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Summary

Postpartum Haemorrhage – Disease Burden, Risk Factors, and Clinical Management

A summary on the incidence, causative risk factors, and prophylactic and therapeutic management of postpartum haemorrhage

Abstract

Postpartum haemorrhage (PPH) is the leading cause of maternal mortality and morbidity across the world. Data from the World Health Organisation indicates that up to 60% of maternal deaths in developing countries are due to PPH, accounting for more than 100,000 maternal deaths worldwide every year. PPH comes with a significant economic and human cost, especially in countries with inadequate resources. It also causes serious health consequences, particularly in poor countries where women do not have access to quality health care services. This summary describes strategies for early detection, preventive measures, and therapeutic approaches for the effective management of PPH.

What is postpartum haemorrhage?[1,2]

Postpartum haemorrhage (PPH) is the leading cause of maternal morbidity and mortality worldwide. It is a serious obstetric emergency which can result in the death of an otherwise healthy woman, if left untreated. PPH is defined as the loss of over 500mL and 1L of blood following vaginal and caesarean delivery, respectively. PPH is also defined as any amount of vaginal bleeding following delivery that causes derangement of vital signs, or loss of up to 10% of haemoglobin relative to baseline values. Furthermore, PPH is classified as primary if bleeding occurs 24 hours following delivery, or secondary if it occurs between 24 hours and 6 days post-delivery.

Secondary PPH is less common and usually the result of retained tissues from the pregnancy and can be managed effectively with standard treatments. However, primary PPH can escalate quickly if untreated and lead to maternal death.

Disease burden[1,2]

The incidence of PPH is higher in developing countries due to inadequate healthcare resources and financial constraints. WHO has estimated that over 25% and up to 60% of maternal deaths occur globally and in developing countries, respectively, due to PPH.

Mortality due to PPH typically occurs as a result of secondary causes such as shock, sepsis, pulmonary oedema, acute renal failure, disseminated intravascular coagulation, acute respiratory distress syndrome, acute renal failure, and multi-organ failure.

This underscores the unmet need to identify risk factors, along with employing preventive measures and effective treatments to minimise PPH-related deaths and morbidity.

Causes and risk factors[1–5]

A number of pregnancy- and childbirth-related risk factors have been found to be associated with PPH. These include uterine atony or failure of the uterus to contract adequately after childbirth, prolonged third (active) phase of labour, low antenatal haemoglobin, antepartum haemorrhage, high

neonatal weight, multiple pregnancy, body mass index (BMI) ≥25, previous caesarean section, anterior placenta, retained placenta, maternal age above 35 years, gestational age below 37 weeks or above 41 weeks, pregnancy-induced hypertension, anaemia, previous history of PPH, uterine rupture, placental abruption, and placenta previa.

The four main causes or 'four Ts' associated with PPH include trauma, tone (musculature), tissue, and thrombin. Among them, uterine atony or weakening of uterine muscles is the most common cause of PPH, accounting for 75–80% of the cases. Contraction of the uterus following childbirth is necessary for the removal of the placenta, tissue debris, and blood clots. Uterine contractions close blood vessels in the placenta, and are therefore crucial to prevent PPH. However, atony, which can occur following both vaginal and caesarean births, prevents uterine contractions, and increases the risk of PPH. Uterine atony can result from prolonged labour, induction, anaesthesia, or uterine distention due to a large foetus or multiple pregnancies/ twins.

Further, the number of pregnancies, mode of delivery, antenatal care during pregnancy, inadequate iron–folate supplementation, episiotomy, and any tear or injury to the genital tract can significantly influence the occurrence of PPH.

Studies have shown that increased parity or number of births, large infant size, induction of labour with the exogenous hormone — Pitocin (oxytocin), instrumental vaginal delivery, and multiple caesarean section births can substantially increase the risk of PPH. This increase in risk may be attributed to injuries to surrounding organs and tissues during surgery, lacerations to the vagina, perineum, and cervix during delivery, and reduced uterine contractions due to prolonged labour and weakening of muscles.

Conditions like placenta previa and placenta accreta, in which the placenta lies low covering the cervix or grows deep into the uterine tissue, are also known to be major risk factors for PPH.

Coagulation disorders, including disseminated intravascular coagulopathy; liver dysfunctions; thrombocytopenia; inherited bleeding dysfunction, such as von Willebrand diseases; and anticoagulant therapies, can impair blood clotting, resulting in excessive bleeding during and after childbirth.

Additionally, comorbidities including hypertension, diabetes, cardiac diseases, sickle-cell anaemia, and bleeding disorders can significantly increase the risk of PPH and associated complications.

A comprehensive assessment of the mother's medical history, risk factors, and clinical parameters during childbirth can help predict the risk of PPH.

Challenges in diagnosis and treatment[1,2,4,5]

Accurate estimation of blood loss is essential for the diagnosis and timely management of PPH. Quantification of the volume of blood loss can help in identifying women at the highest risk of PPH for active management. However, visual assessment, which is the most convenient and commonly used method, has been shown to underestimate blood loss by 50% of the actual amount. Further, haemoglobin and haematocrit estimations are used to quantify blood loss. However, intensive haemorrhage can cause blood to concentrate in a short time, leading to false-normal readings. While gravimetric methods and volume measurement can provide a more accurate estimate of the blood volume lost, they are not practical when multiple patients are admitted in the delivery wards, which is the scenario in many developing countries. Furthermore, all of the above methods provide a retrospective analysis of blood loss rather than a real-time measurement. Therefore, there is a need to identify clinical predictors of PPH in postpartum women.

Assessment of maternal indicators like heart rate, hemodynamic parameters like blood pressure, body temperature, and respiratory rate, and their correlation with clinical symptoms, can provide a quicker and relatively more accurate estimate of blood loss and decrease the time period between diagnosis and initiation of treatment. This can help decrease the risk of complications and mortality associated with excessive blood loss.

However, despite the detection of PPH, treatment may be delayed in clinical settings with limited resources and expertise, particularly in developing countries, where a large number of deliveries take place during the same time period. Devising a

systematic plan of action in cases of PPH can help clinicians in timely control of bleeding.

Management of postpartum bleeding – preventive and therapeutic interventions[1,6,7,8]

On recognition of PPH, a multi-disciplinary response team consisting of an obstetric provider and surgeon, nurse, anaesthetist, and blood transfusion personnel must devise an appropriate management strategy. A systematic institutional protocol must be laid down to guide the team on the steps to be taken. These should include fluid resuscitation, laboratory and clinical assessment, monitoring of haemodynamic parameters, blood transfusion, medical management, and surgical interventions, if necessary.

Medical and physiological management[3,6,7–10]

Oxytocin is a peptide hormone released naturally in response to labour, suckling by the baby during breastfeeding, and stimuli like touch. It plays a key role in stimulating uterine contractions during labour and aids in the separation of the placenta from the uterine wall. In addition, oxytocin promotes the secretion of milk from the mammary glands. Given its important role in labour, birth, and lactation, administration of exogenous oxytocin has evolved as an effective strategy to induce labour and aid delivery in a controlled manner.

Two types of interventions are used during the third stage of labour to prevent PPH, namely active management and expectant/physiological management. Active management involves safe delivery of the placenta through delayed cord clamping (as recommended by the American College of Obstetricians and Gynecologists guidelines or ACOG), administration of a prophylactic uterotonic to stimulate contractions, and controlled cord traction. Medications like synthetic oxytocin (Pitocin) and carbetocin, which can be administered intravenously or intramuscularly, methylergonovine (Methergine, contraindicated in patients with hypertension), and prostaglandins, like 15-methyl prostaglandin (Hemabate), misoprostol (Cytotec), and dinoprostone (Prostin E2), are used to induce uterine contractions. Further, massaging of the uterine wall while gently pulling the umbilical cord aids the detachment of the placenta.

While active management involves delivery of placenta with prophylactic administration of oxytocin, expectant management involves the delivery of the placenta spontaneously or through pushing, without the use of exogenous hormones. Other methods, such as skin-to-skin contact (SSC) with the newborn (involves placing the infant on the bare chest of the mother) and immediate breastfeeding (to boost the release of oxytocin in the mother), may also help in the optimal management of PPH. SSC with the newborn infant has been shown to increase the transmission of neurological signals to the pituitary gland for the release of oxytocin. Additionally, SSC enhances mother-infant bonding, promotes milk production, and decreases maternal anxiety.

Expectant management without the use of medical interventions may be a safer alternative in low-risk women who have had a healthy pregnancy without complications. Although, active management decreases the risk of bleeding during the delivery of the placenta, administration of oxytocin can lead to other side-effects including after-birth pains, vomiting, blood pressure, and use of analgesia postpartum. Active management of the third stage of labour (AMTSL) is recommended to reduce the risk of PPH as per guidelines on PPH management, including those by ACOG.

Tamponade[10,11]

Tamponade techniques involve the application of pressure to the uterine walls and are used to stop uncontrolled bleeding which persists despite early interventions. This is achieved by packing the uterine cavity and vagina with gauze.

Additionally, uterine balloon tamponade is used to inflate the uterine cavity. It serves as a conservative and effective approach when medical treatments fail to reduce bleeding. The Bakri balloon used for tamponade is an intrauterine device consisting of a silicone balloon attached to a catheter. The balloon is an effective alternative for the management of acute PPH. It is a simple and non-invasive technique that requires minimal training to use. The collapsed balloon is inserted into the uterine cavity, and when it is inflated with sterile liquid, it conforms to the shape of the cavity and stops the bleeding by

facilitating draining of blood through the catheter. The main advantages of the Bakri balloon are its easy transvaginal or transabdominal insertion, which can bring about rapid tamponade of the uterine cavity, simplify PPH control, and avoid the need for other more invasive procedures, such as hysterectomy, which can have long-term implications, such as loss of fertility. In a retrospective study on 24 women with PPH, the use of Bakri balloon was effective in controlling haemorrhage in 87.5% of the women. Early intervention with the Bakri balloon leads to higher success rates and time to control of bleeding.

Going ahead, studies will be needed to investigate the effectiveness of balloon tamponade with other conservative methods of PPH management, such as surgical ligation, arterial embolization, or uterine compression suture.

Surgical interventions[6,7,8]

If bleeding persists despite the use of conservative approaches, surgical management may be necessary. If retained placenta is identified as the cause of PPH, the first step would involve uterine curettage wherein, a spoon-like instrument is used to carefully scrape off tissue debris and clots in the uterus. If bleeding does not resolve, ligation of arteries supplying blood to the uterus or uterine compression sutures may be considered. Massive blood transfusion, required in cases of severe blood loss, is typically carried out before surgical intervention.

The final step to control bleeding if all other measures fail is a hysterectomy or complete removal of the uterus. This extreme measure will, however, lead to permanent loss of fertility and failure to bear more children and must be considered as a life-saving measure if no other treatment helps control blood loss.

Conclusions

- Timely diagnosis is key to the effective management of PPH.
- Preventive measures against PPH can help ensure maternal and foetal health, especially in developing nations, where the risk of mortality is higher.
- Early prophylaxis with medicines and conservative physiological approaches can help control bleeding in the early stages and prevent PPH.
- The impact of PPH can be significantly reduced by controlling modifiable obstetrics-related risk factors, such as induction and delivery approaches.
- Monitoring preexisting medical conditions, and vigilance throughout labour can aid the early detection and effective management of PPH.

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