and Gynecology services, receiving referral cases with obstetric complications from other centers in the Lake Zone Region. BMC has a Histopathology laboratory offering histopathology, cytopathology, immunohistochemistry, and forensic medicine services, with a total of 7 registered Pathologists providing Pathology services in the Lake Zone area, Tanzania. The BMC pathology department comprises Pathologists, residents in Pathology, general practitioners, histotechnology laboratory specialists, and histotechnology laboratory scientists working in the histopathology laboratory. BMC hospital has Obstetricians and Gynecologists, residents in obstetrics and gynecology, general practitioners, interns, and midwives working in maternity, while SRRH has 4 obstetricians and gynecologists, medical doctors, interns in obstetrics and gynecology, and midwives.

Study Population

All women who underwent a pregnancy-related hysterectomy at Bugando Medical Centre and Sekou Toure Regional Referral Hospital from February 2022 to December 2022 were included. Only women who underwent EPH, from a gestational age (GA) of 28 weeks up to 6 weeks postpartum, and had histopathological results, were enrolled in the study.

Sample Size Determination and Sampling Procedures

The minimum sample size for women undergoing EPH was estimated using the Yamane Taro formula for a cross-sectional survey: n = N / (1 + Ne^2) where: n = minimum sample size required = total number of EPH performed annually at BMC and STRRH, which ranges from 70 to 75 cases per year, ε = margin of error (5%). After computation with the above formula, a minimum sample size of 51 was obtained.

A total of 73 EPH cases at a gestational age of 28 weeks and above were included in the study. Convenience sampling was used to recruit 46 women from Bugando Medical Centre and 27 from Sekou Toure Regional Referral Hospital between February and December 2022. Seven cases were excluded due to poor quality of sample for histopathological evaluation.

Participants

During the study period, researchers were informed by the surgeon or assistant surgeon about the occurrence of EPH cases. Additionally, daily morning reports were reviewed to collect the names of participants who underwent EPH. After a 24-hour post-surgery period, researchers approached the participants in the postnatal ward, High Dependent Unit (HDU), or Intensive Care Unit (ICU). Participants were informed about the study and asked to provide their consent to participate. In cases where participants were unconscious, their relatives or caregivers were approached, and consent

was obtained on their behalf. Seven participants who declined to participate, and those samples not sent to the histopathology department, were excluded from the study. Clinical and demographic information, as well as histological examination findings, were collected from the participants, operating doctors, pathologists, and the electronic Health Information Management System (eHIMS). A pretested coded questionnaire, specifically prepared for the study, was used to collect this information.

Data Analysis

Data collected were processed using Microsoft Excel version 10 and then migrated into STATA version 15 (College Station, Texas, USA) for quality control, edit checks, and analysis. Descriptive statistical analysis was performed, and data were summarized in the form of frequency (proportions) and bar graphs for categorical variables, while continuous data were reported as mean ± standard deviation (SD).

Patient and Public Involvement

Ten patients from BMC Zonal Hospital and four from SRRH were involved in testing the data collection form used for data collection. They were given the form and provided comments on each question asked. Furthermore, the study proposal was presented to the Joint BMC-CUHAS Ethical Clearance Review Board, BMC in the departments of Obstetrics and Gynecology, for review and presented again to share the study findings. Additionally, a copy of the study findings was submitted to the management of each hospital that participated in this study.

Ethical Approval

Ethical clearance was obtained from the Joint BMC-CUHAS Research and Ethics Committee (CREC/551/2022), and permission to conduct the study was granted by the relevant authorities from the Department of Obstetrics and Gynecology at BMC and SRRH, as well as the Department of Histopathology and Morbid Anatomy at BMC. Patient confidentiality and privacy were maintained throughout the data collection process.

RESULTS

During the study period total of 73 emergency peripartum hysterectomies were done. Whereby at Bugando Medical Centre were 46(63.0%) hysterectomies and 27(37.0%) at Sekou Toure Regional Referral Hospital. 66 participants mate the requirements criteria and were enrolled in the study as illustrated in Figure 1.

Among 66 EPH performed 40(60.6%) were done within 24 hours and 26(39.4%) more than 24hours post-delivery, 41(62.1%) was referrals from lower facilities, 42(63.6%) were aged between 20 and 34. Majority 50(78.8%) delivered by caesarean section, 36(55.4%) were multiparous and 24(36.4%) had history of previous cesarean birth (Table 1)

Indication(s) for Emergency Peripartum Hysterectomy

In this study the most common clinical indications for emergency peripartum hysterectomy observed were Septic uterus 24(36.4%), followed by ruptured uterus 17(25.8%) and uterine atony 15(22.7%) and the rest as shown (Figure 2).

Histopathological Examination findings

Among histological examination findings plasmasitic endometritis was the leading by 16(24.0%) followed by placenta accreta spectrum 15(23.0%) and suppurative inflammation 12(18.0%) (Figure 3).

FIGURE 1: Participants Recruitment Flow Chart

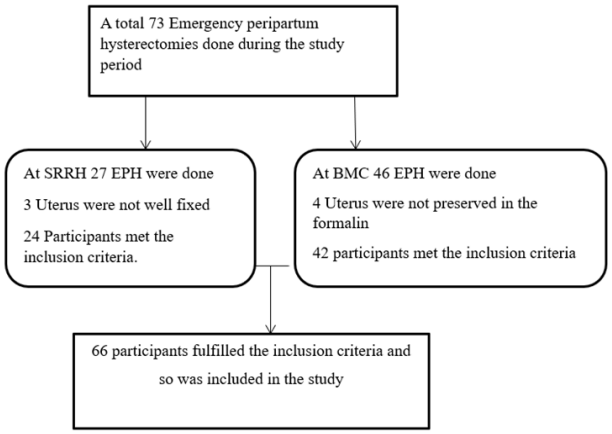

TABLE 1: Demographic and Clinical Characteristics of EPH Participants

Characteristics	Frequency/Number	Percentage (%)
Age group		
<20	4	6.1
20-34	42	63.6
35+	20	30.3
Median age (IOR)	30(16- 46)	
Parity		
Primiparous	7	10.8
Multiparous (2-4)	36	55.4
Grand multiparous (≥5)	22	33.9
Referred from lower facility		
Yes	41	62.1
No	25	37.9
Mode of delivery		
Caesarean	50	78.8
Vaginal birth	16	21.2
Previous uterine scars		
No	42	63.6
Yes	24	36.4
Delivery to EPH interval		
≤ 24hours	40	60.6
> 24hrs	26	39.4

Figure 4: Diagram labeled: A-showing Placenta accreta with chorionic villi just invaginate the smooth muscle stromal of myometrium pointed the black arrow (x4hpf). B-showing Placenta increta with trophoblastic cell infiltrate deep inner the myometrium layer pointed by black arrow (x4hpf).C-showing Suppurative

inflammation (x4hpf). D-showing Plasmasitic endometritis pointed by black arrow (x40 hpf). E-showing the leiomyoma pointed by black arrow (x10hpf) in H&E section.

Intraoperative maternal complication and outcomes(s)

In our study, more than half of the participants required three or more blood transfusions. Additionally, 5 participants (7.6%) experienced cardiac arrest, another 5 (7.6%) sustained ureteric injuries, 2 (3.0%) had respiratory arrest, and 3 (4.6%) suffered bowel injuries. Among the 66 participants recruited, 10 (15.2%) died due to various complications following EPH for a period of one year study. (Table 2)

FIGURE 2: Clinical Indication for Emergency Peripartum Hysterectomy

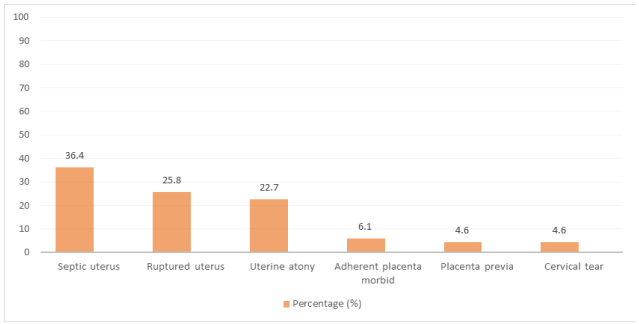

FIGURE 3: Histological Diagnosis on EPH

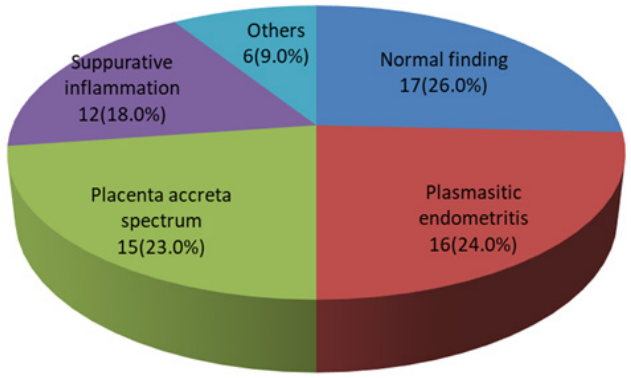

FIGURE 4 : Microscopic Patterns of EPH Samples Submitted for Pathological Diagnosis

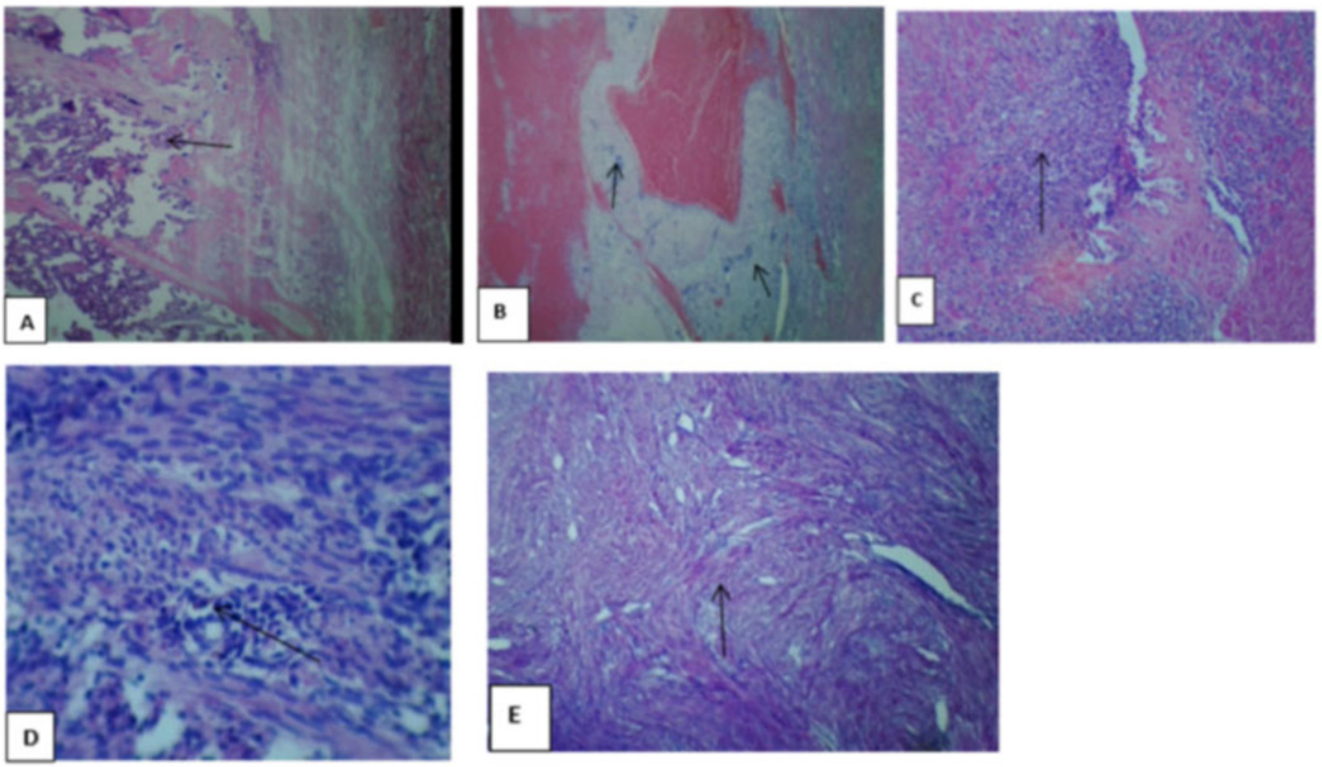

TABLE 1: Intraoperative Maternal Complication

Intraoperative complications	Frequency (N)	Percentage (%)
Urinary bladder injury	1	1.5
Bowel injury	3	4.6
Cardiac arrest	5	7.6
Excessive haemorrhage	34	51.5
Respiratory arrest	2	3.0
Ureteric injury	5	7.6
No complications	9	13.6
*Others	7	10.6

DISCUSSION

This study, the first of its kind in Mwanza, Tanzania, conducted across BMC and SRRH, provides critical insights into the clinical indications, histopathological patterns, and intraoperative complications associated with EPH.

A significant finding was that approximately one-third of the participants underwent EPH due to sepsis-related uterine complications. This likely stems from ascending infections facilitated by multiple vaginal examinations, prolonged rupture of membranes, obstructed labor, and inadequate hygiene practices. Additionally, cesarean delivery, recorded in nearly three-quarters of participants, emerged as a major predisposing factor for postpartum sepsis a reflection of both procedure-related risks and suboptimal infection control at referring facilities. [5,26] Notably, this sepsis-related EPH rate was higher than similar data from South Africa, underscoring disparities in obstetric care practices across regions. [7] The difference can be attributed to variations in obstetric care provided in the two countries. The key implication of this findings, underscores the urgent need to strengthen maternal health services, particularly at lower-level facilities. Inadequate infection control, delayed referrals, and limited surgical readiness contribute to preventable maternal morbidity. The high rate of EPH due to sepsis and atony suggests missed opportunities for earlier interventions. Standardizing labor monitoring, ensuring judicious use of uterotonics, and promoting safe cesarean practices can mitigate risk.

Uterine rupture was observed in one-quarter of the participants, largely attributed to inappropriate use of uterotonics, grand multiparity, and previous uterine surgeries. [27] Compared to historical data from Tanzania, the current lower rate may signal improvements in institutional delivery and referral systems. [28] Additionally, uterine atony was identified as a common indication, consistent with prior studies.[29] Risk factors such as prolonged labor, chorioamnionitis, excessive oxytocin use, and cesarean delivery are known contributors to atony and were relevant in this cohort.[2,3,9]

Histologically, about 25% of cases showed no pathological abnormalities, indicating that EPH is often performed in life-threatening situations without overt tissue changes highlighting the critical nature of clinical indications such as uncontrolled hemorrhage. [4,30] These findings of normal histology in a substantial proportion of uteri removed via EPH calls for stronger clinical auditing to ensure accurate decision-making. Enhanced diagnostic support may reduce unnecessary hysterectomies.

Plasma cell endometritis and placenta accreta spectrum were each identified in nearly one-quarter of cases. These findings reinforce the role of chronic inflammation and abnormal placental adherence in driving maternal morbidity. The presence of placenta accreta spectrum is often associated with risk factors such as prior cesarean birth, placenta previa, and uterine surgeries. [31] The incidence of placenta accreta spectrum reported in this study is consistent with findings from previous studies conducted in various countries. [12–14] Placenta adherence spectrum can be linked to uterine sepsis and infection during childbirth; when the placenta abnormally attaches to the uterus, it can create openings for bacteria to enter, increasing the risk of infection. Delayed diagnosis and the damage caused by these conditions increase susceptibility to infection and sepsis. Also, the inflammation triggered by placenta adherence spectrum conditions weakens the immune system's ability to fight off infections. Suppurative inflammation, noted in nearly 20% of participants, confirmed the burden of severe uterine infections within this patient group. The incidence of suppurative inflammation reported in this study aligns with previous research highlighting the impact of infections on uterine health. [32] This findings of consistent presence of placenta accreta and endometritis reinforces the need for better prenatal risk stratification and delivery planning in high-risk women.

Hemorrhage emerged as the most frequent intraoperative complication, with half of the participants requiring transfusion of more than three units of blood. This emphasizes both the severity of blood loss and potential delays in decision-making or referral. These findings align with several other studies where the need for blood transfusions ranged from 44% to 100%.[1, 8] Bowel and urogenital injuries occurred in a minority of cases, likely due to the emergency nature of the procedure and poor visibility during surgery. In rare instances, participants experienced cardiac or respiratory arrest, largely attributed to septic and hypovolemic shock. Remarkably, all patients survived intraoperative events. These intraoperative injuries have also been widely reported in many other studies [1,3,33] and it explained by the nature of the procedure being performed under emergency conditions, as well as the limited visibility surgeons may face due to massive bleeding and the desire to complete the procedure quickly. [33] However, it is also possible that these complications were a result of anesthesia-related issues, and if proper resuscitation measures were not taken, the mortality rate could reach 50%. [34] Also, the fatality rate EPH in this study slightly higher compared previous study done in Tanzania reported a fatality rate of 10.3% for EPH cases [8] while the world fatality rate approximately to be 5.2%.[3]

The implication of the intraoperative complication profile calls for preparedness in managing hemorrhage and potential organ injuries during EPH. Investing in surgical training, optimizing blood bank systems, and establishing clear referral protocols will be critical in improving outcomes.

A key strength of this study is that, it integrates both clinical indications and histopathological findings, offering a detailed and multidimensional understanding of the underlying causes and outcomes of EPH

This study has a few limitations, including offers valuable insights into the clinical indications, histopathological patterns, and intraoperative maternal complications associated with EPH at BMC and STRRH, it was limited to tertiary referral hospitals. As such, the findings may not be fully generalizable to the wider population across the Lake Zone region of Tanzania, particularly in lower-level health facilities where healthcare infrastructure and clinical practices may differ.

CONCLUSION

This study highlights sepsis-related complications and placenta accreta spectrum as key indications for EPH in Mwanza, Tanzania. Many cases occurred without underlying pathology, reflecting the urgent, life-saving nature of EPH. Inadequate care at lower-level facilities, delayed referrals, and poor intrapartum monitoring contributed to maternal risk. Frequent hemorrhage and intraoperative injuries underscore the need for improved surgical preparedness, timely intervention, and better referral systems. Strengthening maternal care, infection control, and labor management protocols is critical to reducing EPH rates and improving outcomes in resource-limited settings.

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