



Prevention and Management of PPH

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Introduction:

One of the Millennium Development Goals set by the United Nations in 2000 is to reduce maternal mortality by three-quarters by 2015. Postpartum hemorrhage (PPH) is one of the five major causes of maternal death and is the leading cause in developing countries. To bring about a reduction in the maternal mortality, health workers need to have access to appropriate medications, training and evidence-based guidelines on safety, quality and usefulness of the various interventions.

Definition: PPH is generally defined as blood loss greater than or equal to 500 ml within 24 hours after birth, or change of 10% in the hematocrit value following the birth of baby or any amount of blood loss making the patient haemodynamically unstable. Severe PPH is blood loss greater than or equal to 1000 ml within 24 hours.

Types: 1. Primary PPH - Occur in the first 24 hours following delivery

2. Secondary PPH - Occurs between 24 hours and 12 weeks postnatally

Pathophysiology: During pregnancy physiologically there is increased blood flow to the uterus. A term gravid uterus is perfused at a rate of 500 to 750 ml/min¹. Control of hemorrhage from the uterus after delivery occurs primarily by two mechanisms

1. Vasoconstriction provoked by myometrial contraction

2. Intravascular thrombosis in the placental bed induced by platelet adhesion, aggregation & formation of fibrin²

PPH may result from failure of the uterus to contract adequately (atony), genital tract trauma (i.e. vaginal or cervical lacerations), uterine rupture, retained placental tissue, or maternal bleeding disorders^{3, 4}. Uterine atony is the most common cause and consequently the leading cause of maternal mortality worldwide.

During the 3rd stage of labour endogenous concentration of PGF2 α peaks which causes effective contraction & retraction of the pregnant uterus⁵. Anesthetic agents like lidocaine reduce the levels of PGF2 α and average blood loss at elective caesarean section ranges between 500 & 1000 ml⁶.

Diagnosis and Prevention: In practice, blood loss after delivery is usually underestimated and seldom measured. Measuring blood loss improves the care and outcome for the women. Anemic women may require interventions to manage PPH with an even less blood loss.

The causes of PPH can be broadly classified into problems with uterine tone (atony), retained placenta, trauma (of the lower genital tract and uterus), and coagulation problems, which may be pre-existing or acquired as a result of other pathology (such as disseminated intravascular coagulation). If birth was assisted with forceps or vacuum extraction, the likelihood of trauma will be higher. If labour is prolonged, uterine atony may occur. However, PPH may occur in women without identifiable clinical

or historical risk factors. It is therefore recommended that active management of the third stage of labour be offered to all women during childbirth:

1. Administration of a uterotonic soon after the birth of the baby;
2. Clamping of the cord following the observation of uterine contraction (at around 3 minutes);
3. Delivery of the placenta by controlled cord traction, followed by uterine massage.

Some women will still require treatment for excessive bleeding. Multiple interventions (medical, mechanical, invasive non-surgical and surgical procedures), requiring different levels of skill and technical expertise, may be attempted to control bleeding.

Management of retained placenta: The WHO guide, 'Managing complications in pregnancy and childbirth', states that if the placenta is not expelled within 30 minutes after delivery of the baby, retained placenta should be the diagnosis^{9,10}. It also says that, in the absence of haemorrhage, the woman should be observed for a further 30 minutes, before manual removal of placenta is attempted⁶. Thus, a conservative approach is advised and the timing of manual removal as the definitive treatment is left to the judgments of the clinician.

- If the placenta is not expelled spontaneously 10 IU of oxytocin in combination with controlled cord traction may be tried. (Strength of recommendation: weak.)
- Ergometrine is not recommended, as it may cause tetanic uterine contractions, which may delay expulsion of placenta. (Quality of evidence: very low. Strength of recommendation: weak.)
- Prostaglandin E₂ (dinoprostone or sulprostone) is not recommended. (Quality of evidence: very low. Strength of recommendation: strong.)
- Intraumbilical vein injection of oxytocin with saline may be offered¹⁷. (Quality of evidence: moderate. Strength of recommendation: weak.)
- Manual extraction of the placenta should be offered as the definitive treatment. (Strength of recommendation: strong.)
- A single dose of antibiotics (ampicillin or first-generation cephalosporin) should be offered after manual removal of the placenta⁸. (Quality of evidence: very low. Strength of recommendation: strong.)

Management : Effective treatment of PPH often requires simultaneous multidisciplinary interventions. The health care provider needs to begin resuscitative efforts quickly, establish the cause of the hemorrhage, and possibly obtain the assistance of other care providers, such as an obstetrician, anesthetist or radiologist. Avoiding delays in diagnosis and treatment will have a significant impact on sequelae and chance of survival

Evidence and Recommendations:

A. Diagnosis of PPH: After childbirth, blood loss and other clinical parameters should be closely monitored. At present, there is insufficient evidence to recommend quantification of blood loss over clinical estimation. (Quality of evidence: low. Strength of recommendation: strong)

B. Management of atonic PPH : Critical steps

- Communicate
- Resuscitate
- Investigate
- Initiate (drug therapy)
- Ligate (the great arteries)

Communicate

Shout for help if alone in the labour ward! During LSCS if PPH occurs the anesthetist is already with us .
Alert theatre

Resuscitate - Rapid initial assessment

Assess blood loss, Visual – poor (Slow trickle
dangerous than gush), Tachycardia, Hypotension

Investigate - 2 wide bore I.V. lines No. 14/16

Withdraw 20 ml blood for Grouping & cross matching, Hb, PCV &
Coagulation Profile . Arterial Blood Gas Study if PPH continues
Vigilance ! C.V.P - Fluid control, Pulse, B.P, Urine output

Correct hypovolemia - Crystalloids / Blood / Blood component/colloids

- Moist nasal O2 at 4 - 6 lit.per min

Initiate oxytocics

Evacuate uterus : Ascertain cause ??

As a general preventive approach, the use of oxytocin for active management of the third stage of labour is strongly recommended (reduces PPH by more than 60%)⁷.

1. Medical interventions

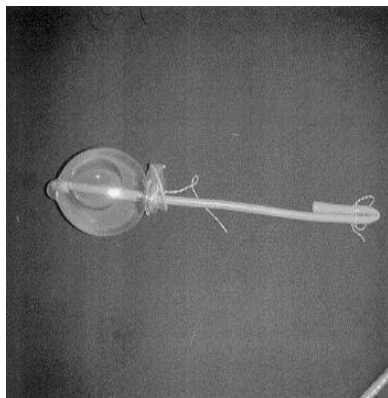
- Oxytocin should be preferred over ergometrine alone, a fixed-dose combination of ergometrine and oxytocin and prostaglandins. (Quality of evidence: very low to low. Strength of recommendation: strong.)
- If Oxytocin is not available, or if the bleeding does not respond, ergometrine or oxytocin - ergometrine fixed-dose combination should be offered. (Quality of evidence: very low to low. Strength of recommendation: strong.)
- If bleeding does not respond to the second-line treatment, a prostaglandin should be offered. (Quality of evidence: very low to low. Strength of recommendation: strong.)
- Misoprostol may be considered as a third line of treatment because of its ease of administration and low cost. There is no added benefit of offering Misoprostol as an adjunct to treatment for PPH in women who have received oxytocin during the third stage of labour. (Quality of evidence: moderate to high. Strength of recommendation: strong)⁸. In resource poor settings there is an advantage of using Misoprostol as it does not require a cold storage chain
- In women who have not received oxytocin, Misoprostol alone should be offered as the drug of choice. (Quality of evidence: moderate to high. Strength of recommendation: strong.)
- In the PPH treatment trials, doses from 600 µg to 1000 µg were administered orally, sublingually or rectally. Side-effects, primarily high fever and shivering, were associated with higher doses. Hence, doses of 1000–1200 µg are not recommended. When the first and second line uterotonics are not available or have failed, as a last resort 800 µg can be used.
- Tranexamic acid (antifibrinolytic agent) may be offered if: (i) all uterotonics have failed; or (ii) it is thought that the bleeding may be partly due to trauma. (Quality of evidence: very low. Strength of recommendation: weak.)
- Recently, recombinant factor VIIa (rFVIIa) has generated interest as an option for treatment of

PPH. Recombinant factor VIIa for the treatment of PPH should be limited to women with specific hematological indications. It could be life-saving, but is also associated with life-threatening side effects, is very expensive and may be difficult to administer.^{9,10}

2. Mechanical interventions: A range of mechanical interventions to compress or stretch the uterus have been proposed, either as temporizing measures or as definitive treatment.

- Uterine massage as a therapeutic measure is defined as rubbing of the uterus manually over the abdomen sustained until bleeding stops or the uterus contracts. It should be started once PPH is diagnosed. (Quality of evidence: very low. Strength of recommendation: strong.)
- Bimanual uterine compression may be offered as a temporizing measure due to uterine atony after vaginal delivery. (Quality of evidence: very low. Strength of recommendation: weak.)
- Uterine packing is not recommended for the treatment of PPH due to uterine atony after vaginal delivery. (Quality of evidence: very low. Strength of recommendation: weak.). There was no evidence of benefit and it placed a high value on concerns regarding its potential harm.

In women who have not responded to treatment with uterotonics, or not available, intrauterine balloon using Foley catheters, Bakri and Rush balloons, or condom tamponade may be offered with success rates ranging from 71% to 100%. Quality of Evidence: low. Strength of recommendation: weak.)



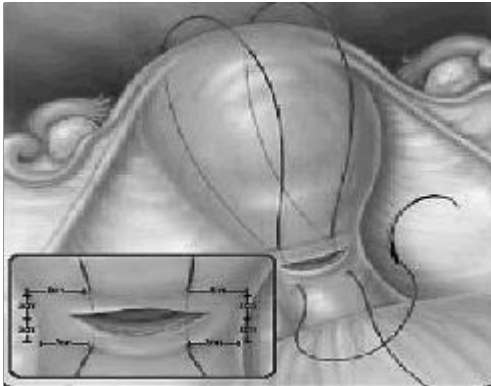
3. Newer innovation: Shivkar's compression packing. After introduction of the catheter, a tight vaginal pack is applied & saline is administered into the catheter. It requires more evidence based trials

- External aortic compression may be offered as a temporizing measure until appropriate care is available. (Quality of evidence: very low. Strength of recommendation: weak.)
- Women treated with Non pneumatic anti shock garments (NASG) had a median blood loss 200 ml lower than women who received standard treatment (hydration with intravenous fluids, transfusion, uterotonics, vaginal or abdominal surgery)¹⁴. Research was ongoing to evaluate the potential benefits and harms of this intervention¹⁴.
- If other measures have failed and resources are available, uterine artery embolization may be offered for PPH due to uterine atony with success rates of 82% to 100%¹⁵. (Quality of evidence: very low. Strength of recommendation: weak.)

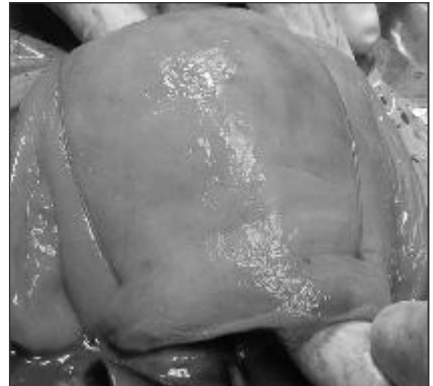
4. Surgical interventions: A wide range of surgical interventions have been reported to control PPH that is unresponsive to medical or mechanical interventions. They include various forms of compression sutures, ligation of the uterine, ovarian or internal iliac artery, and subtotal or total hysterectomy^{16,17}

- Conservative approaches should be tried first, followed, followed by more invasive. For eg : compression sutures may be attempted first. If it fails, uterine, utero-ovarian and hypogastric vessel ligation may be tried.
- Christopher B- Lynch and his colleagues developed a technique in 1997 to treat the patients unresponsive to medical and other surgical modalities. Objective of this technique was to compress the uterus without occluding the uterine arteries or uterine cavity . It is a simple to perform and may be a rapidly effective alternative to hysterectomy It seems to be the most commonly reported procedure with success rates of 89% to 100%. (17,18.)
- Modified by Dr. Richard Hayman & Prof. S. Arulkumaran

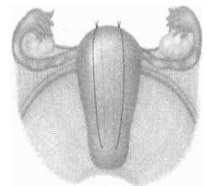
B Lynch sutures



Modified B Lynch sutures



- Modified B Lynch sutures: First a compression test is done and if the uterus responds to that the sutures can be attempted .Lower segment does not require an incision . A delayed absorbable suture like Polyglycolic acid suture on a straight & blunt needle is used to transfix uterus from the anterior uterine wall through to the posterior wall half an inch medial to the angle just above reflection of the bladder. Meanwhile the assistant compresses the uterus. This is then tied at the fundus such that the walls get compressed and helps to achieve hemostasis by effectively producing tamponade .

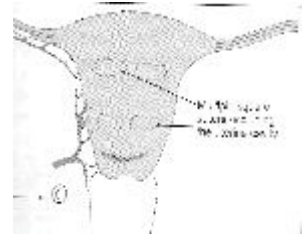


This may be focused in the area of the placental bed in cases of abnormal placentation. Invaluable as an alternative to more complicated surgery of step wise devascularization & hysterectomy which requires more time & expertise. In many cases, hysterectomy is avoided, so is less mutilating ,prevents greater morbidity & psychological suffering due to loss of fertility. It is cost effective. Follow-up reports suggest a normal return to menses and fertility, but the number of cases is small. Our own experience at LTMG hospital (2006-2007) suggested Out of a total no. 40 cases of severe atonic PPH, this technique helped to conserve the uterus in 19 cases. We were able to Other workers have described Cho's multiple square sutures and vertical penetrating sutures within the lower uterine segment combined with oblique penetrating corpus sutures or multiple vertical sutures occluding the uterine cavity. (20)

Simple plication of placental bed without occluding uterine cavity have also been suggested Dr.Gunasheela's global stitch -a purse string suture all around the mid portion of the uterus.

U-suturing technique (21)

An absorbable PGA 1'0 suture and a needle whose curve had been straightened manually were used for suturing. To perform an interrupted single U - suture, the needle was inserted at the ventral uterine wall, led through the posterior wall and then passed back to the ventral wall where the thread was joined with a flat double knot. As the main surgeon ties the suture, the assistant surgeon performs bi-manual uterine compression. The number of sutures required depended on the size of the uterus and the persistence of bleeding. Generally 6 -16 U sutures are inserted in horizontal rows along the uterus, starting at the fundus and ending at the cervix. Thus, approximately 2- 4 cm of tissue was compressed within each suture.



Harnessing the Great Arteries: Selective artery ligation has success rates of 62% to 100%. Useful in selected cases. It does not provide absolute hemostasis.

Internal iliac artery ligation (IIAL) .One must be very familiar with the pelvic anatomy and the course of the great arteries and veins. Care must be taken to identify the ureters and incise the retroperitoneal area very carefully . The internal iliac artery must be ligated 3cms away from the bifurcation of the common iliac vessels to avoid the posterior division of common iliac artery . Linen or catgut can be used for ligation but the vessel must never be divided after ligation.

- Dampens the pulse pressure & transforms the pelvic arterial system into a venous-like system losing the 'Trip Hammer' effect of arterial pulsations facilitating hemostasis.
- The drop in pulse pressure is
 - 85% -- Bilateral L IIAL
 - 77% -- Unilateral IIAL
- Mean arterial pressure 24% – ↓B/L IIAL
 - ↓22% -- U/L IIAL

A timely decision should be taken before it is too late.

Internal iliac artery ligation can be difficult when tissue edema is present. More dissection time & more experience is required. Complications include possibility of injury to ureters and vessels, increased chance of thrombo-embolism and need for blood transfusions. If the main branch gets ligated there can be gluteal region necrosis

If life-threatening bleeding continues, subtotal (also called supracervical or total hysterectomy) should be performed. (Quality of evidence: no formal scientific evidence of benefit or harm. Strength of recommendation: strong.)

Obstetric hysterectomy indicated in certain clinical situations such as bleeding placenta percreta, rupture uteri, inadequate response to blood or thermodynamically unstable patients

- If conservative methods fail obstetric hysterectomy with or without internal iliac ligation may need to be done .There is an increased morbidity.
 - One must ensure stump hemostasis. Post hysterectomy problems include psychological trauma due to amenorrhea and sterility therefore should be last option in young patients with low parity.
- D. **Choice of fluid for replacement or resuscitation:** Fluid replacement is an important component of resuscitation for women with PPH, but the choice of fluid is controversial. Intravenous fluid replacement with isotonic crystalloids should be used in preference to colloids (more expensive)

as high doses of colloids, may cause adverse effects¹⁹. (Quality of evidence: low. Strength of recommendation: strong.)

E. Health systems and organizational interventions

- Health care facilities should adopt a formal protocol for the management of PPH and patient referral to higher level. (Strength of recommendation: strong.)
- Simulations of PPH treatment /PPH drills may be included in pre-service and in- service training programs. (Strength of recommendation: weak.)
- Improvement in communication between health care providers, patients and their family members is an important priority in training of health care providers.

PPH can present in different clinical scenarios. Bleeding may be immediate and in large amounts, it may be slow and unresponsive to treatments, or it may be associated with systemic problems, such as clotting disorders²⁰. It is critical that health workers remain vigilant during the minutes and hours following birth, in order to identify problems early. A stepwise approach is recommended. The initial step is to assess the woman and take immediate nonspecific life-saving measures, such as resuscitation, calling for help and monitoring vital signs. The second step is to give directive therapy following the diagnosis of PPH. In a given clinical situation, not all diagnostic assessments can be done simultaneously. Starting with the more effective, less invasive and less costly measures and, if those fail, moving towards invasive and more costly methods that require expertise and specific facilities. In facilities with limited capacity, transfer of women to a higher center should be organized without delay.

The recommendations mentioned above and the level of evidence used, is adapted from World Health Organization (WHO) recommendations for the prevention of postpartum haemorrhage (2007), Geneva^{20,21}.

H Ask for Help

Assess (Vital parameters ,blood loss) & resuscitate

Establish etiology & ensure availability of blood ascertain cause

Massage uterus

Oxytocin infusion + Prostaglandins(IV,PR,IM,intramyometrial)

Shock garment & shift to theatre exclude tissue or trauma/bimanual compression

Tamponade Balloon or uterine packing

Apply compression sutures B- Lynch or modified

Systematic pelvic devascularisation (uterine,ovarian, internal iliac)

Interventional radiologist –If appropriate uterine artery embolisation

Subtotal or total hysterectomy

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