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Postpartum hemorrhage: A review of evidence based guidelines for prevention and management

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Abstract
Postpartum hemorrhage (PPH) remains a leading cause of maternal morbidity and mortality worldwide, nearly one-quarter of all maternal deaths, necessitating prompt and effective management strategies. The overall prevalence of PPH worldwide is estimated to be 6 to 11 percent. This review provides a comprehensive overview of the current approaches to PPH management. The etiology of PPH is categorized into the "4 Ts": tone, trauma, tissue, and thrombin, which guide diagnosis and intervention. The initial approach to managing PPH involves recognizing the condition, identifying its cause, and initiating suitable interventions tailored to the underlying etiology. Treatment typically follows a stepwise progression from minimally invasive methods to more invasive options, including compression techniques, pharmacologic agents, procedural interventions, and surgical treatments. For refractory cases, second-line interventions include balloon tamponade, uterine compression sutures, and arterial embolization. In life-threatening situations, surgical options such as internal iliac artery ligation or peripartum hysterectomy are employed to achieve definitive hemostasis. While these techniques are life-saving, they require specialized expertise and resources, underscoring the need for well-equipped healthcare systems and trained personnel. Preventive strategies, including active management of the third stage of labour and risk stratification, play a pivotal role in reducing PPH incidence. This review also highlights disparities in PPH outcomes globally, particularly in low-resource settings, and the importance of strengthening healthcare systems and ensuring access to life-saving interventions. By synthesizing the latest evidence, this review aims to provide clinicians and policymakers with a comprehensive resource for improving maternal outcomes in the management of postpartum hemorrhage.

Keywords: Postpartum hemorrhage, uterotonic agents, surgical management, maternal morbidity.

Introduction
Postpartum haemorrhage (PPH) represents a critical challenge in maternal healthcare, particularly in low- and middle-income countries like India [1]. This life-threatening condition is a significant contributor to maternal morbidity and mortality, demanding comprehensive understanding and strategic interventions. The global burden of PPH is profound, accounting for 27% of direct maternal deaths worldwide. In 2017, PPH was responsible for 127,000 maternal deaths despite being largely preventable [2]. In the Indian context, postpartum haemorrhage presents a particularly acute healthcare challenge. PPH accounts for 19.9% of maternal mortality in India [3]. Rural areas experience alarmingly high PPH rates, with approximately 12% of deliveries affected, escalating to 15% in subsequent pregnancies [4]. This prevalence substantially exceeds the global average of 1-10% across healthcare settings [1].
According to the World Health Organization (WHO), postpartum haemorrhage is defined as blood loss exceeding 500 ml following vaginal birth, with severe PPH characterised by a blood loss of more than 1000 ml. In cases of cesarean delivery, PPH is defined as blood loss exceeding 1000 ml. [5] The Ministry of Health and Family Welfare (MoHFW) of India defines primary PPH as a blood loss of 500 ml or more from the genital tract within 24 hours of delivery or as a smaller amount of blood loss that results in hemodynamic instability for the woman. Severe PPH is identified as blood loss greater than 1000 ml within the same 24 hours [6].
The incidence of postpartum haemorrhage in India is 2%-4% after vaginal delivery and 6% after cesarean section. Rural areas experience higher PPH rates, reaching up to 15% in subsequent pregnancies, compared to national averages [3]. This disparity highlights the urgent need for targeted maternal health strategies in the Indian healthcare landscape.

Approximately 75% to 90% of postpartum haemorrhage cases are attributed to uterine atony [7]. The condition's multifaceted nature stems from diverse contributing factors, including limited healthcare infrastructure, demographic risks, and systemic vulnerabilities. For India, PPH translates to a critical public health challenge where 54% to 93% of maternal deaths due to obstetric bleeding could potentially be prevented through standardised, multidisciplinary interventions [6]. The significance of PPH extends beyond mortality statistics. Each case represents a potential loss of life and disrupts families, communities, and the broader social fabric. The economic and emotional toll of preventable maternal mortality cannot be overstated. This review aims to analyse postpartum haemorrhage (PPH) management in India, focusing on epidemiology, risk factors, and management strategies. It evaluates current protocols, identifies resource constraints, assesses intervention efficacy, and develops evidence-based recommendations. The ultimate goal is to reduce maternal mortality and improve clinical outcomes.

Aetiology and risk factors

Postpartum haemorrhage (PPH) is a complex clinical issue that poses a significant maternal health challenge. It is classified into primary and secondary PPH, each with distinct characteristics and mechanisms. Primary PPH is defined as excessive blood loss occurring within the first 24 hours following delivery. This critical period is predominantly characterised by uterine atony, which accounts for approximately 80% of cases. The causes of primary PPH can be understood using the "4Ts" framework: Tone (Uterine atony), Trauma (Genital tract injuries), Tissue (Retained placental fragments), and Thrombin (Coagulation abnormalities). Key risk factors include maternal obesity, multiple gestations, advanced maternal age, and increased labour interventions. Immediate recognition and management of primary PPH are vital to reduce morbidity and mortality [8].

Secondary PPH, on the other hand, develops after the initial 24-hour postpartum period and may extend up to 12 weeks following delivery. This later-stage bleeding is often associated with severe infections, retained reproductive tissue, placental site complications, and coagulation disorders. Secondary PPH presents complex diagnostic challenges and requires a nuanced approach to management [9]. Its occurrence underscores the importance of vigilant postpartum monitoring and timely intervention.

In India, PPH risk factors are influenced by a combination of demographic, clinical, and systemic challenges. Rural areas face higher PPH rates, with prevalence reaching up to 15% in subsequent pregnancies. Factors such as advanced maternal age, multiple gestations, increasing cesarean section rates, and underlying health conditions like obesity and pregnancy-induced hypertension contribute significantly to PPH risk [8]. Additionally, systemic healthcare challenges, including limited antenatal care, inconsistent medical resources, and inadequate training for healthcare workers, amplify the vulnerability of women to PPH [2]. Notably, 20% of PPH cases occur without identifiable risk factors, highlighting the unpredictability of the condition [10].

The physiological changes during pregnancy also play a critical role in PPH. Uterine blood flow increases from approximately 100 ml/min in a nonpregnant uterus to 700 ml/min during pregnancy, creating a significant potential for haemorrhage. Coagulation changes result in a hypercoagulable state, while postpartum processes, such as myometrial contractions and localised decidual hemostatic factors, are essential for preventing bleeding. When these mechanisms fail, substantial haemorrhaging can occur. A blood loss of approximately 1500 ml often leads to clinical signs of hypovolemia, necessitating prompt medical intervention [11]. Given the unique socioeconomic, infrastructural, and biological complexities of the Indian healthcare landscape, a tailored approach to PPH management is crucial. Addressing the interplay of systemic barriers and physiological vulnerabilities requires standardised, evidence-based maternal health strategies to improve outcomes and reduce preventable maternal deaths.

Diagnosis and early recognition of severe postpartum hemorrhage

Clinical Presentation and Diagnostic Criteria

Traditionally, postpartum haemorrhage has been defined by estimated blood loss within 24 hours of delivery, with cut-off values of 500 and 1000 ml. However, recent research suggests these metrics are insufficient for identifying women at high risk of severe maternal morbidity and mortality [12]. The International Network of Obstetric Surveillance Systems (INOSS) proposed a more nuanced definition of severe primary postpartum haemorrhage, including blood loss exceeding 2000 ml and/or requiring at least four units of packed red blood cell transfusion [13].

Recognising the complexity of haemorrhage severity, contemporary medical understanding extends beyond simple volume measurements. Experienced birth attendants emphasise that haemorrhage severity is not solely determined by blood loss volume but also by the rate of bleeding and the patient's physiological response. This holistic approach has incorporated clinical shock signs and treatment responses into diagnostic criteria.

Monitoring Tools and Technological Assessment

The physiological changes during pregnancy and delivery make early detection of clinical deterioration challenging. Due to elevated heart rate and blood volume, cardiac output increases significantly during pregnancy while blood pressure decreases. These adaptations can mask initial signs of haemorrhage, necessitating sophisticated monitoring techniques [12].

Two primary tools have emerged for early recognition of severe postpartum haemorrhage: The Shock Index (SI) and Early Warning Scoring Systems. The Shock Index, calculated by dividing heart rate by systolic blood pressure, has proven particularly effective. Studies have demonstrated that an SI $\geq$ 1.7 can predict intensive care unit admission, invasive surgical procedures, and significant blood transfusion requirements [14, 15-17]. Early Warning Scoring Systems complement the Shock Index by repeatedly calculating scores based on physiological parameters such as heart rate, systolic blood pressure, respiratory rate, temperature, and mental state [12]. These systems have shown promising results in identifying high-risk patients, with some studies reporting areas under the curve of 0.84 for predicting maternal mortality [18]. Implementing such monitoring tools has been associated with tangible improvements in maternal outcomes, including reduced hysterectomy rates.

Practical Considerations in Blood Loss Assessment

Accurate blood loss measurement is crucial for diagnosis and management. While visual estimation has historically been used, studies indicate a misdiagnosis rate of 35-50% [19]. Modern approaches recommend quantitative measurement techniques, such as weighing blood-soaked items and calculating precise blood volume.

Tools like the Shock Index, particularly in resource-limited settings, can serve as critical thresholds for urgent medical intervention. A threshold of SI ≥ 0.9 can alert healthcare providers to the need for immediate transfer and advanced medical care, potentially mitigating the high mortality rates associated with delayed recognition and treatment [20].

Preventive strategies for postpartum hemorrhage

Antenatal Care and Risk Assessment

Antenatal care plays a vital role in minimising the risk of postpartum haemorrhage (PPH). Key measures include addressing anaemia early in pregnancy, ensuring haemoglobin levels are at least 10 g/dL at delivery, and maintaining adequate hydration and nutrition during labour. Identifying high-risk pregnancies through detailed clinical history, ultrasonography, and, where required, advanced imaging techniques like MRI is essential for those with conditions such as placenta previa, uterine overdistension, or coagulation disorders. Women with known risk factors should be advised to deliver in specialised obstetric facilities under heightened surveillance to ensure immediate access to expert care and resources [8, 19].

Active Management of the Third Stage of Labor (AMTSL)

The active management of the third stage of labour (AMTSL) is a cornerstone in preventing PPH. It involves three primary steps: administering an uterotonic agent, controlled cord traction, and uterine massage immediately after delivery of the baby. This evidence-based approach has been shown to significantly reduce the incidence of uterine atony, the leading cause of PPH, which accounts for approximately 80% of cases. AMTSL is strongly recommended in all settings as part of routine obstetric care to mitigate the risk of excessive blood loss during delivery [6, 8].

Role of Uterotonics

Uterotonics are critical in preventing and managing PPH. Oxytocin remains the first-line uterotonic due to its proven efficacy in inducing uterine contractions and reducing bleeding. When oxytocin is unavailable or ineffective, other agents such as misoprostol, methylergonovine, and carboprost can be utilised. Each of these medications has specific indications, benefits, and potential side effects that must be carefully considered. Furthermore, tranexamic acid, an antifibrinolytic agent, is recommended as an adjunctive therapy to minimise blood loss and improve maternal outcomes in cases of active PPH [8, 12, 19].

Community Awareness Programs

Community awareness and education are crucial in reducing the delays in seeking care for PPH. Health education campaigns can increase awareness about the signs and symptoms of PPH and emphasise the importance of skilled birth attendance and timely access to emergency care. In addition, community health workers can educate pregnant women and their families on the benefits of antenatal care, facility-based deliveries, and postpartum monitoring. Strengthening community-based health programs is particularly critical in low-resource settings, where delays in seeking care can significantly impact maternal outcomes [6, 8, 19].

Medical Management of Postpartum Hemorrhage (PPH)

First-Line Pharmacological Treatments

The initial step in managing postpartum haemorrhage (PPH) involves the use of uterotonics to address uterine atony, the leading cause of PPH [21]. Oxytocin is the first-line agent due to its rapid onset of action and effectiveness in inducing uterine contractions. It can be administered as a 10-40 IU infusion in 500-1000 mL of fluid or as a 5-10 IU intramuscular injection. [19] In cases where oxytocin is unavailable or inadequate, other uterotonics are employed. Methylergonovine, a second-line treatment, is particularly effective but contraindicated in hypertensive patients. Misoprostol, a prostaglandin E1 analogue, offers flexibility in administration routes (oral, sublingual, rectal) and is widely used in resource-limited settings. Carboprost, another prostaglandin derivative, is also effective but can cause gastrointestinal side effects [22]. Tranexamic acid is increasingly utilised as an adjunctive therapy to minimise blood loss by promoting clot stability. Carbetocin is a long-acting uterotonic effective in preventing postpartum haemorrhage (PPH), reducing blood loss, the need for additional uterotonics, and transfusions, especially after cesarean delivery. Its single-dose administration simplifies use compared to oxytocin. While generally safe, caution is advised in patients with asthma or cardiovascular conditions [23] (As shown in Table 1).

Uterotonic used in the third stage of labour as prophylaxis	Suggested first-line treatment of postpartum haemorrhage	Suggested second-line treatment of postpartum haemorrhage	Additional treatments that can be offered, depending on clinical need
No uterotonic used Physiological management	Oxytocin plus ergometrine by intramuscular injection (If contraindicated, give carboprost), or oxytocin infusion as soon as intravenous access is available	Carboprost intramuscular injection	Carboprost intramuscular injection (Can be repeated at intervals not less than 15 minutes up to a maximum of 8 doses), or misoprostol 800 micrograms sublingually or rectally (May be used earlier if intravenous route not available)
Oxytocin alone	Ergometrine intramuscular injection (If contraindicated give carboprost), or oxytocin infusion as soon as intravenous access is available	Carboprost Intramuscular injection	Carboprost intramuscular injection (Can be repeated at intervals not less than 15 minutes up to a maximum of 8 doses), or misoprostol 800 micrograms sublingually or rectally (May be used earlier if intravenous route not available)
Oxytocin plus ergometrine	Carboprost intramuscular injection, or oxytocin infusion as soon as intravenous access is available	Repeat carboprost after 15 minutes	Carboprost intramuscular injection (Can be repeated at intervals not less than 15 minutes up to a maximum of 8 doses), or misoprostol 800 micrograms sublingually or rectally (May be used earlier if intravenous route not available)
Carbetocin	Ergometrine intramuscular injection	Carboprost intramuscular injection	Carboprost intramuscular injection (Can be repeated at intervals not less than 15 minutes up to a maximum of 8 doses), or misoprostol 800 micrograms sublingually or rectally

Stepwise Management Protocols

The management of PPH follows a structured protocol to ensure timely intervention and optimal outcomes. After administering first-line uterotonics like oxytocin, uterine massage stimulates contractions. If bleeding persists, additional uterotonics such as methylergonovine or carboprost are administered, often in combination [22].

In cases where pharmacological measures fail to control bleeding, non-surgical options such as balloon tamponade are considered. These measures are escalated to surgical

interventions, including uterine compression sutures, artery ligations, or hysterectomy, if necessary.
This stepwise approach ensures effective and prioritised management based on the severity of bleeding and the response to initial treatments [19].

Emotive Protocol and Bundle Approach for Postpartum Hemorrhage Management
Incorporating the EMOTIVE Protocol the EMOTIVE framework, recommended by the WHO, provides a structured and evidence-based strategy for managing postpartum haemorrhage (PPH). It emphasises prompt interventions to minimise complications and save lives. The EMOTIVE protocol includes [24].

- **Early detection of blood loss:** Ensures timely identification of excessive blood loss through vigilant monitoring and accurate measurements.
- **Massage of the uterus:** Encourages immediate and continuous uterine massage to promote contractions and control bleeding.
- **Oxytocic drugs:** Uterotonic agents, such as oxytocin, are administered to stimulate uterine contraction and reduce bleeding.
- **Tranexamic acid and IV fluids:** Tranexamic acid supports clot formation, and IV fluids stabilise hemodynamics and optimise tissue perfusion.
- **Examination and escalation:** Conducts a thorough clinical assessment to guide escalation to advanced interventions when necessary.

Adhering to this protocol enhances maternal health outcomes and aligns with the best global practices.
The Bundle Approach The bundle approach systematically integrates evidence-based interventions into two response bundles to address all aspects of PPH management effectively [25].

1. **First Response Bundle**
- **Immediate actions:** Includes IV fluid resuscitation, uterine massage, administration of uterotonics, and identification and repair of genital tract trauma.
- **Supportive care:** Involves emptying the bladder and the uterus of remaining placental fragments and membranes.

2. **Refractory Response Bundle**:
- **Advanced interventions**: Applies uterine balloon tamponade, compression and antishock garments.
- **Surgical procedures:** Employs advanced surgical techniques like B-Lynch compression sutures, uterine artery ligation, internal iliac ligation, or hysterectomy for severe cases unresponsive to primary management.

By integrating the emotive protocol with the bundle approach, healthcare providers can improve PPH management, reduce severe complications, and enhance maternal survival outcomes.

Use of rFVIIa in severe and refractory postpartum haemorrhage (PPH)
Recombinant factor VIIa (rFVIIa) can serve as a highly effective treatment option for severe and treatment-resistant postpartum haemorrhage. By initiating the coagulation cascade, it helps achieve stable hemostasis even in patients with underlying coagulopathy. Clinical findings indicate that rFVIIa usage can reduce the need for extensive surgical interventions, such as hysterectomy, thereby preserving a woman's fertility and potentially saving her life. Its rapid mechanism of action is crucial during emergencies, enabling prompt patient stabilisation. RFVIIa can further limit blood loss and improve clinical outcomes when administered alongside standard PPH therapies. Ensuring this agent is readily available within hospital settings is a strategic decision to enhance patient care [26, 27].

Non-Surgical Management of Postpartum Hemorrhage (PPH)
1. Compression Techniques: Bimanual uterine compression is performed by manually compressing the uterus externally and internally to stimulate contractions and reduce bleeding.
Combining UBT with uterine compression sutures, such as the B-Lynch technique, can enhance hemostatic outcomes [28].

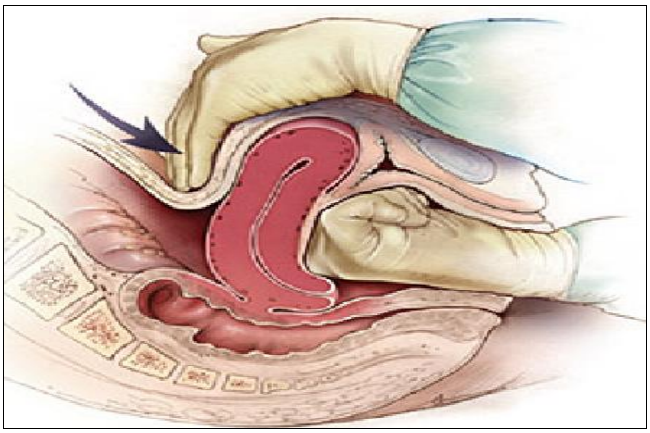

Fig 1: Showing the procedure of Bimanual Uterine Compression

2. Non-Pneumatic Anti-Shock Garment (NASG):
The NASG is a cost-effective, first-aid compression device used to stabilise women with hypovolemic shock caused by PPH [28].
Applying circumferential pressure to the lower body improves blood flow to critical organs (heart, lungs, and brain) and reduces bleeding from the uterus and pelvic region.
NASG is reusable, adjustable for various body types, and proven to reduce maternal mortality and the need for advanced surgical interventions.

Fig 2: NASG-Non-Pneumatic anti-shock garment

3. Uterine Balloon Tamponade (UBT)
- UBT involves inserting a balloon into the uterus and inflating it with sterile fluid to apply pressure and stop bleeding.
- Available devices include fixed-volume balloons (Bakri balloon, ESM-UBT) and free-flow balloons (Ellavi UBT,

Zukovsky balloon) [28].

- UBT effectively prevents hysterectomy and controls PPH, with success rates between 83% and 95%.

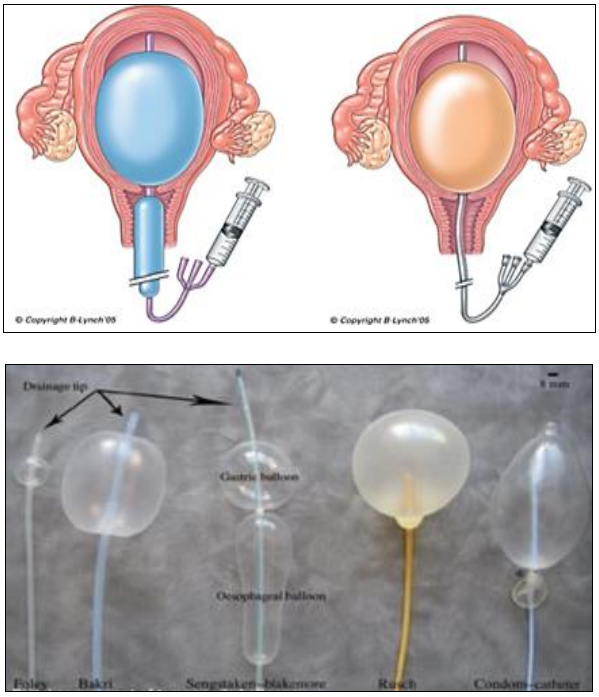

Fig 3: Different types of Uterine Balloon Tamponade (Sengstaken-Blackmore esophageal catheter, Bakri balloon and Condom catheter

4. SR Cannula

The SR cannula is a minimally invasive tool for managing PPH. It enables rapid evacuation of blood and clots from the uterus. It enhances haemorrhage control and visualisation for interventions, offering quick bedside deployment without surgery and making it ideal for emergencies [29].

Preventing postpartum haemorrhage (PPH) involves adopting evidence-based practices, including active management of the third stage of labour with timely administration of uterotonic agents like oxytocin. Ensuring adequate antenatal care, correcting maternal anaemia, and identifying high-risk cases, such as those with uterine overdistension or abnormal placentation, are essential. Routine monitoring of vital signs and early recognition of excessive blood loss are critical. Proper hydration during labour and maintaining a prepared team with access to uterotonics, resuscitation equipment, and surgical intervention facilities further reduce PPH risks. Structured protocols and training also play a vital role in prevention.

Fig 4: SR Canula

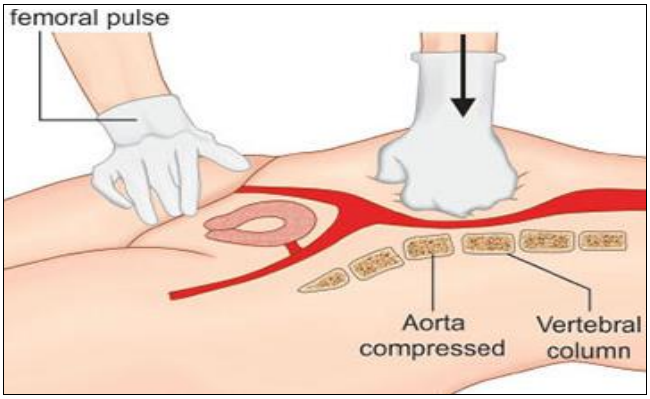

Fig 5: External aortic compression for PPH

5. External aortic compression

External aortic compression is advised for the management of postpartum hemorrhage resulting from uterine atony following vaginal delivery. Administer compression adjacent to the umbilicus on the left side, while monitoring the pulsation of the femoral vein. Compression is efficacious when the femoral pulse is absent.

6. Surgical Management of Postpartum Hemorrhage (PPH)

1. Uterine Compression Sutures

Uterine compression sutures are surgical techniques employed to manage postpartum hemorrhage (PPH) caused by uterine atony when other measures fail. Introduced in 1997 with the B-Lynch suture, various modifications, including the Hayman, Transverse Isthmic Cervical Apposition Suture Ouahba (Four Transverse Sutures) sutures and Cho sutures have since been developed. These sutures compress the uterus to achieve hemostasis while preserving fertility, offering a less invasive alternative to procedures like hysterectomy. Each technique has unique benefits and potential complications, such as uterine necrosis or synechiae. Their effectiveness, typically high, is best ensured when applied promptly in cases of severe PPH. They are effective, with success rates ranging from 76% to 100%, and can be combined with balloon tamponade for better outcomes [28].

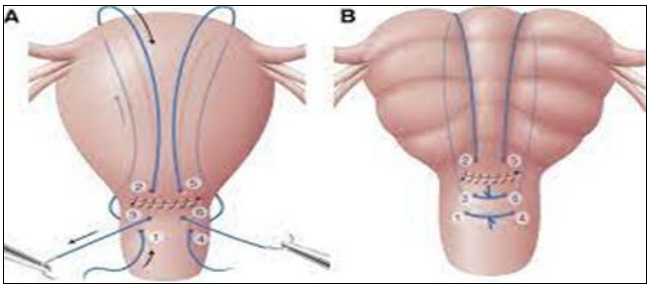

Fig 6: Shows the B lynch sutures

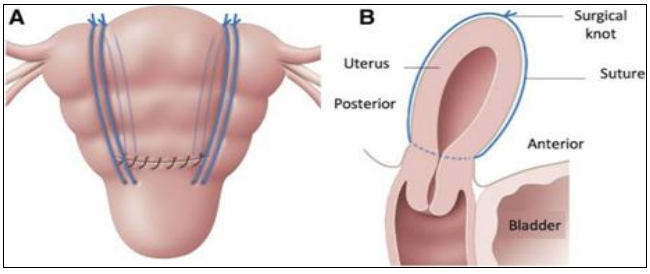

Fig 7: Shows the Hayman Sutures/ Vertical Sutures

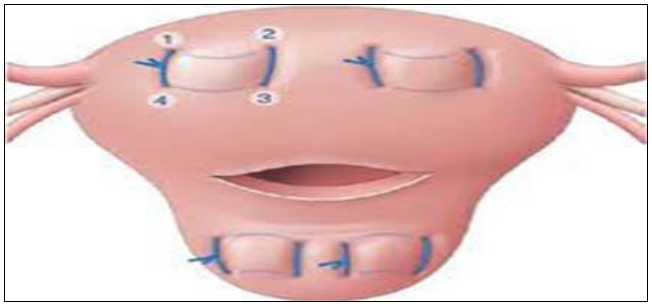

Fig 8: CHO square sutures

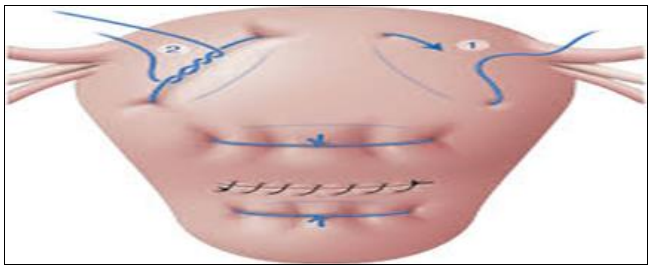

Fig 9: Transverse Isthmic Cervical Apposition Suture Ouahba Suture.

2. Stepwise uterine devascularization

Stepwise uterine devascularization is a surgical technique designed to manage severe postpartum hemorrhage while preserving the uterus. The procedure involves five sequential steps:

1. **Unilateral Uterine Vessel Ligation**: The uterine artery is ligated on one side to reduce blood flow to the uterus.
2. **Bilateral Uterine Vessel Ligation**: Both uterine arteries are ligated for greater hemostasis.
3. **Low Uterine Vessel Ligation**: Additional ligation is performed lower on the uterine arteries, especially effective for cases involving placenta previa or accreta.
4. **Unilateral Ovarian Vessel Ligation**: One ovarian artery is ligated to further control bleeding.
5. **Bilateral Ovarian Vessel Ligation**: Both ovarian arteries are ligated as a last resort.

   This approach has shown high efficacy (100% success in the cited study) and avoids hysterectomy, allowing future fertility. The technique is straightforward, quick, and minimizes complications such as blood loss
6. **Internal Iliac Artery Litigation:** This procedure can be life-saving when conventional measures fail to control bleeding. The reported success rate of internal iliac artery ligation (IIAL) ranges from 40% to 100%. By transforming the arterial flow into a venous-like system, it facilitates stable clot formation and achieves hemostasis. The main indications for internal iliac artery ligation include atonic or traumatic postpartum hemorrhage, adherent placenta, placental abruption, uterine rupture and placenta previa.

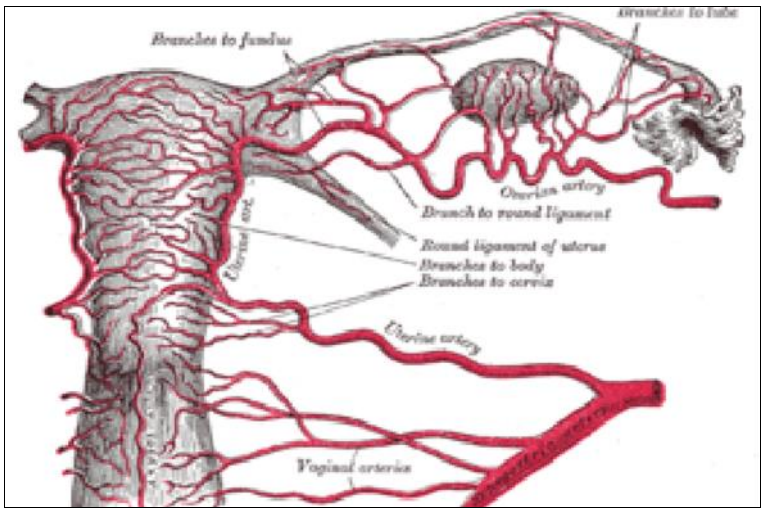

Fig 10: Step wise devascularization

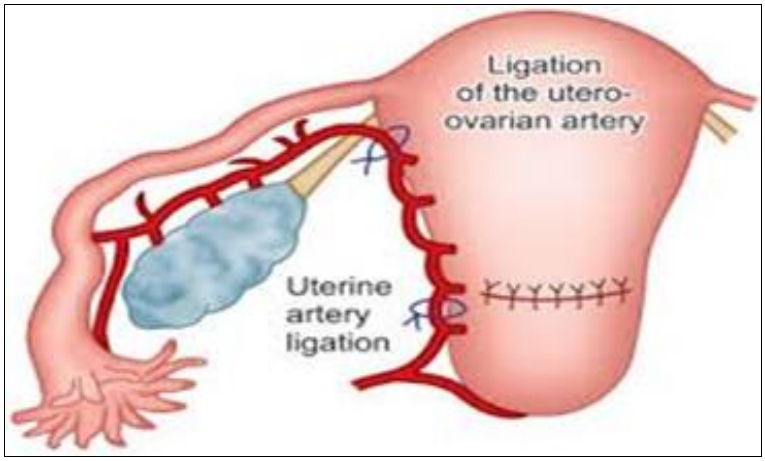

Fig 11: Uterine and utero-ovarian artery ligation

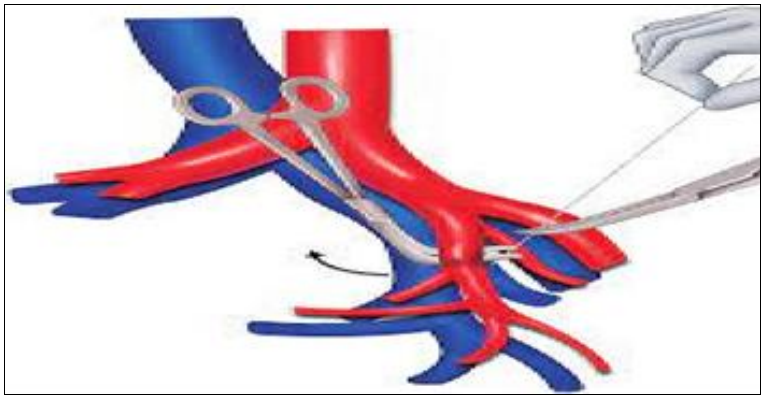

Fig 12: Internal iliac artery ligation

7. Uterine artery embolisati

3. Uterine artery embolisation (UAE) is a non-surgical intervention for controlling persistent postpartum haemorrhage (PPH), with success rates exceeding 90%. It avoids laparotomy and is often preferred over uterine artery ligation. UAE involves inserting a catheter through the femoral arteries to block uterine blood flow, promoting clot formation and tissue necrosis. It is considered a safe option for preserving fertility and resuming menstruation post-procedure. However, complications include low-grade fever, pelvic infection, hematomas, transient ischemia, and rare arterial injury [28].

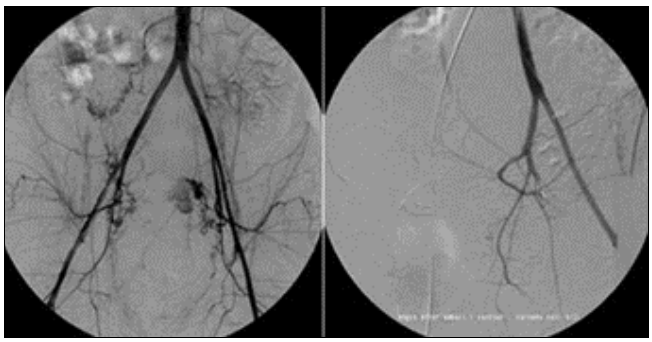

Fig 13: Showing the uterine Artery Embolisation

4. Hysterectomy

1. Peripartum hysterectomy is the last resort for uncontrolled PPH when all other methods fail. It is often indicated in placenta accreta, uterine rupture, or severe bleeding and is associated with significant morbidity and mortality.
2. There are two types of subtotal hysterectomy and total hysterectomy
   These surgical methods are life-saving interventions for refractory PPH, tailored to the clinical situation and available expertise

Steps for Peripartum hysterectomy

1. **Preoperative Preparation:** Stabilize the patient with aggressive fluid resuscitation and blood product transfusion. Ensure availability of cross-matched blood, surgical team, and anesthesia support.
2. **Surgical Access:** Perform a vertical midline or transverse Pfannenstiel incision to provide adequate exposure of the pelvic cavity.
3. **Control of Hemorrhage:** Temporarily compress or clamp uterine arteries using vascular clamps or surgical sutures to reduce active bleeding.
4. **Dissection of Uterine Attachments:** Divide and ligate the round ligaments bilaterally to mobilize the uterus. Open and dissect the broad ligaments, identifying and safeguarding the ureters. Mobilize the bladder downward by incising the vesicouterine peritoneum and separating the bladder from the lower uterine segment.
5. **Uterine Vessel Ligation:** The clamp, cut, drop technique in sequentially clamping, cutting, and ligating vascular pedicles to control bleeding efficiently is to done. This stepwise approach is critical in managing massive hemorrhage and ensuring rapid hemostasis during the procedure.
6. **Uterine Removal:** For subtotal hysterectomy, amputate the uterus at the level of the cervix, leaving the cervical stump in situ. For total hysterectomy, dissect and ligate the cardinal and uterosacral ligaments, and excise the uterus along with the cervix.
7. **Hemostasis and Inspection:** Ensure meticulous hemostasis by inspecting all pedicles, ligatures, and suture lines for bleeding.Use additional sutures, if necessary, to secure hemostasis.
8. **Abdominal Closure:** Irrigate the abdominal cavity to remove blood clots and confirm no retained tissue.Close the abdominal incision in layers after placing appropriate drains if indicated.
9. **Postoperative Monitoring:** Transfer the patient to an intensive care unit for close monitoring of hemodynamic status, coagulation parameters, and organ function.

Management for Traumatic PPH

Management of traumatic postpartum haemorrhage (PPH) begins with careful exploration and cervicovaginal inspection to identify bleeding sources, such as perineal, vaginal, or cervical tears. Hemostatic sutures are applied to control bleeding from these injuries effectively. If uterine rupture is suspected, immediate action is required through an emergency laparotomy to assess and repair the rupture. In cases where bleeding persists despite these measures or the trauma is extensive, a subtotal or total hysterectomy may be necessary as a life-saving intervention. This structured approach ensures prompt identification and control of bleeding to stabilise the patient and prevent further complications.

Conclusion

Effective postpartum haemorrhage (PPH) management requires prompt recognition, timely interventions, and a coordinated multidisciplinary approach. When necessary, utilise evidence-based protocols, such as uterotonics, fluid resuscitation, and advanced surgical techniques, to control bleeding and prevent complications. Proper preparedness and adherence to standardised guidelines can effectively manage PPH,

significantly improving maternal outcomes and saving lives.

Conflict of Interest
Not available

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Not available

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