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Review Article

Postpartum Hemorrhage in Pregnant Women with Previous Uterine Surgeries

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ABSTRACT

Background: The most prevalent preventable reason of maternal sickness and death worldwide remains to be postpartum hemorrhage (PPH). Cohort investigations and randomized clinical trials that assess crucial strategies for anticipating, preventing and controlling PPH continue to be of the most importance given the rising frequency of the condition. One woman dies from PPH every 7 minutes globally, making it a clinically important cause of maternal morbidity and death. Therefore, it's crucial to quickly identify patients who are at risk for PPH, actively manage the 3rd stage of labor on a regular basis, quickly measure blood loss, monitor patients appropriately, and treat PPH. Epidemiology The prevalence of PPH varies greatly with age, being more prevalent in low socioeconomic status areas and between 1 and 5 percent of births, according to a realistic estimate. Numerous variables, including the aging of mothers at delivery, the increased frequency of multiple pregnancies as a result of assisted reproductive technologies and the increasing caesarean section rates, have been linked to the rise in PPH death rates. According to studies, early detection, more timely and effective treatment might reduce the number of PPH-related fatalities.

This review's objective was to talk about PPH's causes, detection, treatment, prevention and prognosis.

Conclusions: Postpartum hemorrhage (PPH) continues to be a major cause of maternal morbidity and mortality and a potentially life-threatening obstetric complication despite important advances in treatment over the past few decades. It is also linked to serious illnesses like hypovolemic shock, acute renal failure, disseminated intravascular coagulation, multi-organ failure, and acute respiratory distress syndrome.

Keywords: Postpartum Hemorrhage; Pregnant; Previous Uterine Surgeries.

INTRODUCTION

It is commonly acknowledged that postpartum hemorrhage (PPH) is the primary global cause of serious obstetric morbidity and death. Blood loss of≥ 500 mL or more following a vaginal birth or ≥1000 mL after a cesarean birth is the most prevalent criteria of PPH [1].

PPH may be classified as primary (takes place within 24 hours after birth) or secondary (takes place between 24 hours and 12 weeks postpartum). Uterine atony accounts for the majority of primary PPH cases, however additional variables that may be specific to or contribute to the condition include placental anomalies, genital tract lacerations and trauma, coagulation problems, and retained uterine contents [2].

To avoid a mild hemorrhage turning into major bleeding, it is crucial to identify risk factors for those PPH etiologies. Older maternal age, multiple pregnancies, obesity, placenta previa, extended labor, oxytocin augmentation, preeclampsia, previous cesarean birth and chorioamnionitis have all

been listed as risk factors for PPH in the past [3].

Post-partum hemorrhage must be considered in any patient who presents with heavy bleeding in the puerperium following caesarean section. These patients should always be admitted to hospital and the uterine wound should be palpated after dilation of the cervix at examination under anaesthesia. Laparotomy and repair or hysterectomy is essential if a defect can be felt in the wound [4].

Secondary post-partum haemorrhage due to uterine scar dehiscence is a potentially life threatening complication of caesarean section. It is of special importance in any population with a high caesarean section rate [5].

In Meta- analysis by Gu et al. [6] multiple cesarean sections cause uterine scarring and placenta implantation during pregnancy and these factors affect the contractility of uterine muscles, which in turn will cause postpartum hemorrhage and in a meta- analysis by Alamo et al. [7] Uterine scar was a high risk of severe perinatal hemorrhages.

Initial medical attention, the use of uterotonic medications, and/or the insertion of an intrauterine balloon are the main components of PPH therapy. Second-line therapies, such as interventional radiological techniques, pelvic vessel ligation, uterine compression sutures, or novel medical therapies, such as recombinant activated factor VII (rFVIIa), may be used before hysterectomy is considered to control bleeding and prevent maternal death when these first therapies fail [8].

Definitions:

The most frequent kind of obstetric bleeding, postpartum hemorrhage (PPH), is a leading global cause of maternal morbidity and death. Increased PPH in industrialized nations is a trend that hasn't been fully explained by changes in women's risk factors [9].

Primary PPH: Excessive hemorrhage in the first 24 hours after delivery is known as PPH. The most frequent methods of diagnosis in an emergency are assessment of the amount of blood lost and changes in the hemodynamic condition [10].

Secondary PPH: Excessive genital tract blood loss that occurs between six weeks and more than 24 hours after birth is known as secondary PPH [11].

Within 24 hours after delivery, PPH is officially described as the loss of at least 500 ml of blood after a vaginal birth or at least 1,000 ml of blood after a cesarean surgery [12].

Incidence: The postpartum form of bleeding, which accounts for 73% of all hemorrhage episodes, is by far the most significant of the three kinds of hemorrhage—antepartum, intrapartum and postpartum. PPH is a major cause of death worldwide, with slightly greater than 43% of deaths occurring in Northern and Sub-Saharan Africa [13]. Primary PPH is one of the top five reasons of maternal death in both industrialized and developing nations [17].

As regard the World Health Organization (WHO), Egypt's maternal death rates in 2013 was 45 deaths per 100,000 live births. Even while the average in underdeveloped nations is 230, this ratio is still much higher than the average in wealthy countries, which is 16 [14].

Predisposing and Risk factors:

Predisposing factors of PPH might be older maternal age, multiple pregnancies, obesity, placenta previa, extended labor, oxytocin augmentation, preeclampsia, previous cesarean birth and chorioamnionitis have these all have been listed as risk factors for PPH in the past [3] Table (1).

Primary PPH accounts for the majority of instances of morbidity and death associated with PPH, whereas secondary PPH is brought on by retained placental parts, subinvolution of the placental site, infection and coagulation disorders (bleeding diatheses) that result in abnormally heavy bleeding [15].

Uterine atony which accounts for between 75 and 90 percent of PPH patients [16], trauma (bleeding from the cervical, vaginal, or perineum), retained or adhered placental tissue, coagulation abnormalities and inverted or ruptured uteruses are all potential causes of bleeding during the 3rd stage of labor.

Whereas researchers discovered that the most significant risk factors for severe PPH were connected to an irregular 3rd stage of labor. The most common abnormalities being third stage more than or equals 30 minutes and retained placenta [17]. In a published study concluded that A 3rd stage that lasts more than 18 minutes carries a substantial risk of PPH. The likelihood of developing PPH is six times more likely after 30 minutes than it was before [18].

Intrapartum risk factors for PPH

***Induction of labor*:** According to a meta-analysis of studies involving induction of labor at or beyond term, cesarean section or surgical vaginal delivery rates are not affected by induction. However, blood loss after delivery was not examined in this meta-analysis. Epidemiological research indicates a connection between PPH and labor induction [19].

***Duration of labor*:** First stage: There is not as much information as there is for the 2nd stage of labor about the impact of the first stage's length on PPH. Second stage: The association between the duration of the 2nd stage and unfavorable maternal and newborn outcomes has been examined in a number of sizable investigations. Third stage: Strong evidence suggests that prolonging the 3rd stage of labor raises the risk for PPH despite the use of active treatment [20].

***Delivery method*:** Intention-to-treat analysis of known randomized, controlled studies comparing planned Cesarean section with planned vaginal delivery investigated maternal morbidity in the UK's NICE Cesarean section guideline.

Prevention of Post-partum

Hemorrhage when feasible, preventive steps for PPH should be performed, preferably starting before conception, with the identification of women who are at high risk and, if needed, therapies to boost iron reserves and hemoglobin levels. In the lead-up to delivery, screening women for PPH risk factors throughout pregnancy and labor might be helpful in determining a suitable birth site [3].

Women with a moderate risk of PPH should have blood testing and screening done, while women with a high risk should have blood testing done and cross-match two units or more of packed red blood cells in preparation for a potential PPH diagnosis [21].

However, if the care team is unskilled, controlled umbilical cord traction may result in uterine inversion and has limited advantages in situations of severe PPH [22].

Prediction of PPH

Maternal morbidity and death have been demonstrated to reduce with the identification of individuals at risk for PPH, early management using standardized procedures and a coordinated, team-based response if hemorrhage develops [23].

For surgical planning, prenatal detection of PAS abnormalities in women who have had previous uterine surgery is crucial [24].

Although magnetic resonance imaging (MRI) and obstetrical ultrasonography (color Doppler or 3D power Doppler) have similar diagnostic efficacy in identifying PAS disorders (94% sensitivity and 84% specificity), MRI can be used in addition to ultrasonography to measure the depth of uterine muscular and parametrial invasion [23].

PPH management:

Diagnosis: Recognizing excessive bleeding and doing a thorough examination to identify its origin are the first steps in making the diagnosis of PPH. To identify particular reasons, utilize the "Four Ts" mnemonic (Trauma, Tone, Tissue, and Thrombin) [3].

Treatment of PPH: PPH treatment necessitates a multidisciplinary strategy. In the majority of instances, bleeding is caused by uterine atony after lower genital tract rips have been ruled out Table (2).

It is unclear if monitoring blood loss is helpful in treating PPH. First of all, it is difficult to consistently quantify blood loss properly. Second, blood loss less than 500 ml in already anemic women may be dangerous and need treatment [26].

***Uterine Massage*:** After the placenta has been delivered, a doctor should undertake a bimanual exam of the uterus if there is rapid blood flow. If the uterus is soft, the fundus is compressed from above via the abdominal wall while one hand is positioned in the vagina and pushed on the uterus's body [28] Figure (1).

Pain or a change in vital signs that is disproportional to the quantity of blood loss might be symptoms of hematomas. Close monitoring may be used to treat small hematomas [30].

***Uterine Rupture*:** Clinically severe ruptured uterus found in 0.6 to 0.7 % of vaginal births after cesarean birth in women with low transverse or unexplained uterine scars, while being uncommon in uteruses without scars. Shorter intervals among pregnancies or a history of numerous cesarean births have a less impact on risk than do past classical incisions or uterine procedures, especially in women who have never had a natural delivery [31].

One treatment approach is to inject 20 mL of a 0.9% saline and 20 units of oxytocin solution into the umbilical vein. Comparing this to injecting saline alone, the necessity to manually remove the placenta is much less [32].

A placenta that is invasive may be fatal. Since the 1950s, frequency has climbed from 0.003 percent to 0.04 percent of births; this growth is probably due to the elevation in the prevalence of cesarean sections. The myometrium is attached to by the placenta accreta, invaded by the placenta increta, and penetrated by the placenta percreta to or past the serosa. The depth of invasion serves as the basis for this categorization [26].

***Uterotonics (Ergometrine and Oxytocin)*:** A hormone called oxytocin is used to initiate or maintain labor as well as to manage bleeding after delivery. Additionally, it may sometimes aid in the release of milk during breastfeeding [3]. Diabetes insipidus and vasodilatory shock are two other conditions for which oxytocin is used [17].

The single most significant technique utilized to prevent PPH is the administration of oxytocin right after following delivery. Women who get oxytocin have reduced blood loss, which lowers the risk of PPH and anemia. Additionally, oxytocin speeds up placenta delivery, reducing the need for manual placenta removal and the accompanying discomfort and infection risks [33, 34].

Hemostatic drugs: Transexamic acid and rFVIIa are two examples of hemostatic medications that have been utilized to treat intractable hemorrhage that has not responded to first- and second-line therapy.

***Artery ligation and compressive sutures for the uterus*:** In some circumstances, ligation of the uterine artery or its principal supply may be regarded. The latter, however, could be technically challenging and is only effective in less than 50% of situations. Recently, uterine compression sutures were reported. B-Lynch was the first to identify a suture that passes entirely through the anterior and posterior uterine walls [35] figure (2).

***Systemic Devascularization*:** If bleeding persists, ligation of the internal iliac artery, the tubal branches of the ovarian arteries, and the uterine arteries—which supply about 90% of the uterine blood flow—may be a possibility. It is a rather straightforward surgery to join the tubal branches of the ovarian arteries with the uterine arteries [33].

***Subtotal/total abdominal hysterectomy*:** As a last option to save life, a subtotal or complete abdominal hysterectomy should be undertaken. However, as was already indicated, if the patient is hemodynamically unstable, this may need to be taken into account sooner. Although having to have a hysterectomy may be distressing, particularly for primigravid women, safety should not be overlooked in order to preserve future fertility [3].

***Radiological embolization*:** Selective radiological embolization of the leaking artery may be a therapy option if interventional radiologists are accessible and the bleeding is not life-threatening. Doumouchtsis et al, [36] assessed the success rate of emergency embolization for the management of major PPH in a systematic study. They claimed a 91% success rate.

Summary

Postpartum hemorrhage (PPH) continues to be a major cause of maternal morbidity and mortality and a potentially life-threatening obstetric complication despite important advances in treatment over the past few decades. It is also linked to serious illnesses like hypovolemic shock, acute renal failure, disseminated intravascular coagulation, multi-organ failure, and acute respiratory distress syndrome.

Within 24 hours after delivery, PPH is officially described as the loss of at least 500 ml of blood following a vaginal birth or at least 1,000 ml of blood following a cesarean surgery.

Epidemiology The prevalence of PPH varies greatly with age, being more prevalent in low socioeconomic status areas and between 1 and 5 percent of births, according to a realistic estimate.

Numerous variables, including the aging of mothers at delivery, the increased frequency of multiple pregnancies as a result of assisted reproductive technologies, and the increasing caesarean section rates, have been linked to the rise in PPH death rates. According to studies, early detection and more timely and effective treatment might reduce the number of PPH-related fatalities.

Table (1): Predisposing factors and causes of immediate PPH (4 T's) [3]

Process	Etiology	Risk factors
Tone	•Uterine overdistension	Maternal anomalies, such as severe hydrocephalus; Multiple pregnancies; Macrosomia; Polyhydramnios;
	•fatigued uterine muscles	•Prolonged/precipitate labor particularly. Utilize oxytocin if stimulated at a high parity.
	•Uterine infections and chorioamnionitis	•Prolonged PROM •Fever
	•Anomaly or distortion of the uterus	•Fibroid uterus •Uterine anomalies •Placenta previa
	•Uterine relaxing drugs	•Anesthetic drugs, beta-mimetics, nifedipine, NSAIDs, magnesium sulphate
	•Bladder distension, prevents uterine contractions	
Tissue	•Retained placenta/membranes •Retained blood clots •Abnormal placenta succinturiate/accessory lobe	•placenta incomplete upon delivery •Atonic uterus •Especially > 24 weeks •Abnormal placenta at ultrasound •Previous uterine surgery

Trauma	•Cervical/vaginal/perineal trauma	• Manipulations during birth and precipitous delivery • Episiotomy esp mediolateral •Operative delivery
	•Extended tear at CS	•Malposition •Deep engagement •Fetal manipulations eg version of second twin
	•Uterine rupture	•Previous uterine surgery
	•Uterine inversion	• Excessive cord traction, fundal placenta, and high parity
Thrombin	•Pre-existing clotting abnormalities eg hemophilia, vWD, hypofibrinogenemia	•History of coagulopathy, liver disorders
	•Acquired during pregnancy	
	• ITP	•High BP, fetus death, bruising
	• PET with thrombocytopenia (HELLP DIC from PET, IUD, abruption, severe infections/ sepsis, AFE • Dilutional coagulopathy form massive transfusion	•Fever, raised WCC •APH, sudden collapse •Fever, neutrophillia/neutropenia
	•Anticoagulation's	•Aspirin, heparin •History of DVT/PE

SROM: Spontaneous Rupture of Membranes; NSAIDs: Non-Steroidal Anti-Inflammatory Drugs; CS: Caesarean Section; ITP: Idiopathic Thrombocytopenic Purpura; vWD: von Wilebrand's Disease; BP: Blood Pressure; WCC: White Cell Count; PET: preeclampsia toxaemia; HELLP: Hemolysis, Elevated Liver enzymes, APH: Antepartum Haemorrhage; Low Platelets; DIC: Disseminated Intravascular Coagulopathy; AFE: Amniotic Fluid Embolism; IUD: Intrauterine death; DVT/ PE: Deep Vein Thrombsis/Pulmonary Embolism

Table (2): Algorithm for controlling atonic PPH: HAEMOSTASIS [23]

H	Ask for assistance
A	Assess (vital signs, blood loss) and revive
E	Establish the cause, ensuring blood is available, and provide ecbolics (bolus oxytocin, syntometrine, and ergometrine)
M	Massage of the uterus
O	Oxytocin infusion/prostaglandins – IM, IV, per rectal, and intramyometrial
S	Shift to the operating room and remove any residual products, trauma, and bimanual compression
T	Tamponade balloon and packing the uterus
A	Apply modified B-Lynch compression sutures.
S	systematic devascularization of the uterus, ovaries, quadriceps, and internal iliac
I	Interventional radiologist who may do uterine artery embolization if necessary
S	Subtotal or complete abdominal hysterectomy

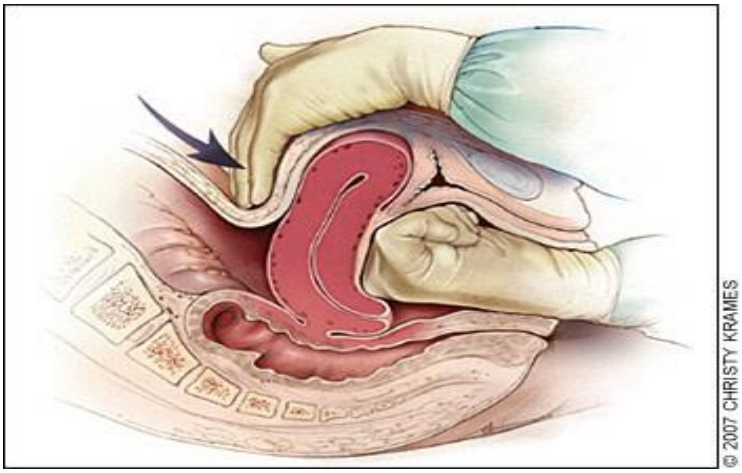

Figure (1): Bimanual massage technique for uterine atony [29].

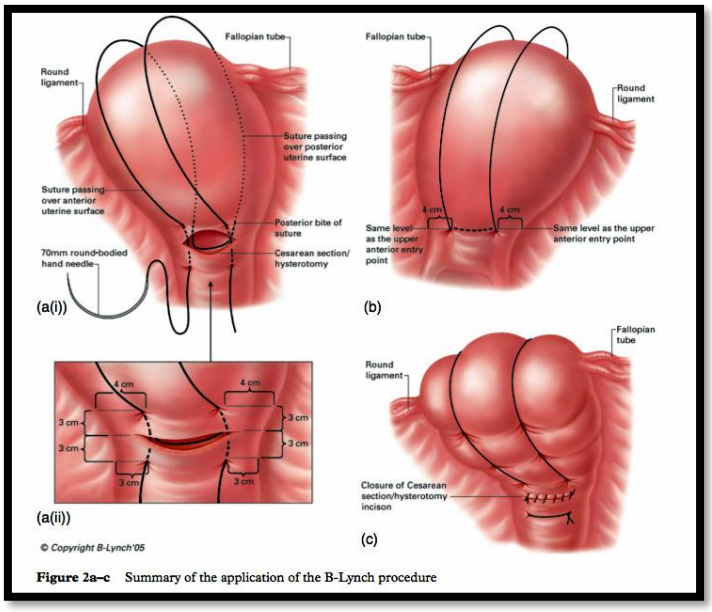

Figure (2): Summary of application of B-Lynch [35].

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