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# The Incidence and Risk Factors of Peripartum Hysterectomy at the Georgetown Public Hospital Corporation (GPHC)

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***Authors' contributions***

*This work was carried out in collaboration between both authors. Both authors read and approved the final manuscript.*

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## ABSTRACT

**Aim:** To assess the incidence and risk factors of peripartum hysterectomy at the Georgetown Public Hospital Corporation over a period of five years.

**Background:** A hysterectomy carried out at the time of delivery or within 24 hours of it is referred to as a "peripartum hysterectomy" (WHO). Postpartum hemorrhage (PPH) is a potentially fatal condition that needs to be treated right away. Over time, numerous medications and surgical procedures have been created, particularly to protect the uterus. However, as a last resort to save a woman's life, an emergency peripartum hysterectomy must occasionally be carried out1. Uterine atony, abnormal placental implantation (accreta, previa, etc.), uteroplacental apoplexy, uterine rupture due to cicatricial uterus, advanced maternal age, increased parity, birth weight less than 4,000 g, and prior uterine surgery are the most significant risk factors that result in Emergency Peripartum Hysterectomy (EPH).

**Objectives:** This study sought to identify the risk factors and indications for peripartum hysterectomy at GPHC, as well as to analyze the complications and outcomes of peripartum hysterectomy performed in GPHC from January 2016 to January 2020. It also sought to provide insight into the incidence of peripartum hysterectomy after medical and surgical management for the management of bleeding during or after delivery was exhausted.

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**Methods:** Retrospective chart reviews of patients who underwent peripartum hysterectomy in Georgetown Public Hospital Corporation's Department of Obstetrics and Gynecology over a five-year period from January 2016 to January 2020 were the goal of this study. The medical record department was contacted to obtain the medical history of every woman who had a peripartum hysterectomy. Risk factors, intrapartum and peripartum notes, operative notes and findings, complications, surgery time, blood loss, and outcomes were all carefully examined in each case file.
**Results:** A total of 6,130 caesarean deliveries were recorded in GPHC during the study period. There were 26 peripartum hysterectomies performed in total during the study period, making the incidence of this procedure 4.2 per 1,000 births. Maternal age greater than 30, prior caesarean deliveries, and multiparity were the main risk factors for peripartum hysterectomies. Early pregnancy loss with prolonged bleeding (31%) and abnormal placentation (which accounted for 27% of patients who underwent peripartum hysterectomy) were noted as the main indications for the procedure.
**Conclusion:** According to the data, abnormal adherent placentation is what leads to peripartum hysterectomy most frequently. The data also show how the likelihood of needing an emergency peripartum hysterectomy increases significantly with parity, particularly when multiparity, a placenta previa, or a previous cesarean section, are factors. Despite the continued high levels of maternal morbidity, no maternal deaths occurred.

*Keywords: Peripartum hysterectomy; postpartum hysterectomy; hemorrhage; GPHC.*

## 1. INTRODUCTION

Peripartum hysterectomy is typically carried out at the time of delivery or in the first few days following childbirth in cases of life-threatening obstetric hemorrhage that does not improve with conservative treatment. One of the most serious obstetric complications is peripartum hysterectomy, which is associated with significant maternal mortality and morbidity both during and after the procedure [1]. The need for additional surgery due to persistent bleeding, massive blood transfusion, coagulopathy, urinary tract injury, renal failure, and respiratory distress are just a few of the complications linked to this procedure that have been detailed in several studies [2,3]. Furthermore, in addition to preventing other pregnancies and thus potentially affecting the women's quality of life, the procedure affects the length of hospitalization [3,4]. According to recent research, peripartum hysterectomy is linked to cesarean delivery [1,5-8] “This finding is especially concerning given the steady rise in cesarean section deliveries in many countries, including Italy, where the proportion of cesarean deliveries is among the highest in the world (38% of all deliveries)” [9]. “It is especially important to quantify the problem of peripartum hysterectomy because it differs from other populations not only by having a high cesarean section delivery rate but also by having an older average age of childbearing mothers and a low fertility rate” [10].

According to some studies, there are between 13.1 and 4.1 peripartum hysterectomy cases for every 10,000 live births [1-3]. The most significant risk factors for EPH are uterine atony, abnormal placental implantation (accreta, previa, etc.), uteroplacental apoplexy, uterine rupture due to cicatricial uterus, advanced maternal age, increased parity, birth weight of 4,000 g, and prior uterine surgery [2-4]. Interesting studies on northern countries found Finland with the highest (5.1) and Norway with the lowest (2.9) prevalence, with cesarean section being used in nearly 80% of cases [3]. A special category is represented by patients whose current delivery was vaginal and who had a cesarean section (CS) in their history; they can have a six-fold risk for EPH [5]. The median maternal age is reported to be between 31 and 35.5 years old (2,6). The average blood transfusion can be as high as 4.79 [1–14] units [6]. Maternal mortality can be as much as 4% in some studies (7,8). The main complications of EPH are often described as febrile morbidity: 12 (21%), wound infection: 8 (14%), and bladder or ureteric injury: 8 (14%). There is a difference in the incidence of EPH after vaginal delivery and cesarean section, with the latter being up to tenfold more common. The incidence of placenta previa increased by parity, from 1/1143 deliveries in nulliparous women to 1/4 deliveries in multiparous women [9,10]. A standardized approach can now provide a standardized approach to evaluating and monitoring the patient, as well as how to notify a multidisciplinary team and provide appropriate treatment.

## 2. LITERATURE REVIEW

“For hundreds of years, the most common medical causes of maternal death have been

hypertensive disease, infection, obstructed labor, complications of (mostly illegal) abortion, and bleeding [1]. Primary postpartum haemorrhage is consistently one of the top five causes of maternal mortality, with the risk of maternal death from primary postpartum haemorrhage estimated to be 1 in 100,000 deliveries in developed countries" [3].

Peripartum hysterectomy is performed during labor or at any time between labor and discharge from the same hospitalization. The most common reason for peripartum hysterectomy is severe uterine haemorrhage that is uncontrollable with conservative measures [4]. Peripartum hysterectomy is a "near-miss" maternal event—an intervention performed to prevent death in life-threatening obstetric situations [5]. It causes infertility and is linked to significant maternal morbidity and mortality [6]. Peripartum hysterectomy rates vary greatly around the world. Peripartum hysterectomy complicates less than one in 1000 deliveries in high-income countries [7–13], whereas in Nigeria [14] and Pakistan [15], the incidence is 4 and 11 per 1000 deliveries, respectively. The number of emergency peripartum hysterectomy procedures has increased over time [10-12,16–18]. It increased by 12% in the United States between 1998 and 2003 (11%), and by 15% between 1995 and 2007 [16]. Coagulopathies, uterine atony, retained products of conception, precipitate or prolonged labor, fetal macrosomia or multiparity, maternal obesity, and previous primary post-partum haemorrhage are all risk factors for post-partum haemorrhage [18–30]. Other risk factors for emergency peripartum hysterectomy (EPH) include advanced maternal age, multiple gestations, and gestational diabetes. Historically, uterine atony was the most common cause of EPH. Recent research, however, has revealed a shift in the trend toward abnormal placentation [18,20,26]. Peripartum hysterectomy can result in serious morbidity and mortality. The majority of peripartum hysterectomy studies come from high-income countries. Using data from Africa, Asia, Europe, and the Americas, a cohort study was used to investigate risk factors for peripartum hysterectomy. Data from the World Maternal Antifibrinolytic (WOMAN) trial, which was conducted in 193 hospitals across 21 countries, was used.

As a complication of postpartum haemorrhage, peripartum hysterectomy was defined as hysterectomy within 6 weeks of delivery. About 35% of all maternal deaths are caused by postpartum haemorrhage (PPH), which is the leading cause of maternal mortality. The lives and health of the impacted families are significantly affected by these deaths. Maternal deaths and the maternal mortality ratio (MMR) decreased globally between 1990 and 2010 from 543 000 and 400 per 100 000 live births to 287 000 and 210 per 100 000 live births, respectively. However, compared to developed nations, maternal mortality rates in developing nations continue to be higher. As opposed to 16 (2 200 maternal deaths) in developed countries, the MMR in developing countries in 2010 was 240 per 100 000 live births (284 000 maternal deaths). Aiming to reduce maternal mortality worldwide by 75% between 2000 and 2015, the Fifth Millennium Development Goal (MDG5) has been identified as being either insufficiently or completely unachievable in 35 countries. (WHO, 1990 to 2010). The Sustainable Development Goals, which were unveiled in 2015, noted that while the maternal mortality ratio is 14 times higher in developed nations, 94% of maternal deaths take place in low-and middle-income countries. The projection for Goal # 3, "Ensure healthy lives and well-being for all ages," is to "improve maternal healthcare and decrease morbidity and mortality by the year 2030."

In comparison to surgical trauma/tears (5%) and uterine atony (3%), haemorrhage from placenta praevia/accreta was associated with a higher risk of hysterectomy (17%). In comparison to uterine atony, the adjusted odds ratio (AOR) for hysterectomy in women with placenta praevia/accreta was 3.2 (95% CI: 2.7-3.8). With maternal age comes an increased risk of hysterectomy. Contrary to vaginal delivery, caesarean sections had a fourfold higher likelihood of hysterectomy (AOR 4.3, 95% CI: 3.6-5.0). Mothers in Asia had a higher hysterectomy incidence (7% vs. 5%; AOR: 1.2, 95% CI: 0.9-1.7) than mothers in Africa. According to the findings of that study, placenta previa/accreta raises the risk of peripartum hysterectomy. Birth in Asia, caesarean section, and advanced maternal age are additional risk factors for hysterectomy [30].

For women suffering from obstetric haemorrhage, peripartum hysterectomy can be a life-saving procedure. Peripartum hysterectomies are estimated to be performed in approximately 0.08% of all deliveries in the United States [32]. The most important risk factor for peripartum hysterectomy is cesarean delivery; women who

have abdominal deliveries are more than six times more likely to need a hysterectomy than patients who have vaginal deliveries [32]. The likelihood of having a peripartum hysterectomy increases with the number of previous cesarean deliveries. Obstetric haemorrhage is the most common reason for peripartum hysterectomy in women. According to most studies, placenta accreta and uterine atony are the most common reasons for hysterectomy. According to a large study from the United Kingdom, more than half of peripartum hysterectomies were performed due to uterine atony, whereas 38% were secondary to placenta accreta. Uterine rupture, extension of a uterine incision, leiomyoma, infection, genital laceration, and cervical cancer are a few additional reported reasons for peripartum hysterectomy. When a peripartum hysterectomy is necessary, it frequently occurs in an emergency situation with heavy bleeding in the background. These factors, combined with the large size of the gravid uterus, result in significant perioperative morbidity and mortality. The majority of the previous data on peripartum hysterectomy is from small series of patients.

Uterine massage, uterine artery embolization, uterine packing, pelvic vessel ligation, B-Lynch suture, multiple square sutures, and recombinant-activated factor VII are all conservative treatments for postpartum hemorrhage [17]. With a risk of about 1 in 100,000 births in developed countries and an increasing trend, maternal death is the most serious complication of hemorrhage. This risk may be present in as many as one delivery in developing countries. Additional maternal side effects of postpartum hemorrhage (ARDS) include adult respiratory distress syndrome, disseminated intravascular coagulopathy, renal failure, hepatic failure, and hypovolemic shock [18,19]. Comparing the incidence, risk factors, indications, outcomes, and complications of EPH performed in a Georgetown Public Hospital Corporation from 2016 to 2020 is the main objective of this retrospective study. This would highlight the lack of antenatal service availability and utilization, point out factors that can be avoided, and emphasize how crucial it is to coordinate health care services to improve maternal and fetal health.

## 2.1 Rationale

The removal of the corpus uteri during a caesarean section or during the puerperium, either separately or in conjunction with the cervix, is known as a peripartum hysterectomy. Caesarean hysterectomy refers to the removal of the uterus during a caesarean section, whereas postpartum hysterectomy refers to the removal following a vaginal delivery.

Peripartum hysterectomy is one of the most harmful complications in obstetrics, despite being rare in contemporary obstetrics. It represents a disastrous end to a pregnancy for all women in general, but especially for those hoping to keep their fertility.

Despite medical and surgical evidence, peripartum hysterectomy is associated with high rates of morbidity, near misses, and mortality. It is mostly used as an emergency procedure to control massive life-threatening hemorrhage and is still a life-saving procedure.

The OBGYN department of GPHC sees a substantial number of patients with eclampsia, preeclampsia with severe features, placental abruption among others and it is of utmost importance to detect these patients and commence initial medical resuscitative measures (MgSO4, FeSO4, trihemics, tranexamic acid etc.) before resorting to surgical management (partial hysterectomy or total abdominal hysterectomy).

There has been no research on the incidence and risk factors of peripartum hysterectomy at GPHC to date. Due to the scarcity of studies, it is difficult for health care professionals to identify management areas that need to be strengthened in order to provide the best care in accordance with international recommendations and prevent further hysterectomies after a cesarean section.

As a result, the researcher's greatest wish is for the study to provide insight into the number of people who had peripartum hysterectomy, as well as the indications, risk factors, complications, and outcomes of patients who had peripartum hysterectomy at GPHC.

Because GPHC is the main hub of medical and surgical management in Guyana, it is an ideal location for such a study. The researcher sought to assess the incidence and risk factors of peripartum hysterectomy in the OBGYN department at GPHC over a 5-year period based on this assertion.

## 2.2 Study Goals and Objectives

**Objective:** To evaluate the prevalence and risk factors for peripartum hysterectomy over a five-

year period at Georgetown Public Hospital Corporation's OBGYN Department.

The goals of this retrospective study are to:

- Ascertain the prevalence of peripartum hysterectomy following the failure of medical and surgical intervention.
- To pinpoint the causes of peripartum hysterectomy risk factors.
- To identify GPHC's peripartum hysterectomy indications.
- To evaluate the peripartum hysterectomy outcomes and complications at Georgetown Public Hospital from January 2016 to January 2020.

## 3. METHODOLOGY

### 3.1 Study Design

This study was designed as a retrospective chart review of patients who underwent peripartum hysterectomy in the Department of Obstetrics and Gynecology at Georgetown Public Hospital Corporation over a five-year period from January 2016 to January 2020. Records of all women who underwent peripartum hysterectomy were collected from medical record department. Each case file was revised in detail for risk factors, intrapartum and peripartum notes, operative notes and findings, complications, duration of surgery, blood loss and outcomes.

The following inclusion and exclusion criteria were used to determine the patients eligible for this study.

### Inclusion criteria:

- Patients who did not respond to surgical, medical, or pharmaceutical treatments for PPH during labor or within 24 hours of delivery.
- Everyone who underwent a peripartum hysterectomy at GPHC between January 2016 and January 2020.

### Exclusion criteria:

- Patients who did not meet the criteria for peripartum hysterectomy.
- Patients with PPH 24 hours postpartum who did not respond to medical or surgical treatment.

Because it sought to assess the incidence and risk factors of peripartum hysterectomy at GPHC, this study was qualitative, quantitative, and descriptive in nature. To fit the time constraints, the study used a cross-sectional design.

The research was carried out in the Obstetrics and Gynecology department of Georgetown Public Hospital Corporation (GPHC), Guyana's main referral hospital. Information was sought from the department, as well as the GPHC's main operating theater and maternity theater.

### 3.2 Procedure and Data Collection

The following methods were utilized for data collection; review of Obstetrics surgery log book from maternity theater, review of Obstetrics surgery log book from Main Operating Theater (MOT), review of patients' charts via the medical records department which included the treatment options, operation notes and outcomes.

### 3.3 Quality Assurance

Patient identification was not possible using the statistical analysis data. A special identification code for each patient entered in the table—known only to the researcher—helped with chart verification. However, during data processing, a different list that only contained the patient's distinctive identification code was created and saved on a different computer. This list was only used to test any discrepancies that emerged during the data entry process. This was taken out after the analysis was finished. The clinical supervisor was in charge of overseeing every aspect of this study.

## 4. RESULTS

During the course of this study, 26 women had peripartum hysterectomy procedures. In total, 6130 deliveries by caesarean section were made in total. Therefore, there were 4.2 peripartum hysterectomies performed for every 1000 deliveries. 30 years of age was the average maternal age. The majority of patients (20/26) were between the ages of 31 and 45, with the remaining (6/26) falling between 19 and 30 [Fig. 1]. Nine (35%) of these 26 women were primigravida, and seventeen (65%) were multigravida (Fig. 2). Two were under 40 weeks of gestation, and 16 were between 37 and 39 weeks [Fig. 3]. Table 1 shows obstetric data in relation to delivery indications. The indications were divided into five categories: 1. hypertensive disorders (eclampsia, preeclampsia with severe features, and HELLP syndrome), 2. abnormal placentation (low-lying placenta and

placenta previa), 3. placental abruption, 4. uterine atony, and 5. early pregnancy loss). Following an examination of these charts, it was determined that among the scheduled patients, two (8%) had uterine atony, seven (27%) had an abnormal placentation (low lying placenta and placenta previa), one (4%) had HELLP syndrome, three (11%) had placental abruption, four (15%) had eclampsia, one (4%) had severe preeclampsia, and eight (31% had an indication of an early pregnancy loss with prolonged bleeding. 1 patient had a blighted ovum, 1 patient had a molar pregnancy, 1 patient had a molar pregnancy with a malignancy, and 5 patients had abortions or miscarriages with prolonged bleeding after). All hysterectomies were carried out as a result of intractable obstetric hemorrhage, which had an incidence of 4.2 per 1,000 caesarean deliveries and was unresponsive to conservative management. Following up with each patient in the gynecology outpatient clinic, each patient made a full recovery.

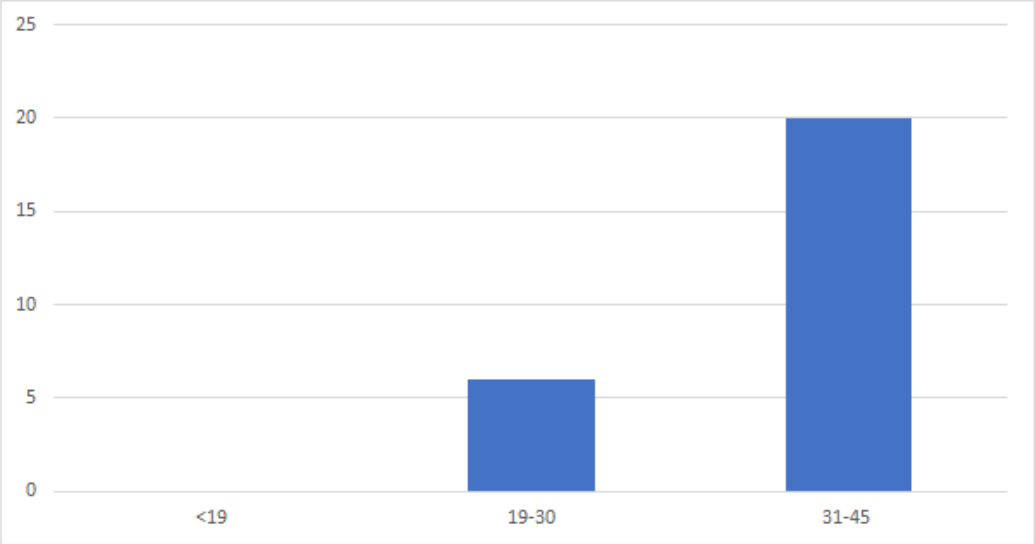


**Fig. 1. Maternal age range at time of delivery**

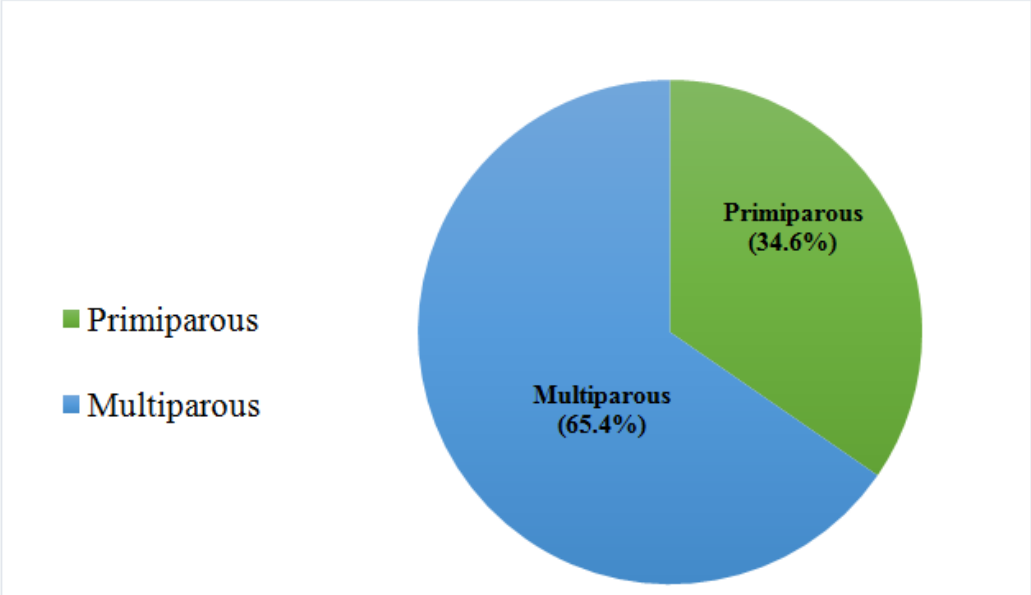


**Fig. 2. Parity of patients who underwent peripartum hysterectomy**

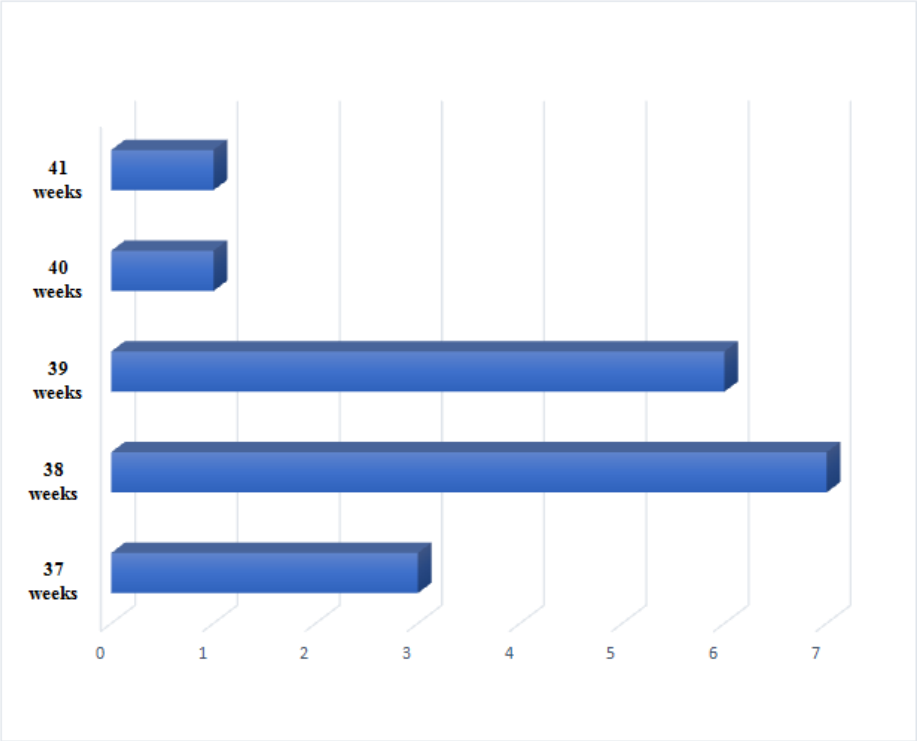


**Fig. 3. Gestational age at delivery**

Fig. 3 shows a bar graph depicting the gestational age of patients who had peripartum hysterectomy. This graph represents 18 patients who delivered at or after term. The remaining eight patients in this study had abortions early in the pregnancy and then experienced prolonged bleeding. As a result, the gestational age was not recorded.

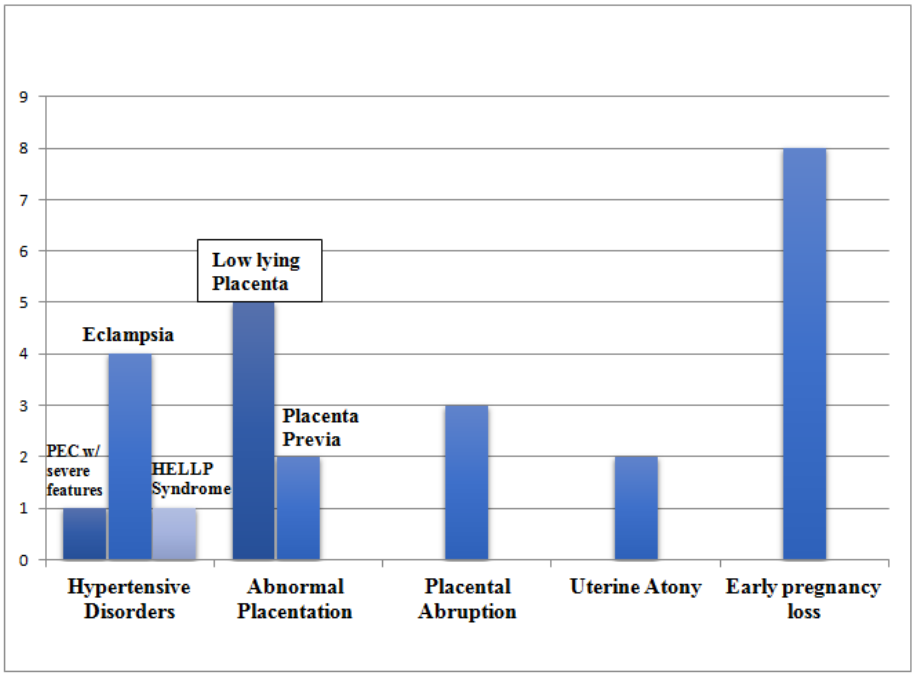


**Fig. 4. Indications for emergency Peripartum hysterectomy**

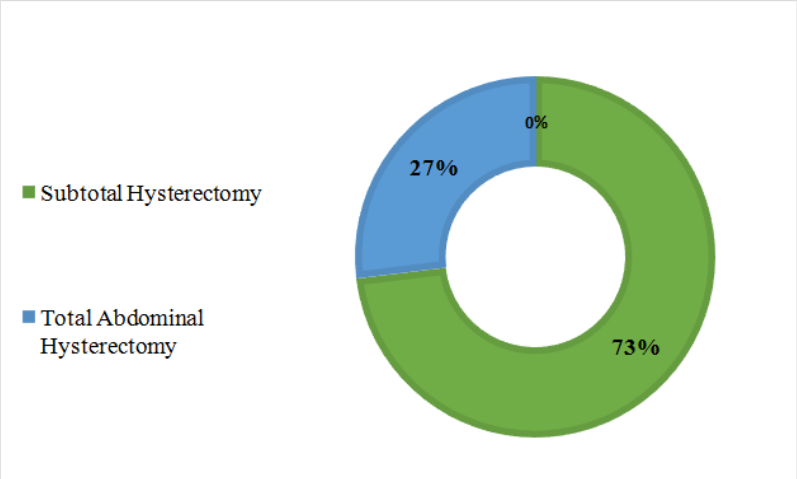


**Fig. 5. Type of Hysterectomy done for patients**

**Table 1. Intra Op and post Op complications of Peripartum hysterectomy**

| Complications | |
|---|---|
| Intra Op Complications n(%) | Post Op Complications n(%) |
| Bowel/ Bladder Injury 1 (4%) | Disseminated Intravascular Coagulation (DIC) 1 (4%) |
| Uterine Artery rupture 1 (4%) | Anemia 17 (65%) |
| Surgical Trauma/Tear 1 (4%) | |

Fig. 5 depicts the type of hysterectomy performed on these patients. Nineteen (73%) patients had subtotal hysterectomy, while seven (27%) had total abdominal hysterectomy.

Table 1 shows the operative complications and postoperative conditions. One case of intraoperative bladder/bowel injury was reported. This patient had previously undergone a cesarean section. There was one case of re-laparotomy due to persistent intra-abdominal bleeding that resolved well. All patients received blood transfusions, and more than 98% of them received more than two units of blood, with a maximum of five units transfused to one patient. We had one case of disseminated intravascular coagulopathy in which the patient was admitted to the intensive care unit but recovered with prompt treatment. There were 17 patients who became anemic after having a hysterectomy. The average postoperative hospital stay was 6 days (range: 5-25). There was no death of a mother. There was no neonatal morbidity or mortality.

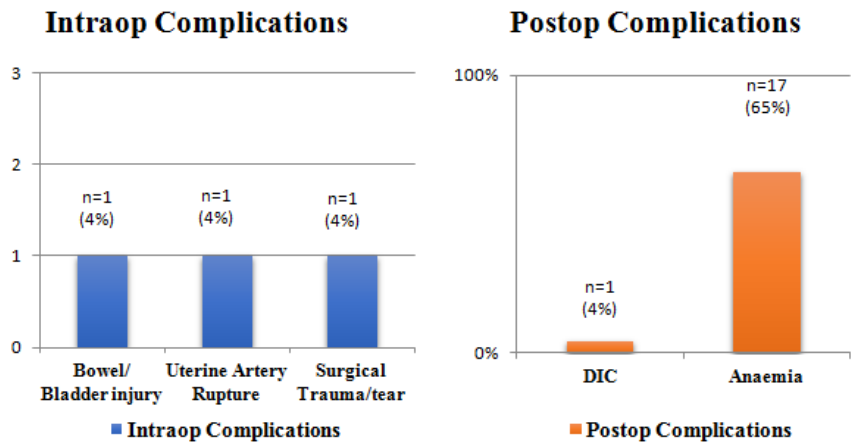


**Fig. 6. Intra Op and Post Op complications of Peripartum hysterectomy**

**Table 2. Treatment options during surgery for management of bleeding at GPHC**

| Treatment options at GPHC |
|---|
| Uterotonics (oxytocin, misoprostol & ergometrine) |
| Tranexamic Acid |
| Antifibrinolytics |
| Uterine Massage |
| Uterine packing |
| B- Lynch suture |
| Foley Balloon Tamponade/Glove Tamponade |

**Table 3. Medical management post operatively**

| Medical management after peripartum Hysterectomy |
|---|
| Iron Sulphate (FeSO4) |
| Folic Acid |
| B Complex |
| Vitamin C |
| Iron Dextran |
| Blood and Blood Products (Pack Red Blood Cells, Platelets, FFP, Cryoprecipitate) |

The treatment options shown in Table 2 were used during surgery to stop the persistent bleeding. Most cases were treated with uterine massage, uterine packing, and B-Lynch suture, while tranexamic acid and an antifibrinolytic were used to treat postpartum hemorrhage (PPH).

The medical management used after the patient's peripartum hysterectomy is shown in Table 3. Trihemics (iron sulphate), folic acid, B complex, and vitamin C were given to all 26 patients. Three patients were treated with all of the above medications except iron dextran, while one patient received all of the medications.

## 5. DISCUSSION

"Emergency hysterectomy is the surgical removal of the uterus as a result of an unexpected and sudden event that must be addressed immediately by performing the procedure. It is referred to as emergency peripartum hysterectomy when performed on a pregnant woman less than 24 hours after delivery (EPH). Since Edward Porro published the first case report of a successful procedure in which both mother and baby survived in 1876, this life-saving obstetric procedure has been in use for more than 100 years" [1].

"Postpartum hemorrhage remains one of the leading causes of maternal morbidity and mortality, despite advances in medicine and surgery. Peripartum hysterectomy is used to treat a potentially fatal obstetric hemorrhage that cannot be controlled with traditional methods. In the literature, the reported incidence of emergency peripartum hysterectomy ranges from 0.24 to 5.09 per 1,000 deliveries. This study's incidence of 4.2 per 1,000 deliveries is consistent with recent studies. Zeteroglu et al. reported an EPH incidence of 5.09/1,000 deliveries in a teaching hospital, which is higher than reported in other studies [10]. This is comparable to institutional rates reported in other studies from developing countries, which range from 2 to 6 per 1000 deliveries" [3,5-7]. However, it is higher than the reported rate of 0.2 to 2.7 per 1000 deliveries in developed countries [8,9,17,18]. This could be due to the high prevalence of PPH risk factors in developing countries, such as multiple pregnancy, grand multiparity, cephalopelvic disproportion and prolonged labor, previous Caesarean section or myomectomy scar, and placenta previa.

Peripartum hysterectomy is becoming more common in this era, most likely due to an increase in cesarean sections rather than an increase in improperly managed third stage of labor or obstructed labor. As a result, the likelihood of repeat cesarean sections rises. This, in turn, increases the likelihood of abnormal placentation (placenta previa and accreta) [26].

"In our study, the majority of patients who underwent EPH were multiparous women in their 30s. Amad and Mir [20] and Barclay et al. [21] discovered a similar pattern [21]. Other EPH risk factors, such as previous cesarean delivery, current cesarean delivery, and abnormal

placental implantation and invasion, were consistent with the literature" [22].

Early pregnancy loss with prolonged bleeding was found to be the most common cause of EPH in this study.The study revealed that there were eight patients (31% of patients) who had early pregnancy loss and in turn underwent hysterectomy in order to save their lives. Of these 8 patients, 1 patient had a blighted ovum which resulted in a miscarriage followed by prolonged bleeding where the only option was a peripartum hysterectomy. One patient had a molar pregnancy, one patient had a molar pregnancy with a malignancy, and five patients had abortions or miscarriages with prolonged bleeding. These five patients had elective abortions outside of the hospital setting and continued with prolonged bleeding afterwards. They then sought medical attention and it was found that they underwent peripartum hysterectomies in order to stop the bleeding after medical management had been exhausted. This study contradicts the findings of Lovina S.M. Machado et al., who discovered uterine atony as the primary cause of EPH in 20.6% to 43% of cases [1-8,21]. "While this was previously the most common cause of EPH, the incidence has decreased due to the use of newly developed pharmacologic treatment strategies such as prostaglandins. Multiparity and the use of oxytocin for uterine stimulation were discovered to be risk factors for uterine atony requiring EPH [1-6]. Pre-eclampsia, nulliparity, twins, induction, prolonged labor, and augmentation were all identified as independent risk factors for uterine atony by Combs et al in their large case control study of patients with postpartum hemorrhage" [23].

"Before considering EPH, conservative measures to stop the bleeding are tried first. Uterotonic drugs, uterine packing, B-Lynch suture, Foley catheter balloon, and uterine massage are among the measures" [4,5,21,22]. "Conservative management is especially important in patients who are young, have low parity, and are hemodynamically stable" [4,5,21,22]. "However, while there have been reports of a 96% success rate following uterine artery ligation" [21], "there have also been reports of only a 39.4% success rate in these cases" [5]. "Individualized decisions should be made between conservative management and EPH. In situations where conservative treatment is likely to fail or has failed, there should be no further delay in performing EPH because delay increases blood loss, transfusion requirements, operative time, DIC, and the possibility of admission to ICU" [1-6]. "Furthermore, on rare occasions, concealed abruptio placentae may be associated with blood extravasation into and through the full thickness of the myometrium (Couvelaire uterus), rendering it unresponsive to oxytocic drugs and necessitating hysterectomy. It should be noted, however, that in the vast majority of cases of abruptio placentae with Couvelaire uterus, the response to oxytocic drugs is appropriate, and the hemorrhage is caused by DIC rather than uterine contractility" [28].

Traumatic rupture, or uterine perforation or laceration, can occur with a variety of obstetric manipulations, including internal version and breech extraction, particularly in obstructed labor; instrumental manipulation, such as the classical application of the anterior blade of Kielland's forceps; manual exploration of the uterus and manual removal of the placenta or its fragments after obstructed labor with a ballooned and thin lower uterine segment; and during curettage for secondary postpartum hemorrhage.

"Third-stage cesarean section in the second stage of labor with the fetal head deeply impacted in the vaginal canal may be associated with lateral extension of the lower uterine segment incision into major vessels" [31]. "This is more likely if the surgeon made a straight line incision rather than a curved or "smile" incision. The extent of this tear may necessitate hysterectomy in rare cases, particularly if one or both uterine arteries are lacerated and a hematoma obscures the surgical repair". [31].

All patients in this study were managed post-operatively with medications such as iron sulfate, vitamin C, B complex, folic acid, whole blood, and blood products. The majority of these patients developed anemia as a result of EPH. However, thanks to the aforementioned medication, this complication was quickly resolved, with patients requiring only a brief hospital stay and no further complications arising. This is consistent with previous studies in which patients who developed complications were treated with the same management options [20–24,28–33].

Despite being a rare condition, peripartum hysterectomy is a devastating (and sometimes fatal) end to any pregnancy for any woman, regardless of whether she considers her family to be complete.

## 6. CONCLUSION

It was determined that 4.2 /1000 cesarean deliveries occurred at Georgetown Public Hospital Corporation due to peripartum hysterectomy. It was discovered that multiparous women, mothers who were older than 30, and patients who had previously undergone or were currently undergoing a caesarean delivery were the main risk factors for peripartum hysterectomy. According to this study, early pregnancy loss with prolonged bleeding, which affected 31% of patients, and abnormal placentation, which affected about 27% of patients overall, were the two main reasons why women underwent peripartum hysterectomy procedures. All patients made full recoveries after the intraoperative and postoperative complications were treated with medical interventions. No post-operative complications were noted during the follow-up of all patients in the gynecology outpatient clinic. Neither maternal nor neonatal deaths were reported during the time of the study.

## 7. RECOMMENDATIONS

1. All patient medical records should be converted to digital format. This will get rid of paper storage and damaged or missing data, speed up data search and collection for future researchers, and improve patient data storage and documentation.
2. Antenatal identification of the risk factors for emergency peripartum hysterectomy is recommended.
3. The high maternal morbidity and mortality rates associated with EPH should be reduced by having the high-risk group of women deliver by trained birth attendants and adhering to established protocols.
4. When such risk factors are identified, cesarean deliveries should only be carried out when absolutely necessary, in suitable clinical settings, and by skilled surgeons.
5. Any delivery department should have policies in place for massive hemorrhage and obstetric emergency training.
6. The outcome will also be greatly improved by anticipating such complications by placing those patients in the risk group, as well as by using protocols that can provide a standardized approach to evaluating and monitoring the patient, notifying a multidisciplinary team, and treatment.

## 8. LIMITATIONS

The medical records of patients who underwent peripartum hysterectomy between 2016 and 2020 provided the data used in this study. The goal of this study was to shed light on the prevalence and risk factors for peripartum hysterectomy in Georgetown Public Hospital Cooperation's Obstetrics and Gynecology division. Numerous challenges were faced throughout this process. For instance,

- There was poor documentation on the operation notes for these patients, all intraoperative complications and challenges were not stated clearly.
- The doctor's handwriting was not very legible, making it challenging to read and understand.

## ETHICAL APPROVAL AND CONSENT

- **Seek approval:** Efforts were made to ensure that ethical standards were followed. Prior to the start of this investigation, the GPHC Head of Medical and Professional Services requested and approved access to patient records from the GPHC records office. The Institutional Review Board (IRB) of the Ministry of Public Health (MOPH) approved the study.
- **Fair subject selection:** All qualifying patients were used as a study sample, removing any ethnic, sexual, cultural, or other biases from the analysis process.

## COMPETING INTERESTS

Authors have declared that no competing interests exist.

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