Vol. 4, No. 1, January, 2013

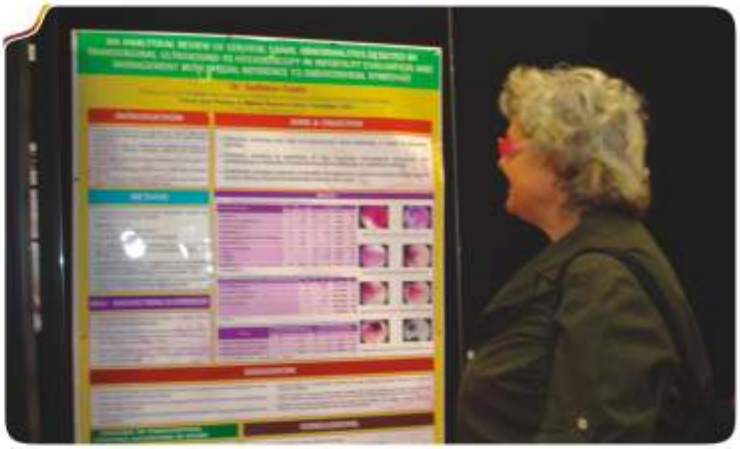
COMPREHENSIVE BULLETIN ON SAFE MOTHERHOOD INITIATIVE

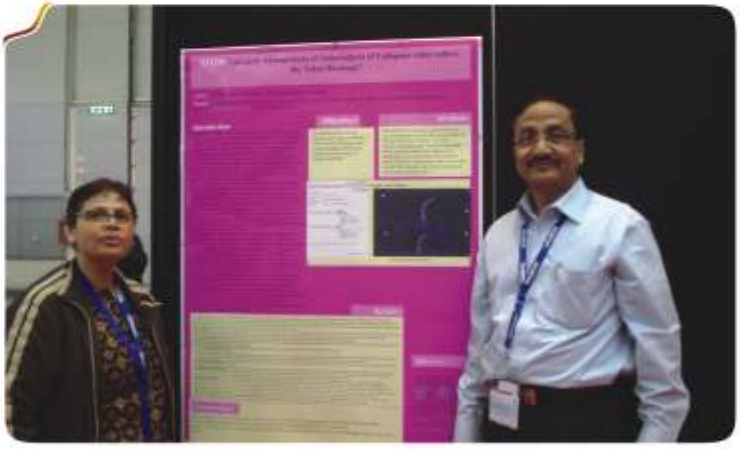
THEME : POSTPARTUM HEMORRHAGE

INNOVATION TO IMPLEMENTATION

Safe Motherhood Committee - FOGSI

Editor : **Dr. Sadhana Gupta**
Chairperson
Safe Motherhood Committee (2011-2013)





- Dr. C N Purandare was elected President FIGO for year 2015–2018
- Dr. Duru Shah received Distinguished Service Award at Inaugural Ceremony of FIGO Conference – Rome
- About 600 FOGSI members were participated in FIGO with presentation of many research paper

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Joint Secretary

Contribution of Safe Motherhood Committee – President's Maternal Mortality Workshop Sep - Dec 2012

September 8th 2012 at Lucknow, Key organizer Dr. Uma Singh, Faculty Dr. Sadhana Gupta, Dr. Hema J Shobhane, Dr. Preeti Kumar, workshop attended by 60 participants

October 15th 2012 at Sagar, Key organizer Dr. Monika Jain, Faculty Dr. Hema J Shobhane, workshop attended by 40 participants

November 3rd 2012 at Agra, Key organizer Dr. Saroj Singh, Dr. Anupam Gupta, Faculty Dr. Sadhana Gupta, workshop attended by 80 participants.

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East Zone : **Dr. Alka Pandey**

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Contribution of Safe Motherhood Committee – President's Maternal Mortality Workshop Sep - Dec 2012

October 14, 2012 at Saharanpur, Faculty Dr. Charu Mittal, Dr. Alka Pandey, workshop attended by 40 participants.

November 15th 2012 at Ghaziabad, Key organizer Dr. Veena Mittal, Dr. Smita Agrawal, Faculty Dr. Sadhana Gupta, Dr. Ragini Agrawal, workshop attended by 60 participants

December 29th 2012 at Dehradun, Key organizer Dr. Manju Kala, Faculty Dr. Sangeeta Gupta, Dr. Hema J Shobhane, workshop attended by 50 participants

MESSAGE

FROM THE DESK OF EDITOR

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Safe Motherhood Committee – Contribution Vice President's Advanced Postpartum Care Workshop Sep - Dec 2012

Vice President Incharge - **Dr. Mandakini Megh**, National Coordinator - **Dr. Sadhana Gupta**

November 9th 2012, at Muzaffarnagar, Key organizer Dr. Usha Sharma, Dr. Tarini Taneja, Dr. Bharti Maheshwari, Faculty Dr. Mandakini Megh, Dr. Sadhana Gupta, Dr. Shilpa Agrawal, workshop attended by 80 participant.

December 29th 2012, at Allahabad, Key organizer Dr. Ragini Mehrotra, Dr. Ranjana Khanna, Faculty Dr. Sadhana Gupta, Dr. Manju Shukla, Dr. Preeti Kumar, workshop attended by 70 participant

Let the Life of Every Mother & Neonate Count

President's Message

Dr. P. K. Shah
President, FOGSI

MESSAGE

Wishing you all a very Happy & Prosperous New Year!

It gives me immense pleasure to write a few words for the 4th issues of Safe Motherhood Committee's bulletin. I have observed activities of this Committee in past few years. I was impressed by the enthusiasm of the Chairperson & the members of the Committee.

I congratulate Dr. Sadhana Gupta for making it possible to bring out this bulletin on Postpartum Haemorrhage. I am sure that information provided in this bulletin will tremendously help FOGSI members know and understand all related to Postpartum Haemorrhage.

This wonderful efforts and my best wishes to Dr. Sadhana Gupta & team for future.
With warm regards,

Dr. P. K. Shah

Dr. Hema Divakar
President FOGSI 2013

My dear FOGSI'ans,

I have said it before and I say it yet again .... "Hurt me with the truth - I don't mind ..... But don't comfort me with a lie"

We can never ever say we have done enough with respect to womens healthcare until we prevent every single preventable death.

"Postpartum Hemorrhage" tops the list of the causes for maternal mortality in our country and we know that women are needlessly dying due to bleeding after birth .

- Anemia eradication
- Active management of third stage
- Acting as swiftly as possible
- Acknowledging that you can save lives
- Awarding and rewrding the Champions who Help Mothers Survive
- This completes the spectrum for Vision 2022
- Access to healthcare
- Awareness about PPH management
- Alerting the team and ref center

My congratulations to Dr Sadhana Gupta for leading many initiatives through Safe Motherhood Comittee - with Passion and Commitment. We need to figure out what works for us - move from Innovation to Implementation.

My sincere request to all FOGSI'ans to ACT and IMPACT

Coz I truly believe that our efforts can make a difference to Womens Health Care in India.

Best wishes,

Dr. Hema Divakar

Contribution of Safe Motherhood Committee towards FOGSI event

November 30th 2012, at Nagpur in World Congress in Obstetric Dielema – Precongress workshop on Maternal Mortality, many eminent international faculty participated – Dr. Padma (UK), Dr. Asma Rana (Nepal), Dr. Siddique (Pakistan). Academic were high standard, intraction was lively,

UP State Chapter Conference, December 23-23 2012 at Jhansi, Safe Motherhood Committee contributed to Symposium of 3rd Stage Complication. Dr. Sadhana Gupta given scientific talk CPR in Obstetric Collapse, Dr. Alpna Agrawal delivered Retained Placenta, Dr. Abhilasha delivered talk on Massive PPH

December 16th 2012, at Mau, Annual Conference & CME, Dr. Sadhana Gupta was Chief Guest of Inaugural function. Local political and administrator participated. Dr. Sadhana Gupta coordinated Panel discussion on Different Case Situation on Adolescent Gynecological Problem

Safe Motherhood Committee coordinated with NARCHI World Congress on 14th September 2012 at India Habitate Centre, New Delhi. A precongress workshop on Maternal Mortality was organized by ESI Hospital Badarpur. Key organiser Dr. Sangeeta Gupta & Dr. Leena Wadheva, Convener Dr. Sadhana Gupta, Speaker Dr. A K Debdas, Dr. Parikshit Tank, Dr. Sadhana Gupta, Dr. Asmita Rathore, Dr. Charu Mittal, Dr. Hema J Shobhane

Dr. Laxmi Shrikhande
Senior Vice
President FOGSI 2012
Director, Shrikhande IVF
& Endoscopy Centre,
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MESSAGE

Save a mother, Save a family.

Death of a mother spells doom for the family. Childbirth a time for joyous celebrations turns into gloom and depression. Thousands of mothers die every year because of various reasons. Of these post partum haemorrhage (PPH) is world's leading cause of maternal mortality. PPH can lead to death within 2 hours if not managed immediately. However there is a mismatch between the degree of risk and use of services in the postpartum period, there is also a mismatch between actual risk and perception of risk. The notion that a baby is born, the event is over and there are few or no remaining risks for the woman. Because it is impossible to predict who will get PPH, all women who give birth should have a skilled provider present who can perform Active Management of Third Stage of Labour (AMTSL) which is a simple effective low cost intervention.

Consistent practice of AMTSL can make the difference between life and death. Unfortunately AMTSL is vastly underutilised by health care professionals worldwide because of lack of knowledge, lack of supplies or outdated guidelines leading to devastating consequences. Most of this maternal morbidity and mortality could be stopped with coordinated action, sufficient resources, strong leadership and political will. Providing access to comprehensive reproductive health services (including family planning and safe abortion), ensuring skilled care by midwives during pregnancy and childbirth, and providing emergency care for all mothers and newborns with complications, would dramatically impact outcomes.

Safe Motherhood Committee of FOGSI is doing commendable job towards reducing the high MMR because of PPH. I congratulate Dr Sadhan Gupta for her dedication & tireless work in this direction. I am sure this quarterly bulletin on PPH will update the FOGSI members on the current scenario & prompt management of these cases.

With best wishes,

Dr Laxmi Shrikhande

Dr. Mandakini Megh
Vice President
Incharge,
Safe Motherhood Committee

It gives me immense pleasure to communicate to my FOGSI members through release of 4th issue of Safe motherhood bulletin which is focused on Postpartum Haemorrhage.

The academic quality, aesthetic formatting and range of columns of safe motherhood bulletin is par excellent, and I congratulate **Dr. Sadhana Gupta for receiving Dr. D.C. Dutta best publication of FOGSI for year 2012. I believe that future issues will be more and more better** .

Postpartum hemorrhage still remains a nightmare for obstetric team and kills thousands of women in child birth in Developing and poor countries. Political and burocratic initiatives to improve infrastructure are required to combat this obstetric complications in form of availability of functioning obstetric unit in all places, blood banking, referral and transport facilities are other areas where we need interventions.

Obstetricians, untrained doctors and paramedical all have to acquire basic knowledge and skills to manage PPH in initial stages so that women do not become critically ill. So please share your knowledge with all. Prevention of one death by each of us means many ,many for all. Publication and distribution of such bulletin is part of this learning and sharing process.

I highly appreciate the tremendous effort of Chairman Safe Motherhood Committee Dr. Sadhana Gupta for regular release of Safe Motherhood bulletin, which covers many aspect of maternal health in our country.

Dr. Mandakini Megh

Safe Motherhood Committee members reaches the unreached Rural camp in Chirgaon, Jhansi on 16th December, 2012

400 Patients - including women, men, children. Maximum women with PID and other diseases. Maximum women and men were undernourished and anaemic with worm infestation. Hypertension, skin disease and eye ear diseases are common in all. Investigations and drug distribution done adequately.

Editor's Desk

Dr. Sadhana Gupta
Editor

Another year in timeless time has passed. Our nation has undergone huge turbulence through series of incidents. We lost many great and stall worthy personalities, we saw inhuman suffering and at the same time restlessness to change and will for struggle for change in right direction of compassion and care. Women's dignity and her right to live as independent being again emerged as hot and vibrant issue. As doctors and that too as obstetrician & Gynaecologist our roles in society can be enormous and innovative. And the key words are — **'Be the Change you want to see in the world'**

The fourth issue of Safe Motherhood bulletin is in your hands. It is focused on Postpartum Hemorrhage, which can kill the mother in two hours, if not managed promptly and aggressively. Postpartum Haemorrhage is sole cause of 30% of all maternal deaths in Africa & Asia. Wide discrepancy in incidence of PPH causing critical illness and mortality itself speaks that PPH related sickness and death are preventable. We require knowledge, skills, infrastructure and organized team work. It is our humble attempt to cover all aspect of PPH in this bulletin. I am immensely thankful to all contributors who have shared their expertise and experience in this bulletin. I owe a special thanks to Prof. Arulkumaran for his article on Uterine Tympanode. His continued encouragement for safe mother hood bulletin is source of inspiration for us.

In column of India Speaks Dr. Shirin Venkat explores Narmada. We hope this reading will motivate us to explore our country and move out of our clinics and home for much vaster experiences. In column of Project PATH foundation have shared their research work on use and misuse of oxytocics and future work in collaboration with FOGSI.

I am immensely thankful to our President Dr. P.K. Shah and incoming president Dr. Hema Diwaker who has taken issue of maternal death vigorously throughout the country. As chairman Safe Motherhood Committee FOGSI it was our pride and pleasure to be part of all the program. We will share memoirs of many program in the issue.

It is our great pleasure to communicate that Safe Motherhood Bulletin has been awarded with Dr. D.C. Dutta Award for best FOGSI Focus publication in year 2012. I owe special thanks to authors, my coordinator & joint editor, FOGSI office bearers and members of Safe Motherhood Committee for their encouragement, inspiration and involvement. It has added to our responsibility and inspired us to improve in future issues.

Lastly I wish all of You a Very Happy and Great New Year and pray Almighty God to be with us to show us the right ways of living.

Wish you an enjoyable reading,

Yours sincerely,

Dr. Sadhana Gupta

Defining & Diagnosis of PPH

Dr. Rajat Ray
Chairperson
Public Awareness Committee
(2010–2012)
Ray Ultrasound Centre & Infertility Clinic
S.T.I. Chowk, Rourkela-769004
Dist. Sundargarh, Orissa

DEFINITION

The most common definition of PPH is estimated blood loss e500 ml after vaginal birth or e1000 ml after cesarean delivery with in 24 hours. Most cases of morbidity & mortality due to PPH occur in first 24 hours following delivery. Hemorrhage within first 24 hours is regarded as primary PPH, whereas haemorrhage within 24 hours & 12 weeks postnatally is regarded as secondary PPH.

The inadequacy of this definition was illustrated in studies that assessed blood loss using various objective methods: the mean blood loss reported after vaginal and cesarean deliveries was approximately 400 to 600 ml and 1000 ml, respectively, and clinicians were likely to underestimate the volume of blood loss.

An estimated blood loss of e500ml should call attention to mothers who are bleeding excessively & warn the physician that dangerous haemorrhage is imminent.

Another classic definition of PPH is a 10 percent decline in postpartum hemoglobin concentration from antepartum levels. However, this is not a clinically useful definition for several reasons: rapid blood loss may trigger a medical emergency prior to observation of a fall in hemoglobin concentration; laboratory changes that are not correlated with events that endanger the patient should not be used to define a medical emergency; and antepartum hemoconcentration (eg, from preeclampsia or dehydration) may cause a large fall in serum hemoglobin concentration following delivery in the absence of excessive intrapartum blood loss.

DIAGNOSIS

In addition to a complete medical history and physical examination, diagnosis is usually based on symptoms, with laboratory tests often helping with the diagnosis.

PPH is diagnosed clinically as excessive bleeding that makes the patient symptomatic (eg, pallor, lightheadedness, weakness, palpitations, diaphoresis, restlessness, confusion, air hunger, syncope) and/or results in signs of hypovolemia (eg, hypotension, tachycardia, oliguria, low oxygen saturation [<95 percent])

Vaginal bleeding is usually noted, but may not be present in cases where hemorrhage is related to abdominal bleeding from a cesarean delivery or a broad ligament hematoma after a sulcus laceration,0r in some instances of uterine rupture with intraperitoneal bleeding.

The differentiation between bleeding from uterine atony& from lacerations is tentatively made on predisposing risk factors & the condition of uterus. If bleeding persists despite a firm, well contracted uterus, the cause is most likely is lacerations. Bright red blood also suggests lacerations. Careful inspection of vagina & cervix is essential.

Examination of uterine cavity is also essential after internal podalic version & breech extraction.

- Tests used to diagnose postpartum hemorrhage may include:
- estimation of blood loss (this may be done by counting the number of saturated pads, or by weighing of packs and sponges used to absorb blood; 1 milliliter of blood weighs approximately one gram)
- pulse rate and blood pressure measurement
- hematocrit
- clotting factors in the blood
- ultrasound

A timely, accurate diagnosis of PPH is important in order to initiate intervention (eg, drugs, surgery, referral) and improve outcome.

ARTICLE

Debdas's PPH BAG

Dr. A.K. Debdas
FRCOG, FRCS, MD, FICOG
Chairman, ICOG (2012)
Vice President, FOGSI (2006)
Associate Professor (Obs & Gyn)
MGM Medical College, Jamshedpur
debdas2000@gmail.com

Description of the bag

This bag has been designed to envelop the lower half of the body of the mother. It has an anterior or front wall (the printed side of the bag) which is split in the middle up to ***half*** of its length and a posterior or back wall which is intact and is just like a sheet. This wall is meant to go under the buttock of the patient high up-up to her loin.

When to spread the bag

After clamping the cord and handing over the baby by which time all liquor would have drained away. The aim is to avoid volume dilution effect by the liquor on the blood being collected in the bag.

How to spread the bag

It is a matter of using common sense only. 4 Ask the patient to lift her buttock 4Hold the two lateral margins of the bag by two hands and slip the posterior leaf/wall of the bag upwards under the buttock of the patient to reach to the level of the *waist/loin* which would correspond to the level of the umbilicus in front/anteriorly.

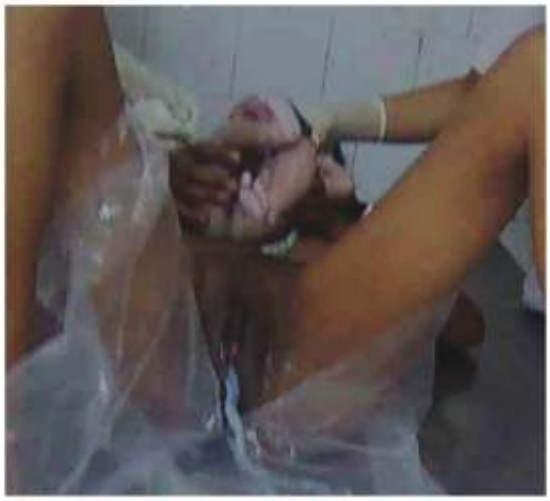
4Fix the upper margin of the bag there at the waist level with two small pieces of adhesive tapes- one on each side on the antro-lateral aspect of the trunk so that the bag sticks to the skin there and also get a little elevated too so that there is no chance of leakage due to gravity.

As one does this, the split in the anterior wall of the bag opens up automatically to accommodate the buttocks while leaving the vulva and perineum uncovered and well exposed giving **excellent perineal access** for :

For delivery of the placenta For stitching of the perineum etc.

(*If necessary, this slit may be increased further by cutting a little more for more space)* .

4The two triangular anterior/front flaps of the bag are to be fixed with two more adhesive tapes on to the medial side of the thighs a little high up so as to promote gravity for the accumulation of the blood. The wide V shaped gap created by this lateral fixing the anterior flaps also allows **excellent abdominal access** for **massaging** the uterus and **doing CCT**.



For cases of intractable PPH

This wide gap would allow access for –

Bi-manual uterine compression and Aortic compression *while efficiently collecting all the lost blood.*

Note : With the use of this bag, *no linen or draping is required* to be put directly on the lower half of the trunk as this part is already encased in the bag. Use of any of

these materials and their soakage would affect the estimation of blood loss.

Postures of delivery in which it can be used

This bag may be used for delivering mothers in any of the conventional postures of delivery -

- In dorsal position
- In semi-reclining position
- In lithotomy position

Use of PPH bag in caesarean section

Here the bag has to be spread under the patient before draping her. The bag will capture all bleeding that will come out through the vagina during and after the operation which is usually ignored in calculation of blood loss in CS.

International Reference on PPH bag (Debdas)

- In WHO website since 2006 – Downloadable
  se-mch@solutionexchange-un.net.in
- Brown University, Providence, USA
- Maternova (www maternova.net)

Dr. Karl Theodore Dussik

Invention of Ultrasound

Doctor Karl Theodore Dussik of Austria published the first paper on medical ultrasonics in 1942, based on his research on transmission ultrasound investigation of the brain. Professor Ian Donald of Scotland developed practical technology and application for ultrasound in the 1950s.

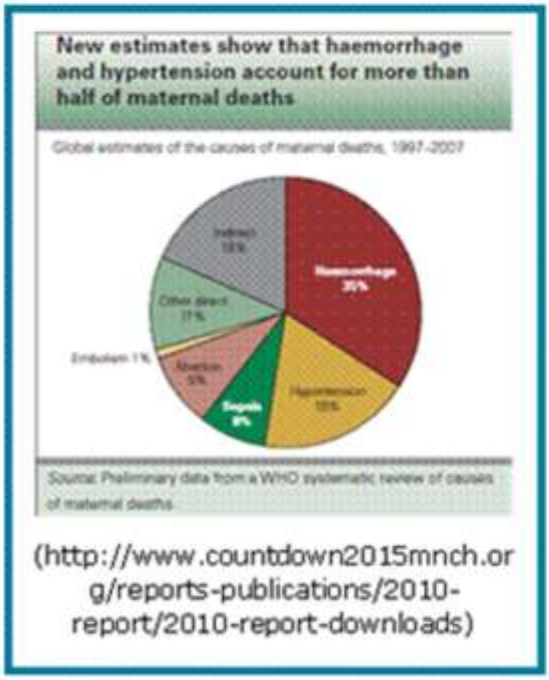
Prevention of PPH in Society & Hospital

Professor Dr. Revathy Janakiram
MD.,DGO., MNAMS.
FICOG., FICMCH

Revathy Women's Speciality Hospital, Madurai, Tamil Nadu.
(Former Director, IDG Chennai)

Postpartum hemorrhage (PPH) is responsible for around 25% of maternal mortality worldwide (WHO, 2007), reaching as high as 60% in some countries. PPH can also be a cause of long-term severe morbidity, and approximately 12% of women who survive PPH will have severe anemia (Abou-Zahr, 2003; WHO, 2006). Additionally, women who have severe PPH and survive ("near misses") are significantly more likely to die in the year following the PPH (Impact International, 2007).

Morbidity and mortality due to PPH are largely preventable through skilled care during childbirth. However, delays in identifying hemorrhage, delays in transport to the appropriate point of care, and delays in receiving the recommended treatment all contribute to high rates of maternal mortality and morbidity due to PPH.



(http://www.countdown2015mnch.org/reports-publications/2010-report/2010-report-downloads)

There are several possible reasons for severe bleeding during and after the third stage of labor – uterine atony, trauma (cervical, vaginal, or perineal lacerations), retained or adherent placental tissue, clotting disorders, and inverted or ruptured uterus. More than one of these can cause postpartum hemorrhage in any given woman. Uterine atony is the leading cause of immediate PPH (75–90 percent) (Koh et al, 2009).

Predicting who will have PPH based on risk factors is difficult because **two-thirds of women who have PPH have no risk factors** (Jhpiego, 2001). Therefore, all women are considered at risk, and hemorrhage prevention must be incorporated into care provided at every birth. In addition, women should be encouraged to give birth with a skilled birth attendant who can manage PPH should it occur, in spite of preventive measures.

Prevention

PPH is one of the few obstetric complications with an effective *preventive* intervention. Active management of the third stage of labor (AMSTL), defined as

- Intramuscular administration of 10 IU of oxytocin, within 1 minute of delivery
- Controlled cord traction (CCT)
- Fundal massage after delivery of the placenta, substantially reduces the risk of PPH.

The Bristol and Hinchingbrooke studies compared active versus expectant (physiologic) management of the third stage of labor. Both studies clearly demonstrated that, when active management was applied, the incidence of PPH was significantly lower (5.9% with AMTSL vs 17.9% with expectant management).

A meta-analysis from four facility-based clinical trials showed a 62% reduction in the risk of PPH associated with AMTSL (Prendiville et al, 2000). The World Health

ARTICLE

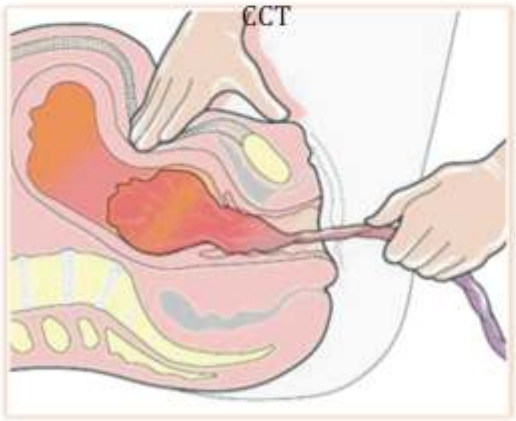
Organization (WHO), International Federation of Gynecologists and Obstetricians (FIGO) and the International Confederation of Midwives (ICM) recommend that skilled birth attendants provide AMTSL for all vaginal births (ICM and FIGO, 2003; ICM and FIGO, 2006). In the absence of a skilled birth attendant who can provide all of the components of AMTSL, the WHO, FIGO, and ICM recommend that oxytocin (10 IU) or misoprostol (400-600 mcg orally) should be given by a health worker trained in its use to prevent PPH. Oxytocin is preferred to other uterotonic drugs where its use is feasible (Mathai et al, 2007; WHO, 2006).

UTEROTONIC AGENT

Within 1 minute of delivery of the infant, palpate the abdomen to rule out the presence of an additional infant(s) and give oxytocin 10 IU intramuscularly (IM). Oxytocin is preferred over other uterotonic drugs because it is effective 2–3 minutes after injection, has minimal adverse effects, and can be used in all women.

CONTROLLED CORD TRACTION

Compared with management waiting for clinical signs of spontaneous placental separation, in women with vaginal delivery, CCT, by reducing the length of the third stage of labour, facilitates early postpartum uterine contraction and local haemostasis and decreases post partum blood loss.



Placing the other hand just above the woman's pubic bone and stabilize the uterus by applying counter-pressure during controlled cord traction.

- Keep slight tension on the cord and await a strong uterine contraction (2–3 minutes).
- With the strong uterine contraction, encourage the mother to push and very gently pull downward on the cord to deliver the placenta. Continue to apply counter-pressure to the uterus.
- If the placenta does not descend during 30–40 seconds of controlled cord traction, do not continue to pull on the cord.

  Gently hold the cord and wait until the uterus is well contracted again.

  With the next contraction, repeat controlled cord traction with counter-pressure.

  Never apply cord traction (gentle pull) without applying counter traction (push) above the pubic bone on a well-contracted uterus.
- As the placenta delivers, hold the placenta in 2 hands and gently turn it until the membranes are twisted. Slowly pull to complete the delivery.
- If the membranes tear, gently examine the upper vagina and cervix wearing sterile/disinfected gloves and use a sponge forceps to remove any pieces of membrane that are present.
- Look carefully at the placenta to be sure none of it is missing.

  If a portion of the maternal surface is missing or there are torn membranes with vessels, suspect retained placenta fragments and take appropriate action .

How to do uterine massage

- Immediately after expulsion of the placenta, massage the fundus of the uterus through the abdomen until the uterus is contracted.
- Palpate for a contracted uterus every 15 minutes and repeat uterine massage as needed during the first 2 hours.
- Ensure that the uterus does not become relaxed (soft) after you stop uterine massage.

Other preventive measures which may either increase the woman's chance of survival or prevent conditions associated with causes of PPH include:

During antenatal care

- Detect and treat anemia, because anemic women are more vulnerable to even moderate amounts of blood loss.
- Bringing up the Hb of >11 gms for every woman entering labour, must be our target.

- Develop a birth preparedness plan to ensure giving birth with a skilled attendant.
- Administer misoprostol to pregnant women during the third trimester of pregnancy in case they give birth without a skilled birth attendant.

CHECKLIST IN LABOUR ROOM

1. Drugs/check expiry date
2. O2 cylinder/airway
3. Emergency tray for PPH
4. Chart for PPH management
5. List of contact numbers of Senior consultants, Blood bank, Donars, Anesthetist, etc.

During labor

- Use a partograph to monitor and guide management of labor and quickly detect unsatisfactory progress.
- Encourage the woman to keep her bladder empty.
- Limit induction or augmentation use for medical and obstetric reasons.
- Do not encourage pushing before the cervix is fully dilated.
- Do not use fundal pressure to assist the birth of the baby.
- Perform selective episiotomy for medical and obstetric reasons only.
- Take care to identify the apex, bleeders and suture episiotomy carefully.
- Avoid/recognize vaginal, paraurethral tears & tackle immediately.
- Assist the woman in the controlled delivery of the baby's head and shoulders to help prevent tears.
- Instrumental delivery- proper & careful application of ventouse/forceps to avoid trauma to cervix, lateral vaginal wall & rupture uterus.

During third stage of labor

- Provide AMTSL (the single most effective way to prevent PPH).
- Do not massage the uterus prior to delivery of the placenta.
- Do not use fundal pressure to assist the delivery of the placenta.
- Do not perform CCT without administering a uterotonic drug.
- Do not perform CCT without providing countertraction to support the uterus.

After delivery of the placenta

- Routinely inspect the vulva, vagina, perineum, and anus to identify genital lacerations.
- Routinely inspect the placenta and membranes for completeness.
- Evaluate if the uterus is well contracted and massage the uterus at regular intervals after placental delivery to keep the uterus well-contracted and firm (at least every 15 minutes for the first two hours after birth).
- Teach the woman to massage her own uterus to keep it firm.
- Monitor the woman for vaginal bleeding and uterine hardness every 15 minutes for at least the first two hours.
- Encourage the woman to keep her bladder empty during the immediate postpartum period

PPH drill must be taught to all labour room staff & practiced on regular basis.

WHO GENEVA 2007. WHO RECOMMENDATIONS FOR THE PREVENTION OF POSTPARTUM HEMORRHAGE (report)

Five Key Recommendations to Prevent PPH

1. AMTSL should be offered by skilled attendants to all women.
2. Oxytocin is the drug of choice for AMTSL in preference to ergometrine, methylergometrine, misoprostol and carboprost/sulprostone
3. In the absence of other components of AMTSL, a uterotonic drug (oxytocin or misoprostol) should be offered to all women by a health worker trained in its use for the prevention of PPH.
4. Because of the benefits to the baby, the cord should not be clamped earlier than necessary for applying cord traction in AMTSL (around 3 minutes).
5. Given the current evidence, the panel recommends no change in the practice of controlled cord traction as one of the components of AMTSL

WHO Recommendations for PPH prevention (2012)

The intrinsic contribution of each component of the 'active management of the third stage of labour' was examined in light of new available evidence, and relevant recommendations were made.

- All women giving birth should be offered uterotonics during the third stage of labour for the prevention of PPH.
- Oxytocin (IM/IV, 10 IU) is recommended as the uterotonic drug of choice. Other injectable uterotonics and misoprostol are recommended as alternatives for the prevention of PPH in settings where oxytocin is unavailable.
- The importance of controlled cord traction (CCT) was revisited because of new evidence. This intervention is now regarded as optional in settings where skilled birth attendants are available, and is contraindicated in settings where skilled attendants do not assist with births.
- Early cord clamping is generally contraindicated.
- Continuous uterine massage is not recommended as an intervention to prevent PPH in women who have received prophylactic oxytocin, as it may cause maternal discomfort, require a dedicated health professional, and may not lead to a reduction of blood loss.
- However, surveillance of uterine tonus through abdominal palpation is recommended in all women for early identification of postpartum uterine atony.

In summary, the Guideline Development Group (GDG) considered the use of uterotonics as the main intervention within the active management of third stage of labour package. In this context, the use of misoprostol for the prevention of PPH by community health care workers and lay health workers is supported in settings where skilled birth attendants are not present.

The GDG also issued recommendations for reducing blood loss during the third stage of labour in caesarean sections. Oxytocin is the recommended uterotonic drug for the prevention of PPH in caesarean sections. Cord traction is recommended in preference to manual removal when assisting placental delivery in caesarean sections.

Misoprostol and the prevention of postpartum hemorrhage

The 18th Expert Committee on the Selection and Use of Essential Medicines met in March 2011 and approved the addition of misoprostol for the prevention of PPH to the WHO Model List of Essential Medicines. It reported that misoprostol 600 µg administered orally can be used for the prevention of PPH where oxytocin is not available or cannot be safely used. Misoprostol should be administered by healthcare workers trained in its use during the third stage of labor, soon after birth of the infant, to reduce the occurrence of PPH.

The most common adverse effects are transient shivering and pyrexia. Education of women and birth attendants in the proper use of misoprostol is essential. Recent studies in Afghanistan and Nepal demonstrate that community-based distribution of misoprostol can be successfully implemented under government health services in a low-resource setting and, accompanied by education, can be a safe, acceptable, feasible, and effective way to prevent PPH .

The usual components of management of the third stage of labor with misoprostol include:

A single dose of 600 µg administered orally (data from 2 trials comparing misoprostol with placebo show that misoprostol 600 µg given orally reduces PPH with or without controlled cord traction or use of uterine massage .

KEY MESSAGE

1. Anticipate PPH in every woman in labour.
2. All patients in second stage should have an IV line with 18 G cannula.
3. Practice AMTSL as a routine in all cases.
4. Women with risk factors for PPH should be delivered only in a centre) with facilities for blood transfusion, surgical procedures, & Lab workup.
5. Placenta previa, especially with a previous scar, should be managed by a senior consultant in a tertiary care centre only.
6. USG assessment of percreta, increta, accreta in cases of placenta previa is a must.
7. Never ignore slow continuous trickling.

8. While conducting any delivery, especially, C.S, make sure that cross matched blood is available. Never take things for granted.
9. during the Golden hour of first two hours all patients after delivery should be under close observation.
10. Fire drills for PPH management must be practiced periodically.
11. Initial management of PPH includes, Early Recognition, Resuscitation.
12. Clinical Audit should be practiced in each centre(not to criticize but to analyze & Improve).

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Raymond V. Damadian

Inventor of Magnetic Resonance (MR) Scanning Machine

Raymond V. Damadian proposed the MR body scanner in 1969. Finally, in 1977, Damadian's team produced the first MRI scan of the human body, using a prototype device he called "Indomitable".

Active Management of Third Stage of Labour : WHO recommendations and the Global Scenario

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ARTICLE

Introduction

The third stage of labour is defined as the time between the birth of the baby and the delivery of the placenta and membranes. Much of the literature is concentrated on the management of the first two stages of labour whereas the third stage remained relatively ignored. This was despite the fact that the problems occurring during third stage are much more likely to be catastrophic than the first two stages combined. The World Health Organization (WHO)1 statistics suggest that approximately 30 per cent of direct maternal deaths worldwide are due to hemorrhage, mostly in the post-partum period. It is only recently that the management of third stage has received its due attention with publication of various studies and guidelines.

Evolution of Third stage management

The placenta separates from the uterine wall through the decidua spongiosa as a result of capillary haemorrhage and the shearing effect of uterine muscle contraction. The degree of blood loss associated with placental separation and delivery depends on how quickly the placenta separates from the uterine wall and how effectively uterine muscle contracts around the placental bed during and after separation.

The third stage can be managed expectantly or actively. Expectant (physiological) management, which was the norm before the advent of active management of third stage of labour (AMTSL) includes only watchful observation for signs of placental separation (alteration of the form and size of the uterus, descent and lengthening of the umbilical cord and blood loss) and allowing the placenta to deliver either unaided using gravity or with the aid of nipple stimulation.[2] It DOES NOT use any drugs for initiating or augmenting uterine contractions. Proponents of physiological management argue that the natural processes outlined above promote normal separation and delivery of the placenta and lead to fewer complications.

The full AMTSL approach[3,4] involves administration of an oxytocic agent, early umbilical cord clamping and division and controlled cord traction for delivery of the umbilical cord. Although the AMTSL was practiced even earlier, the first evidence as to its efficacy was given by The Bristol third stage trial[5] (1988), which concluded that AMTSL reduced the incidence of PPH, shortened the third stage of labor and resulted in reduced neonatal packed cell volumes. These findings were further substantiated by other trials such as the Dublin study (1990)[6], Abu Dhabi trial (1997)[7] & the Hinchingbrooke randomized controlled trial (1998).[8] A Cochrane systematic review[9] identified five randomized controlled trials (RCTs) comparing active and expectant management that included more than 6,400 women. Compared with expectant management, active management was associated with: a shorter third stage (mean difference, –9.77 minutes); a reduced risk of postpartum hemorrhage (RR 0.38, 95% CI 0.32–0.46, number needed to treat [NNT] = 12) and severe postpartum hemorrhage (RR 0.33, 95% CI 0.21–0.51, NNT = 57); a reduced risk of anemia (NNT = 27); a decreased need for blood transfusion (RR 0.34, 95% CI 0.22–0.53, NNT = 65); and a decreased need for additional uterotonic medications

(NNT=7).[9] Active management also was associated with an increased risk of maternal nausea (number needed to harm [NNH]=15), vomiting (NNH=19), and elevated blood pressure (NNH=99), likely caused by the use of an intramuscular ergot alkaloid as the uterotonic medication in four of the five studies in the systematic review. There were no advantages or disadvantages for the baby with either approach.

In the last few years, it is the individual components of the AMTSL and their contribution towards preventing blood loss that have come under spotlight. The ICM-FIGO (International Confederation of Midwives - International Federation of Gynaecology and Obstetrics) issued a joint statement[10] in 2003, wherein, early clamping of the cord has been done away with and uterine massage after delivery of the placenta added to the package of active management. While there is agreement on the beneficial effects of AMTSL for prevention of PPH, there is less consensus on issues such as importance of the intervention's individual components, their relevance under conditions of limited resources, choice of uterotonics, their mode of administration & safety in unskilled hands. In the light of these issues, the World Health Organization has issued a number of publications in the last decade,[11,12] with the most recent update made in 2012.[13]

The evolution of components of the AMTSL over time has been depicted in Table I

Table I : Evolution of the components of the AMTSL over time

Sr. No.	AMTSL (Bristol trial 1988)[5]	ICM- FIGO (2003)[10]	WHO (2012)[13]
1	Oxytocic agent at the delivery of anterior shoulder	Oxytocic agent within one minute of birth of the baby	Oxytocic agent within one minute of birth of the baby
2	Immediate clam-ping of the cord	-	Late clamping of the cord
3	CCT* with first contraction	Controlled cord traction by a SBA**	Controlled cord traction by a SBA
4	-	Uterine massage after placental delivery	Uterine massage NOT recommended

*CCT: Controlled cord traction, **SBA: Skilled Birth attendant

The WHO Guideline[13]:

i) Use of Oxytocics: *Recommendations*

- The guideline endorses universal use of uterotonics for the prevention of PPH during the third stage of labour for all births..
- Oxytocin (10 IU, IV/IM) is the recommended uterotonic drug for the prevention of PPH.
- In settings where oxytocin is unavailable, the use of other injectable uterotonics (e.g. ergometrine/ methylergometrine or the fixed drug combination of oxytocin and ergometrine) or oral misoprostol (600 µg) is recommended.
- In settings where skilled birth attendants are not present and oxytocin is unavailable, the administration of misoprostol (600 µg PO) by community health care workers and lay health workers is recommended for the prevention of PPH.

Choice of drug :

Oxytocin remains the drug of choice for prevention of PPH. A Cochrane systematic review[14] evaluated oxytocin versus no prophylactic oxytocic in management of the third stage of labor. In more than 3,000 women (7 RCTs) analyzed, the use of oxytocin was associated with reduced risk of postpartum hemorrhage (NNT=8) and reduced need for therapeutic uterotonics (NNT=15). Although Syntometrine is better in relation to prevention of mild PPH (500-1000 ml [NNT=61]), it did not show a statistically significant difference in prevention of major PPH (> 1000 ml) & it is associated with fivefold increase in side effects like nausea, vomiting (NNH: number needed to harm=61) and hypertension (NNH=96).[15] Moreover, use of ergometrine is associated with increased chances of retained placenta and the need for a later manual removal.[14]

Misoprostol (Cytotec) is available as a tablet that can be administered by oral, sublingual, rectal, or vaginal route. It is stable at room temperature, inexpensive, and has been studied as prophylactic therapy in the management of the third stage of labor. Neither oral nor rectal administration of misoprostol has been shown to be as effective as injectable uterotonics in preventing postpartum hemorrhage.[16] Its use is associated with increased need for therapeutic uterotonic medications (NNH=22). Side effects from misoprostol were common, dose related and included shivering (NNH=7), vomiting (NNH=225), diarrhea (NNH=258), and elevated body temperature (NNH=18). The review16 concluded that conventional injectable uterotonics were preferable to prostaglandins for routine prophylaxis and that research on prostaglandins in the context of obstetric haemorrhage should focus on treatment, rather than prevention. A systematic review by Joy and colleagues[17] found that compared

with placebo, misoprostol was associated with a decreased need for additional uterotonics (OR 0.64; 95% CI 0.46 to 0.90) and an increased risk of shivering and pyrexia. The authors proposed that misoprostol is a reasonable agent for management of the third stage of labour when other agents are not available for reasons of cost, storage, or difficulty of administration.

Carbetocin is an longer acting synthetic oxytocin analogue with its t1/2 four to ten times longer than oxytocin. An RCT18 compared 100 mcg of intramuscular carbetocin with 10 units of intravenous oxytocin and found no difference in the number of women requiring additional uterotonic medication. However routine use is NOT recommended as it is not freely available and because it costs considerably more than oxytocin.

Mode of administration

Oxytocin : The WHO update[13] did not find enough evidence to recommend one route over the other. So they found a dose of 10 IU either IM or IV to be appropriate. However, a bolus IV dose of oxytocin may possibly be inappropriate in some women, such as those with major cardiovascular disorders and women undergoing a cesarean section under regional anaesthesia with hypotension (where it may trigger arrhythmias and further hypotension), suggesting that an IM injection or a low-dose IV infusion in saline might be a safer alternative.

Misoprostol : The WHO guideline[13] recommends ORAL dose of misoprostol in a dose of 600 ug for AMTSL, acknowledging the fact that the lower doses may be associated with less side effects but that their efficacy has not been tested. Also, the per rectal route may not be acceptable to all women.

Timing of the uterotonic agent

Traditionally the AMTSL advocated administration of the oxytocic agent at the delivery of anterior shoulder of the baby. However it was noted that this was achieved correctly only in a fraction of patients and with great difficulty, So the ICM-FIGO stagement[10] advocates use of uterotonics within one minute of the birth of the baby. Use of Oxytocin before placental delivery is NOT associated with increased risk of retained placenta[19] but infact, is associated with a decrease in the need for manual removal of the placenta.[9,19]

ii) Clamping of the cord: *Recommendations*

- Late cord clamping (performed approximately 1 to 3 minutes after birth) is recommended for all births while initiating simultaneous essential newborn care.
- Early cord clamping (<1 minute after birth) is not recommended unless the neonate is asphyxiated and needs to be moved immediately for resuscitation.

The initial practice of early cord clamping has now been replaced by a recommendation of delayed cord clamping. This hold true irrespective of the HIV status of the mother and the gestational age of the delivering baby.[13] A 2004 Cochrane Review by Rabe et al.[20] and a prospective study by Ibrahim et al.[21] demonstrated that delaying cord clamping by 30 to 120 seconds resulted in less need for transfusion because of anemia (RR 2.01; 95% CI 1.24 to 3.27) and less intraventricular hemorrhage (RR 1.74; 95% CI 1.08 to 2.81) in nonresuscitated premature infants (< 37 weeks' gestation). A 2008 Cochrane review22 included 11 RCTs that compared the effect on maternal and neonatal outcomes of cord clamping done early (up to 60 seconds after delivery) and late (beyond 60 seconds after delivery). The results showed no difference in the incidence of PPH but an increased incidence of neonatal jaundice requiring phototherapy, higher newborn hemoglobin levels up to 6 months of age, and higher ferritin levels at 6 months of age after late clamping.

iii) Controlled cord traction: *Recommendations*

- In settings where skilled birth attendants are available, CCT is recommended for vaginal births if the care provider and the parturient woman regard a small reduction in blood loss and a small reduction in the duration of the third stage of labour as important.
- In settings where skilled birth attendants are unavailable, CCT is not recommended.

The guideline[13] concluded that CCT was regarded as safe when applied by skilled birth attendants as it provides small beneficial effects on blood loss (average reduction of 11 ml on blood loss) and on the duration of the third stage of labour (average reduction of 6 minutes). The decision to implement CCT in the context of a prophylactic uterotonic drug should be discussed by the care provider and the woman herself. However, they stressed the importance of use of CCT when ergot alkaloids are used as the primary uterotonic agent to minimize chances of a retained placenta. Also, the major problem with CCT when performed by untrained persons is uterine inversion. More recently (2011), WHO conducted a hospital-based, multicenter RCT to assess the 'non-inferiority' of a simplified package' for actively

managing the third stage of labor (use of uterotonic without CCT) compared to the 'full package' for actively managing the third stage of labor (use of uterotonic and CCT). Based on findings of this study, the investigators made the following two inferences from the trial[23] :

- CCT is safe and in settings where it is routinely practiced it can be continued; and
- The main component of active management is the uterotonic agent and in settings where it is not possible to employ the full package (absence of SBA) one can safely focus on the uterotonic component

iv) Uterine massage: *Recommendations*

- Sustained uterine massage is not recommended as an intervention to prevent PPH in women who have received prophylactic oxytocin.
- Postpartum abdominal uterine tonus assessment for early identification of uterine atony is recommended for all women.

There is a lack of evidence regarding the role of uterine massage for PPH prevention when no uterotonic drugs are used, or if a uterotonic drug other than oxytocin is used. Although the GDG acknowledged that one small study reported that sustained uterine massage and clot expulsion were associated with a reduction in the use of additional uterotonics, there is lack of robust evidence supporting other benefits. However, the GDG considered that routine and frequent uterine tone assessment remains a crucial part of immediate postpartum care, particularly for the optimization of early PPH diagnosis.

Global Scenario :

Despite the knowledge of the effectiveness of active management & availability and promotion of guidelines, actual implementation of AMTSL varies greatly between countries. One study conducted in 15 university teaching hospitals in 10 countries showed rates of use ranging from 0% to 98% (25% across all hospitals), with no pattern of difference between developing and developed countries.[24] A study in a large public teaching hospital in Egypt reported active management of the third stage of labour in 15% of all deliveries,[25] and another in three maternity hospitals in Istanbul, Turkey, documented the use of oxytocics in 95% of deliveries during the third stage of labour.[26] There exists a marked variation in practice with respect to AMTSL. A recent survey of management of the third stage of labor in 14 European countries confirmed this variation.[27] Whereas all units professed to practice active management of the third stage of labor, prophylactic uterotonics were infrequently employed in units in Austria and Denmark. Controlled cord traction was almost universally used in Ireland and the UK, but in less than 50% of units in the other 12 countries surveyed. Policies with respect to clamping and cutting the umbilical cord also varied widely, with most practitioners clamping and cutting immediately. However, this procedure was not performed in most units in Austria, Denmark, Finland, Hungary and Norway until the cord stopped pulsating.[27]

Similarly, a WHO study conducted in seven developing countries found that although the use of a uterotonic during the third or fourth stages of labour was nearly universal, Correct use of active management of the third stage of labour was found in only 0.5% to 32% of observed deliveries due to multiple deficiencies in practice. In every country except Indonesia, policies regarding active management were conflicting.[28] They concluded that developing countries have not targeted decreasing postpartum haemorrhage as an achievable goal; there is little use of active management of the third stage of labour, and policies regarding such management often conflict. Just availability of evidence & guidelines is unlikely to make a big difference to the current situation unless it is supplemented by political will, provision of cold chain for uterotonics, availability of SBAs to administer them & ongoing audits to monitor the number of women actually receiving proper care.

Conclusions

Based on the most recent evidence, understanding of the contribution of each component of the active management of the third stage of labour package has evolved. The WHO guideline considered that this package has *a primary intervention: the use of an uterotonic*. When oxytocin is used, CCT may add a small benefit, while uterine massage may add no benefit for the prevention of PPH. Understanding of this new knowledge will help in further simplifying the AMTSL protocol. It is however necessary, that every country makes its local protocol based on its resources, provisions, availability of manpower and strictly adheres to it by having audits to ensure its implementation.

Keypoints

1. PPH can occur in women with no risk factors
2. Uterine atony is the commonest cause of PPH

3. AMTSL decreases the risk of PPH by 60%
4. The revised components of the AMTSL include i) use of a oxytocic agent within one min of birth ii) Delayed clamping of the cord iii) Controlled cord traction by a SBA &iv) Periodic postpartum uterine tone assessment for early detection of uterine atony
5. Oxytocin is the uterotonic of choice for prevention of PPH
6. Ergot alkaloids are effective but cause lot of side effects
7. Misoprostol is less effective and results in increased side effects
8. Uterine massage as a component hardly contributes to a decrease in blood loss
9. There is a need for continuous audit and research to find answers & develop local protocols

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Postpartum Haemorrage (PPH)
4 Step Medical Management

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Points to remember in PPH management

- **Prompt resuscitative measures and cause directed management** depending upon degree of blood loss is the mainstay of the treatment. Make use of the ***Golden Hour*** (1st hour after beginning of severe PPH) to ensure the best chance of survival.
- **Early decision** for operative corrective measures should be taken by a senior obstetrician before irreversible shock or dilutional coagulopathy (80% blood replaced by fluids while awaiting blood/ blood fractions) sets in.
- **Untreated** severe PPH patient may **collapse within two hours.**
- Loss of more than 40% of total blood volume is 'life threatening'.

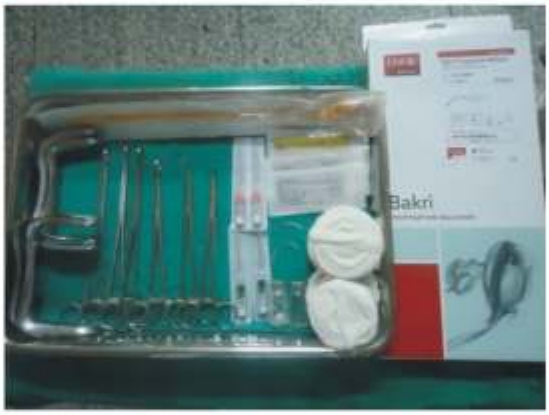
PPH Trays- Anticipate PPH

PPH Tray-1: Drugs

- Oxytocin (5 IU) – 14 amp. **Keep in fridge**
- Ergometrin (0.2 mg)-5 amp. (protect from light) } do not freeze
- Carboprost (0.25 mg)-8 amp. }
- Mesoprostol tab (200 mcg)- 04
- I/V Fluids – R-L / NS 2 liters + additional stock
- Colloids – 1 liter
- Calcium Gluconate (10 ml 10 %) 1 amp.

PPH Tray-2

- Vaginal retractors, speculum (big)-4
- Sponge holding forceps-4
- Roller gauze
- Suture material
- Bakri balloon/Condom catheter (uterine lemonade measures)
- Urinary Catheters
- IV/canula 14-16 G (2 to 4)
- Surgical gloves
- Blood sample tubes (PPH Profile kit)



Identify PPH

Primary PPH - Clinical Signs

Bleeding p/v - ≥ 500ml / >2cups (Vaginal delivery) ≥1000ml (C section) e"1500ml (Obstetric Hysterectomy)

OR

Any amount of postpartum bleeding adversely affecting the general condition of the woman.

OR

Heavy bleeding - Pad or cloth soaked in < 5minutes.

OR

Continuous trickling of blood P/V

ARTICLE

Call Alert

↓

Rapid Assessment and beginning of action

Put on gloves

↓

General condition –
Assess airway,
Breathing,
circulation

and

Vital parameters
(If unconscious
Start Basic Life
Support immediately)

Probable cause of PPH

1. **Tone (70%)**
   Place hand on uterine fundus and feel for the state of contraction (if soft, start massage)
2. **Trauma (19%)**
   If uterus is well contracted
3. **Tissue- (10%)**
   retained productsts
4. **Thrombin (1%)**
   Coagulation abnormalities

Degree of PPH

MINOR PPH
(blood loss
500-1000ml,
no clinical shock)

MAJOR PPH-
blood loss more than
1000ml and
continuing to bleed

Severe PPH-
->2000ml
OR
Clinical shock

Alert an experienced obstetrician &Anesthetist

Get PPH Trays 1 and 2

Quick Assessment- Clinical estimation of extent of blood loss

for woman weighting 50-55 kg having normal circulatory volume of 5000-5500 ml

Clinical Signs	Class 1 PPH	Class 2 PPH	Class 3 PPH	Class 4 PPH
Amount of blood loss (Volume loss)	500-1000 ml (<15 %)	1000-1500 ml (15-30 %)	1500-2000 ml (30-40 %)	>2000 ml (>40 %)
Pulse (beats/minute)	Normal/<100 (mild tachycardia)	>100	>120	>140
Systolic Blood pressure (mm Hg)	Normal	Normal	60-80	<60
Tissue perfusion Indicators	Postural Hypotension	Peripheral vasocon - striction (coldclammy)	Pallor, restlessness,	Collapse, Air hunger
Urinary output (ml/ hour)	Normal	20-30	5-15 (Oliguria)	Anuria
Capillary refill	Normal	May be delayed	delayed	Delayed

Suspect Shock - Rule of 30

(Loss of eH 30% of total blood volume)

1. Pulse – Rises by ≥ 30/minute
2. Systolic Blood pressure-falls by ≥ 30 mm Hg
3. Respiratory rate - rises to ≥ 30 breaths/minute
4. Urinary output drops to dH 30 ml/hour

↓

Act urgently

MINOR PPH (blood loss 500–1000 ml, no clinical shock)

↓

Basic Emergency Obstetric Care (EmOC)

Reassure the woman

Replace fluid (1.5-2.5 litres@40drops/min)

Arrest bleeding

If atonic- by massage and oxytocin (10 unit i/m and I/V 20 units in 1 L of N/S @ 40 drops/min.

If not-explore

Empty bladder

Send blood for-CBC, group and cross match

Give antibiotics

Record events

Arrest of hemorrhage achieved

↓

Keep under close observation

Transfuse blood if Hb dH 7gm/dl

↓

BUT IF

Continuing to bleed

OR

Clinical signs of shock

OR

Tachycardia associated with a smaller estimated loss)

↓

Full protocol of measures to achieve resuscitation and haemostasis (Comprehensive EmOC)

MANAGEMENT

Major/ Severe PPH- *Medical management*

Do all simultaneously-

(call help and assign tasks)

RESUSCITATE (Assign support staff)

- Basic Life support if required
- Start 2 I/V lines with 14-18 G cannula. **Draw 20 ml blood** for investigations
- Head down tilt
- **Oxygen** by mask @ 8-10 liters / minute or Endotracheal tube if required
- **Start transfusing rapidly with Lactated Ringer's solution**

Infuse 1 litre in 15-20 minutes & follow infusion Protocol (box-1)

COMMUNICATE

&

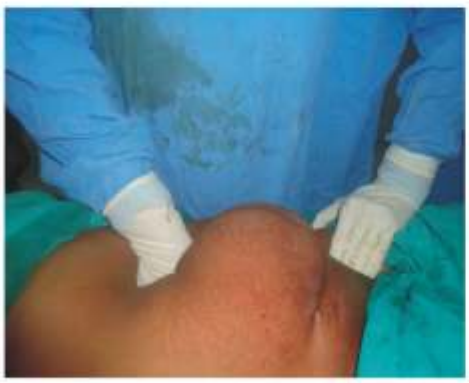
Arrest hemorrhage

Assigned to the

Team Leader

(Obstetrician)

Instruct + Act + Obtain help of support staff



If catastrophic bleeding-employ life saving (but only temporary) measure

Manual aortic compression

- Feel for femoral pulse.
- Apply pressure above & to the left the umbilicus to stop bleeding. Apply sufficient pressure by leaning over and feeling the aorta against your knuckles until femoral pulse in not felt.
- Keep applying pressure while definitive measures are instituted.

Stepwise arrest of hemorrhage -within 1 (Golden) hour / till haemostasis

Continue resuscitation & monitoring

Ascertain & treat the primary cause

Step-1

Tone
Flabby Uterus

Trauma
(Uterus well contracted)
Achieve haemostasis
Give tranexamic acid & Antibiotics

Tissue (retained)
Examine completeness of expelled placenta
Evacuate the uterus

Thombosis error
Do bedside coagulation test **(box-2)**
Blood & fractions-box-6

Massage uterus , Catheterize

Oxytocin – 1st Line uterotonic agent (most preferred)

10 units I/M (if not already given) and in drip (20-40 IU in 1 L of N/S @60 drops/minute)

Imp-Limit fluid containing oxytocin to maximum 3 L

Other agent-

Tab misoprostol 800 mcg P/R or sublingual (If oxytocin is not available)

(Do not use as an adjunct to other uterotonics- Box-5)

Uterus contracts & bleeding controlled

Continue oxytocin infusion (20 IU in 1 L of N/S@ 40 drops/minute)

Keep close observation

Uterus remains atonic

Continue massage of uterus and oxytocin drip

Inj. methylergometrine IV - 2nd Line uterotonic agent

0.2mg i/v, repeated 2- 4hrly . Maximum 5 doses(1mg/24 hrs)

Imp- Do not give in c/o hypertension, heart disease & for concomitant use of certain drugs used to treat HIV. (see box-5) unless no other uterotonic is available for saving the life.

OR

Other agents- oxytocin–ergometrine combined preparation-**Syntometrin**-1amp i/m **carbetocin** 100mcg i/m or slow i/v over 1 minute

Uterus remains atonic

Continue **massage** of uterus and oxytocin drip

Injection Carboprost- 3rd Line uterotonic agent

0.25 mg i/m , may be repeated every 15 minute. Maximum 8 amp

Imp- contraindicated in asthma, if necessary to administer, intubate beforehand

See box - 5 uterotonics (Fact File)

Note

I st , 2nd or 3rd Line uterotonics may be administered in rapid succession if any one agent does not seem to be effective. (Depends upon the amount of bleeding)

Step-2

Uterus remains atonic

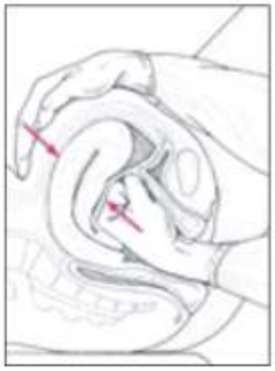
Apply bimanual uterine compression

(As a temporizing procedure until more definitive treatment instituted)

Internal-Introduce the right hand into the vagina, clenched fist, with the back of the hand directed posteriorly and the knuckles in the anterior fornix.

Place the other hand on the abdomen behind the uterus and squeeze the uterus firmly in between the two hands.

External- Compression of the uterus with both hands on the abdomen holding the uterus



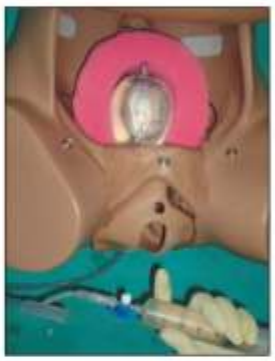
Step-3

Uterus remains atonic

Uterine tamponade (if available)

Bakri balloon – preferred (box-3) **or**

Condom catheter, Foley catheters, Rush catheter, Sengstaken-Blakemore tube



Step-4
(Optional)

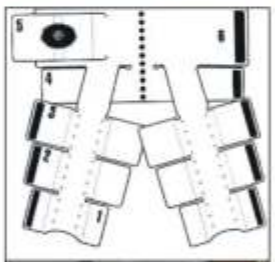
Uterus remains atonic

Selective Uterine artery Embolisation (if available)

Important-Only in case of hemodynamically stable pt having moderate trickle as it takes around 60-90 minutes at the earliest to achieve haemostasis)

&/OR

Use the **anti-shock garment** (box-4) while waiting for a blood / definitive surgical measures



Uterus remains atonic OR in cases of Caesarian section with atonic PPH-Unresponsive to uterine massage and ecbolics

Surgical interventions

All the while - TRANSFUSE (Box 1 & 6)

MONITOR – **bleeding, Pulse, B P, RR, UOP, Oxygen saturation**

RECORD –Input/output, medications, events & communications.

Box-1

Investigations

(bedside coagulation test- if a clot fails to form indH 7 minutes, suspect coagulopathy)

Send sample in – Plain vial, EDTA, Citrate and PT Tube.

Order-

- Complete blood count
- Grouping and cross match

(Order as per Box-7)

- Clotting Screen – Clotting time, Bleeding time,PT, APTT, Fibrinogen, platelet counts and Fibrin Degradation Product in suspected c/o consumption coagulopathy / DIC
- Liver and Renal function tests ,basic biochemistry for baseline value

Repeat

CBC, PT, APTT, Fibrinogen - Every 4 hours/after one third volume replacement/after infusion of FFP

Box-2

Blood products- transfusion considerations

Blood fraction	Indication	Dose
blood/ concentrated red blood cells	**Major PPH -Class 2 -Class 3 Severe PPH, hemodynamically unstable despite aggressive volume replacement by fluids Hb <7 gm%**	**2 units4 units6 units to start with**
Fresh frozen plasma	**4 units for every 6 units of red cells/blood If PT and PTT > 1.5 times the control in presence of continuing bleeding/ massive bleeding/ severe PPH**	4 unitsDose is 12–15 ml/kg or total 1litre
Cryoprecipitate	**If fibrinogen <100mg/dl**/empirically in relentless bleeding**One unit raises fibrinogen by 10mg/dl**	**5 units1pack per 10 kg body weight**
Platelets concentrates	if Platelet count <50000/mm^3 <80000/mm^3 if contemplating surgery/ PPH class>3.	Dose is 10ml/kg (One pack of adult therapeutic dose)

Key message for Low resource settings

1. Every woman should deliver by a trained birth attendant & should be implicated as a basic human right. Public awareness must be increased through media, talk shows & public forums. National organizations of Obstetricians, various other medical associations as well as the National Commission for women may advocate to implement it.
2. AMTSL must be practiced in each & every labor. Every birth attendant must have the training for the same. Remember that oxytocin is the first choice, but if not available, tab misoprostol 600 mcg must be given sublingual specially in home based delivery system.
3. Authorities must ensure that uterotonics are available in sufficient quantity at every level of obstetric care.
4. Non Pneumatic Antishock Garment may save lives while awaiting blood/definitive

ıerapy/during transportation. NASG must be made available s a part of basic EmOC (in addition to uterotonics & removal of :tained tissue of uterus)

egular Obstetric drills of PPH must be conducted at all the :vels of care.

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Willem Einthoven

Inventor of Electrocardiogram

Willem Einthoven performed research and invented concepts for recording electrical heart impulses that greatly evolved the field of cardiology and lead to the development of one of the most important diagnostic tools in all of medicine: the electrocardiogram.

Conservative Surgical Options in PPH

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Postpartum Haemorrhage (PPH) is a major cause of maternal mortality globally, especially in under-resourced settings. World Health Organisation (WHO) estimates that at least 1,66,000 deaths annually are due to PPH accounting for 28% of direct maternal deaths. PPH tests the functioning of the health system and the skills of health workers, because it is often unpredicted and patients deteriorate very rapidly after onset. PPH occurs in approximately 10.5% of all births. Atonic uterus accounts for 80-90% of primary PPH. Other causes of PPH are injury to the genital tract, retained placental tissue and coagulation failure. As a memory aid these processes can be thought of as the four T's; *Tone, Tissue, Trauma and Thrombin.*

There are some interventions that can prevent the occurrence of PPH by addressing factors that lead to PPH and by appropriate management of the third stage of labour. Anticipation, Prophylaxis, Prompt Diagnosis and Management can save patient's life. Universal adoption of active management of third stage of labour will go a long way to prevent tonic PPH and the subsequent mortality and morbidity to a great extent. Without proper management patient may die within 2 hrs.

Management of Postpartum Haemorrhage

Medical management is always first line of treatment in atonic PPH. But if patient is unresponsive to medical treatment, surgical intervention should not be delayed so much, that the patient becomes too sick to tolerate it. A wide range of surgical interventions has been reported to control PPH.

In the past, the surgical management of postpartum haemorrhage included use of an intrauterine pack, stepwise devascularisation of uterus and finally, subtotal or total abdominal hysterectomy.

Recently two types of conservative surgical approach seem to be highly effective in controlling atonic PPH, are uterine balloon therapy and compression sutures.

Depending on the mode of delivery, treatment options are chosen, a vaginal approach (i.e. balloon tamponade) after spontaneous delivery or an abdominal surgical approach (i.e. compression sutures and systematic devascularization) during Caesarean delivery should be performed.

Balloon tamponade

This method should be attempted once medical treatment for PPH due to an atonic uterus has failed. Balloon tamponade is the least invasive and most rapid approach and thus be the logical first step. In case of PPH following normal delivery balloon tamponade proved to be effective method. Condous and colleagues, first described in 2003 using Sengstaken–Blakemore esophageal catheter. Cooke, Bakri or Rusch catheters can be used if available for uterine tamponade, but are expensive and not generally available. Balloon tamponade can be done less expensively by using a condom catheter system or a surgical glove catheter.

It is a life-saving intervention, especially in low resource settings where blood transfusion and surgical facilities are not available. It is particularly useful during transportation of a patient to a tertiary care centre.

Steps of balloon tamponade

- This procedure should be carried out in the labour room or OT under

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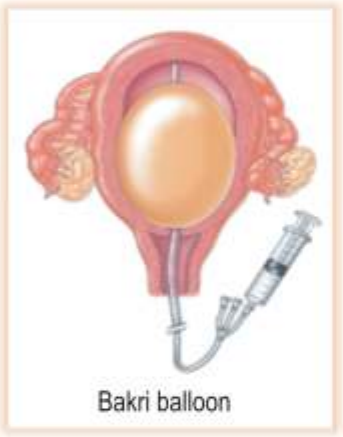
anesthesia or iv sedation.

- The woman is placed in lithotomy position with an indwelling urethral catheter, ensure that the uterus is clear of retained placental tissue or blood clot.
- Introduce vaginal speculum & catch hold the anterior lip of the cervix with a ring forceps and with the help of another ring forceps, insert the balloon gently into the uterine cavity.
- Inflate the balloon with warm NS until, it is palpable per abdomen & surrounded by well-contracted uterus or visible at the cervical lumen.
- Apply gentle traction to the catheter shaft and fix it with woman's inner thigh to maintain tension. Oxytocin infusion should be continued and prophylactic antibiotic started
- The procedure was considered successful if bleeding stopped with balloon inflation. Balloon tamponade was continued as recommended for at least 24 hours.



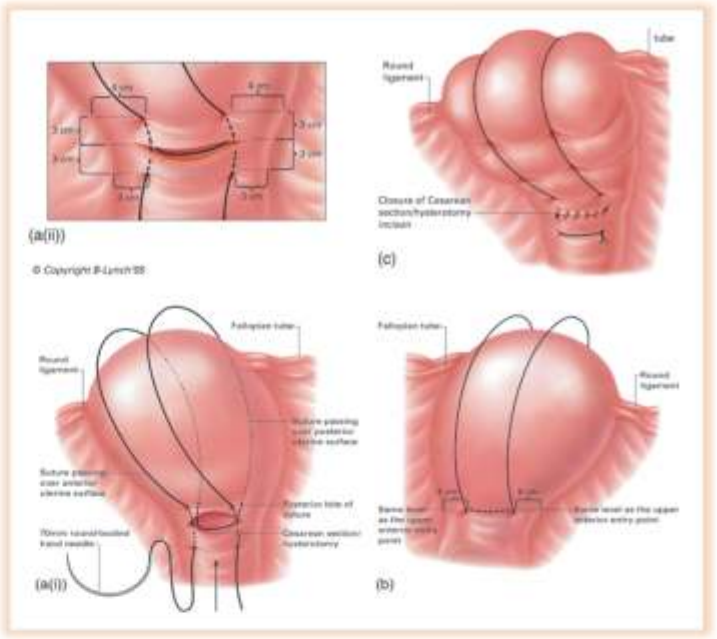
Bakri balloon

Compression suture

A more conservative procedure, now colloquially known as the Brace suture technique, was first described by B-Lynch and colleagues in 1997. Along with later modifications by Hayman, Cho and colleagues, this is proven effective to control life-threatening postpartum haemorrhage. These conservative surgeries are particularly helpful as it preserves fertility.

The B-Lynch suture compression technique

The procedure was first performed and described by Mr Christopher B-Lynch, a consultant obstetrician & Gynaecological surgeon from UK, during management of a patient with a massive postpartum haemorrhage in November 1989. This patient refused consent to an emergency hysterectomy.



The B-Lynch surgical technique and steps

- TAMPONADE TEST: Before applying compression suture always compress uterus to see if bleeding stops on compression. Uterus is exteriorized, cavity explored and evacuated.
- Uterus punctured at a point about 3cm below the right lower edge of the uterine incision and 3 cm from the right lateral border.
- Suture threaded through the uterine cavity to emerge 3cm above the upper margin of the incision and 4cm from the lateral border.
- Suture passed over anterior surface of uterus, 3-4cm medial to right cornu and taken downwards along posterior surface.
- Enter uterine cavity from the posterior wall at a point corresponding to anterior wall.
- Suture passed laterally and horizontally to left side within the uterine cavity.
- Suture taken out through posterior wall passed upwards along posterior uterine wall, over fundus, 3-4cm medial to left cornu and brought down along anterior uterine wall.
- Enter the uterine cavity 3cm above upper edge of uterine incision, 4cm medial to left lateral border.
- Right and left ends of the suture are tied anteriorly below the uterine incision while assistant compresses anterior and posterior uterine walls.
- Uterine and abdominal incisions are closed.

Modified B-Lynch suture proposed by Bhal et al.

- Principles of surgery remains same
- But only difference is he uses two separate sutures one for each side.

The Hayman uterine compression suture: clinical points

- Lower uterine segment or uterine cavity not opened
- Uterine cavity not explored under direct vision
- Quicker to apply
- No feed-back data on fertility outcome
- Morbidity feed-back data limited
- Unequal tension leads to segmented ischemia secondary to slippage of suture – 'shouldering' with venous obstruction

The Cho multiple square sutures: clinical points

- Multiple full-thickness square sutures applied
- Uterine cavity drainage restriction – pyometra risk
- No feed-back data on fertility outcome
- Morbidity feed-back data limited
- Rhythmic contraction not facilitated and involution impeded
- The production of multiple uterine synechiae

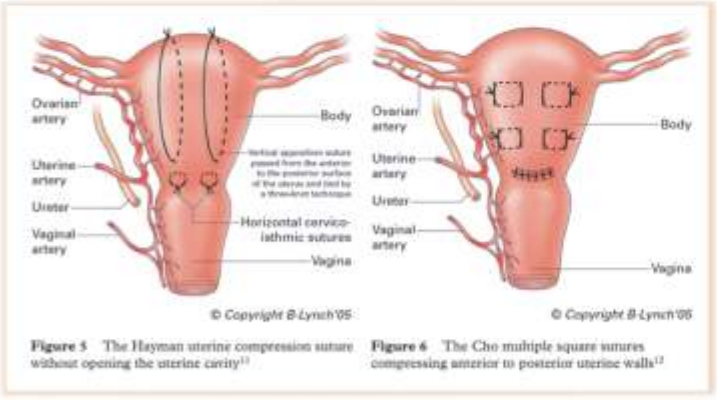


Figure 5 The Hayman uterine compression suture without opening the uterine cavity[13]

Figure 6 The Cho multiple square sutures compressing anterior to posterior uterine walls[12]

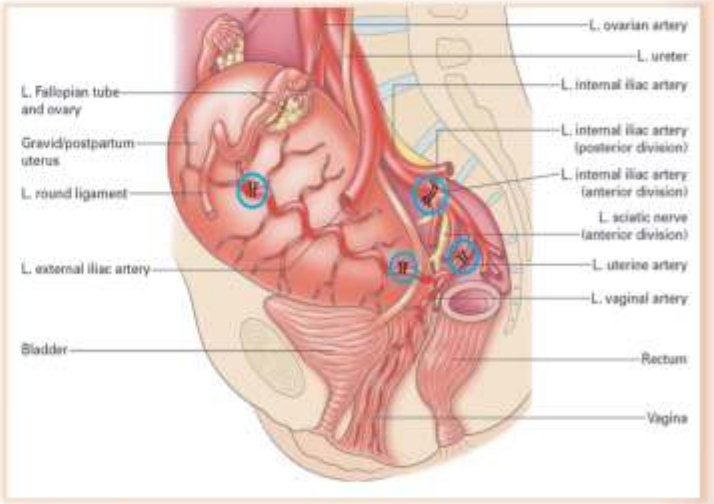
Stepwise devascularisation of uterus

Waters first described this procedure in 1952. The surgical approach starts with ligature of the uterine artery, ligation of uterine division ovarian artery and anterior division of internal iliac artery. To perform these surgeries, there is a need for a competent obstetrician who is conversant and competent at pelvic gynaecological procedures, and who has a working knowledge of the pelvic anatomy, including the vascular and neurological supply of the pelvic organs.

Uterine Artery Ligation : Uterine artery ligation is a relatively easy procedure that can be performed by most obstetricians. The objective is to decrease blood flow to the uterus, as about 90% of the uterine blood supply in pregnancy comes from these vessels. The technique is to place an absorbable ligature 2 to 3 cm medial to the uterine vessels through the myometrium and then lateral to the vessels through the broad ligation in the lower uterine segment. After ligation of uterine vessels if bleeding is not controlled then the next step is to ligate the ovarian arteries.

Ovarian Artery Ligation : It arises directly from the abdominal aorta and anastomosis with uterine artery in the region of the uterine aspect of the uteroovarian ligament. A suture is placed on the ovarian artery in mesovarium near uterine cornu.

Internal Iliac Ligation : Bilateral ligation of internal iliac artery can effectively control bleeding in PPH. The most important mechanism of action with internal iliac ligation is an 85% reduction in pulse pressure in those arteries distal to ligation, thus turning an arterial pressure system into one with pressure approaching those in venous circulation and leads to haemostasis via clot formation. The immediate risk is injury to internal iliac vein, so an experienced surgeon is required.



The technique of internal iliac ligation is to open the peritoneum over common iliac artery. The ureter should be identified and retracted medially. Identify the internal iliac artery and a right angle clamp is then passed under the internal iliac artery after dissection of the covering sheath. Carefully ligate the

artery with nonabsorbable suture. Pulsation of the external iliac artery must be checked to confirm that blood supply to this vessel is intact.

Arterial embolization

Some tertiary institutions may have the radiological equipment and skills to perform selective pelvic artery embolization. This will be the procedure of choice if available, but requires a well resuscitated patient.

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Al-Qasim ibn al-Abbas Al-Zahrawi

Invention of absorbable sutures

Surgeon Abu al-Qasim Khalaf ibn al-Abbas Al-Zahrawi first used absorbable sutures. Al-Zahrawi discovered the absorbable properties of catgut when a monkey ate his lute strings.

Role of Uterine and PELVIC Temponade in Management of Postpartum Haemorrhage

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Postpartum haemorrhage (PPH) is a major cause of maternal morbidity and mortality. World Health Organisation (WHO) estimates that PPH accounts for 25% of all maternal deaths worldwide[1]. The traditional definition of PPH is a blood loss of 500 ml or more from the genital tract within 24 hours of the birth of a baby. PPH is classified as primary when it occurs within the first 24 hours after delivery and secondary, if it occurs between 24 hours up to 12 weeks postpartum[2]. One to five percent of all births are complicated by major PPH of greater than 1000 ml[3].

While managing PPH, if bimanual uterine compression and pharmacological measures fail to control the haemorrhage, examination under anaesthesia is warranted and surgical methods to control the bleeding should be instituted without delay (Fig. 1). Uterine sparing

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Management Algorithm for Primary PPH

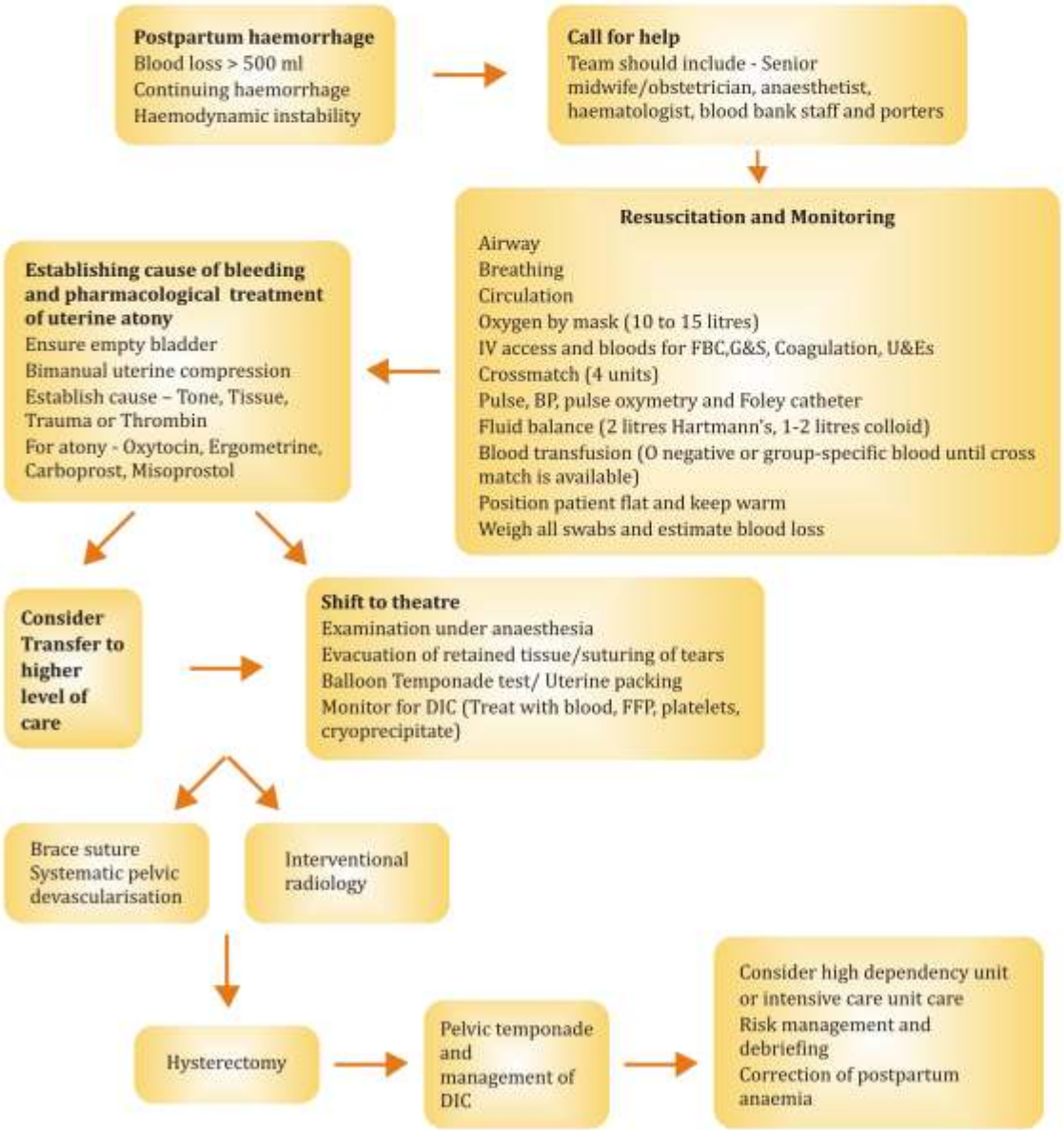

Fig. 1: Algorithm for management of primary postpartum haemorrhage

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interventions have long been practiced as an alternative to hysterectomy in the management of major PPH. Intrauterine balloon tamponade is an appropriate first line surgical intervention for most women where uterine atony is the only or main cause of haemorrhage. It is simple, inexpensive and can be used by inexperienced operators in areas with limited resources. If temponade fails to stop the bleeding, any of the following conservative surgical interventions may be considered, before proceeding to hysterectomy as a last resort, depending on clinical circumstances and available expertise - haemostatic brace suturing, bilateral ligation of uterine and/or internal iliac arteries or selective radiological arterial embolisation. A recent systematic review of these various techniques concluded that there is no evidence to suggest that any one method is better for the management of severe PPH than the rest[4].

Uterine temponade

About 80-90% cases of primary PPH are due to uterine atony[5]. Uterine temponade is a minimally invasive procedure which can be performed within minutes and will often immediately reduce or stop the bleeding in cases of uterine atony. If such 'temponande test'[6] is successful, it can avoid the need for laparotomy, hysterectomy and blood transfusions.

The underlying principle behind uterine temponade is application of pressure to the bleeding site to compress the blood vessels[5]. After placental separation, the venous sinuses and spiral arterioles of the uterus are exposed - which results in bleeding from the placental bed if the uterus does not contract and retract efficiently. The temponade aims to compress these bleeding sinuses and once the applied pressure stops the bleeding - the blood can clot and form a permanent seal. Recent studies suggest that the temponade effect of the intrauterine balloon represents a combination of factors such as endometrial-balloon interface interactions, alteration of blood flow within the uterine arteries, uterine activity secondary to myometrial stretching besides occlusion of the bleeding areas[7]. The intraluminal pressures required vary with different volumes for different uteri. Any of the conservative measures like a balloon tamponade or compression sutures or the combination of the two should be instituted before coagulopathy sets in and if necessary stabilisation of clot in the blood vessel of the placental bed can be achieved by the use of 1-2 gm intravenous tranexamic acid.

Technique – Maternal resuscitation and the efforts to control bleeding should take place concomitantly. After an adequate examination under anaesthesia to exclude retained tissue or trauma, if intractable bleeding continues despite use of all drugs, a temponade should be attempted. Uterine temponade is performed by passing a balloon through the cervix into the uterine cavity. Either commercially available balloons such as Bakri[8] or Rusch balloon or, in resource poor settings, a Sengstaken Blackmore[9] (SB) tube or a condom[10] tied on a Foley catheter may be used as an alternative (Fig. 2,3). The balloon should be filled with 200 to 500 ml of water or saline at room or higher temperature to obliterate the uterine cavity and the common clinical practice is to fill the balloon until part of it is visible via the cervix. Once the balloon catheter is in place, the vagina should be packed with gauge and a Foley catheter inserted in the bladder. Maintaining the balloon in the uterus can be problematic during placement and this may be counteracted by packing the vagina once the tamponade is thought to be effective. If there is a drainage channel this can be connected to the suction drain[11].

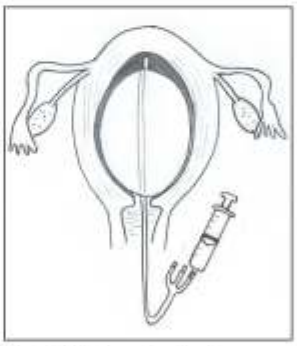

Fig. 2: Balloon uterine tamponade with Bakri balloon

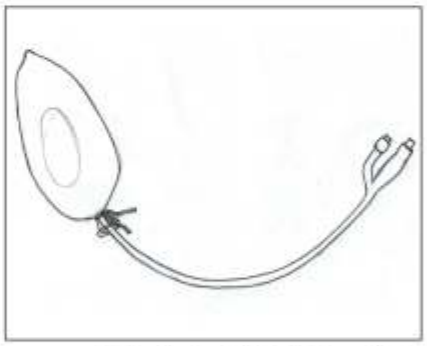

Fig. 3: Condom tied to Foley catheter

In practice drainage through such channel is extremely rare and the need for such channel could be questioned. A better approach would be to have close watch on any ongoing blood loss through the cervix and to mark the level of the fundus on the abdominal wall and to monitor that there is no rise in the height of the fundus. This would be in addition to the regular observation of vital parameters of pulse and blood pressure measurements.

Whether the tamponade is going to be successful or not is known within minutes. If the bleeding stops with temponade, the need for further surgery is avoided and the balloon catheter may be removed after 6 to 12 hours once patient's condition is stable. However if significant

bleeding continues, a laparotomy is indicated. A Scottish confidential audit of severe maternal morbidity identified 64 cases where balloon tamponade was used for the management of major PPH and hysterectomy was averted in 50 (78%) women[12].

In low resource settings, SB tube or condom catheter are more readily available compared to other alternatives. In case of SB tube, the tube distal to the stomach balloon is cut off to facilitate easy insertion. SB tube also comes with single balloon and as an alternative a Rusch urological balloon can be used. Uterine tamponade with a balloon catheter may also be considered after a caesarean section in cases without discrete bleeding points or to provide tamponade of the poorly contracting lower uterine segment in placenta praevia[5].

Following the tamponade, the woman should be kept fasting and under close surveillance. Monitoring should include – pulse, temperature, respiratory rate, blood pressure, uterine fundal height, vaginal bleeding (through the drainage lumen where available and cervix) and urinary output. Broad spectrum antibiotics should be administered from the time of balloon insertion up to three days. Oxytocin infusion (40 units in 1 litre of saline) should be continued for 6-12 hours to keep uterus contracted over the balloon.

Uterine packing

Packing of the uterus can be viewed as a method of tamponade, with the packing material distending the uterine cavity as it provides pressure against the uterine wall. Although uterine packing has been used as an emergency measure to stop bleeding following delivery for the last two centuries, it became unpopular with time due to risks of infection and concealed haemorrhage. Recent years have seen a renewed interest in this technique as a method of emergency uterine tamponade.

Technique - Packing the uterus requires several metres of 10 cm gauge tightly packed into the uterine cavity manually and with ring forceps. There are multiple instruments reported in the literature including the Holmes packer, the Broadhead packer and uterine packing forceps to effect satisfactory placement of the packing material[13]. When packing the uterus with the packing forceps, it is easiest to insert a hand into the uterus and guide the packing material into the hand with the use of forceps[13]. It is important to pack the uterine cavity completely and uniformly. Parenteral antibiotics are empirically administered during and after the procedure. The vagina is also firmly packed and a Foley catheter placed in the bladder. The gauge packing is removed after 24-36 hours.

The disadvantages of packing include – the need for anaesthesia and that the entire cavity may not be packed uniformly leaving areas where concealed uterine bleeding may occur. Incomplete packing may occur due to the fear of perforation. Whether packing has been effective is not known for several minutes as the blood has to first soak through the pack before revealing itself at the cervix[5]. To overcome this problem, a sterile plastic bag may be introduced first into the uterus and the bag then packed with the gauge. This facilitates more complete packing of the uterine cavity and makes the removal of the gauge easier.

Pelvic temponade

When pharmacologic and conservative surgical or radiological interventions fail to control PPH, hysterectomy becomes the option of last resort. Continued bleeding even after an emergency hysterectomy is often accompanied by disseminated intravascular coagulopathy (DIC). This should be managed actively with transfusion of blood products and coagulation factors. Involvement of the haematologist and consideration of activated Factor VII may be required. Surgical control of bleeding may be enhanced using local sealant materials such as fibrin glue or surgicel.

To counteract the diffuse oozing from operative sites, the pelvis can be packed with laparotomy packs, which can be either used separately or tied together. Packing is especially indicated when hypothermia (<35 degrees Centigrade), acidosis and coagulopathy coexist. A relaparotomy may be performed in the woman after stabilisation, volume control and control of coagulopathy, to remove the packing materials after 24 hours. In 1926, Logothetopoulos described a pack for the management of uncontrolled posthysterectomy pelvic bleeding[14]. This technique has subsequently been called the mushroom, parachute, umbrella, pelvic pressure or Logothetopoulos pack. Different types and techniques of packing have since been described in several case reports of obstetric haemorrhage with success rates of about 85%[15-18].

Technique - In an umbrella pack – the laparotomy sponges are used to fill a Kerlex wrap as if it were an umbrella and the trailing edge brought out through the cervix or vaginal apex and placed on gentle traction providing tamponade in the pelvis[19]. The pack is introduced transabdominally into the pelvis and the 'neck' is delivered transvaginally through the introitus by passing a surgical clamp from below through the vagina (Fig. 4). Traction is applied to the pack by tying intravenous tubing to the neck of the pack and suspending a one litre intravenous fluid bag off the foot of the bed. Such umbrella pack can be removed without reopening the patient in majority of cases although significant care must be taken in retrieving the pack 24 hours later. Febrile morbidity is very common in women with a pelvic pack which may be attributable to the massive transfusion therapy as well as placement of a foreign body (pack). Prophylactic broad spectrum antibiotics should be administered whenever a pelvic pressure pack is in situ and should be continued after pack removal until the patient is afebrile for at least 48 hours. The use of pelvic packing of one sort or another does give a period of time in which the medical condition of the patient can be improved and coagulation status stabilised. It is particularly useful in low resource settings where more advanced surgical skills such as pelvic vascular ligation and selective arterial embolisation may not readily available.

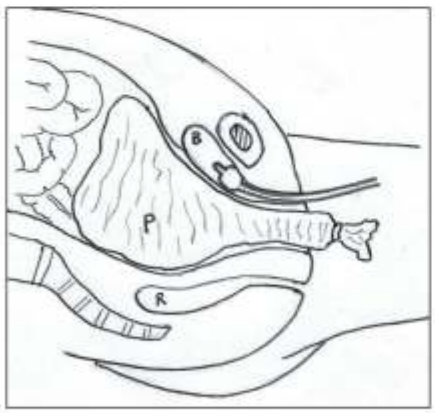

Fig. 4 : Pelvic pressure pack brought out through the vagina (B-bladder, P-Pack, R-Rectum)

Key points

- If bimanual uterine compression and pharmacological measures fail to control the PPH, examination under anaesthesia is warranted and surgical methods to control the bleeding are recommended without delay.
- Intrauterine balloon tamponade is an appropriate first line surgical intervention for most women where uterine atony is the only or main cause of haemorrhage. This should be instituted before coagulopathy sets in and the success can be enhanced with the use of an antifibrinolytic agent.
- It is simple, inexpensive and can be used by operators with minimal skills in areas with limited resources.
- The temponade aims to compress the bleeding sinuses and once the applied pressure stops the bleeding - the blood can clot and form a permanent seal.
- In low resource settings, SB tube or a condom tied to Foley catheter filled with saline are more readily available balloons compared to other alternatives. Large rubber glove tied to a catheter is used in some countries and good success has been reported.
- Uterine packing can be useful in control of haemorrhage with few reports of infections or adverse events.
- Continued bleeding even after an emergency hysterectomy is often accompanied by DIC. This should be managed actively with transfusion of blood products and coagulation factors.
- To counteract the diffuse oozing from operative sites, the pelvis can be packed with laparotomy packs while the woman's condition is stabilised by treatment of coagulopathy.
- Broad spectrum parenteral antibiotics should be administered whenever uterine or pelvic temponade /packing has been performed.

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Selman A. Waksman

Invention of antibiotics

In 1943 American microbiologist Selman A. Waksman discovered a fungus that produced a powerful antibiotic substance. This original antibiotic, which was produced in quantity in 1944, helped in treating lethal diseases such as tuberculosis, typhoid fever, bubonic plague and bacterial meningitis.

Obstetric Hysterectomy and Internal Iliac Ligation in PPH

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In spite of the marked improvement in the management of (Post Partum Hemorrhage) PPH, early/primary PPH remains a significant contributor to maternal morbidity and mortality. The complication of PPH is among the most challenging one which all of us face.

PPH by definition is the excessive bleeding after the birth of the baby with or without the expulsion of the placenta which can have a deleterious effect on the mother's condition. Traditionally amount of loss blood for Normal delivery is 500 ml and Cesarean section 1000 ml.

Mrs. X - I Case

34 years old 2nd gravida previous caesarean was admitted to our labor room on 1st October 2006 at 6 AM, with the complaint of 37 weeks amenorrhoea and profuse bleeding, P/V since 2 hours. She was planned for elective LSCS on 2nd Oct 2006.

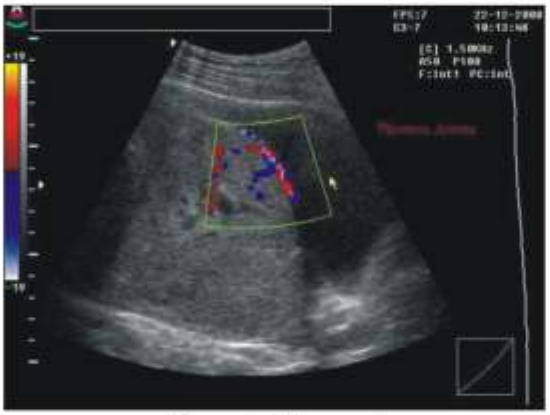

Figure – 1 Ultrasound

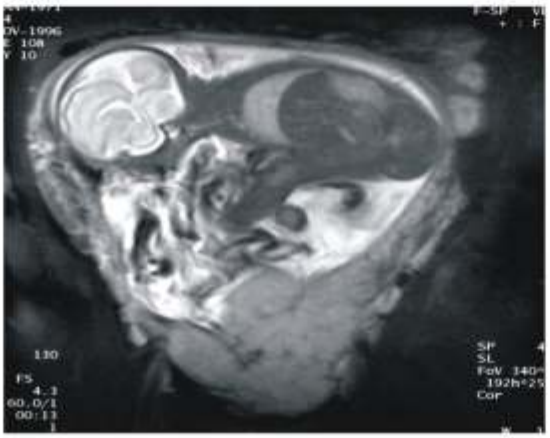

Figure – 2 MRI

She had similar complaints at 28 weeks of gestation, when she was admitted in a Private Nursing Home and was managed conservatively and was referred to us with the USG report of anterior placenta praevia accreta.

We confirmed Anterior Placenta Accreta by MRI.

On Examination

Clinically she was haemo-dynamically stable; Uterus was 37 weeks. Uterus relaxed cephalic presentation FHS audible regular Bleeding P/V (+++).

Investigations were normal - Hb : 12.6 gm, Platelet : 1 lakh, PT/APTT : Normal, Blood Sugar F : 61, PP : 101

Following steps were taken for the management

- During antenatal period she was counseled for hysterectomy and blood transfusion.
- She was introduced to the vascular surgeon and urologist as there was indication that bladder was invaded by placenta.
- Informed consent for internal iliac ligation and caesarean hysterectomy was taken.
- Two I.V lines wide bore canula were put.
- Senior anesthetist was called.
- Vascular surgeon + urologist were called.
- 6 units of blood and 4 units of fresh frozen plasma were arranged.
- Caesarean Hysterectomy was done.
- Anterior division of internal iliac artery

ARTICLE

was ligated after hysterectomy to stop the bleeding from the beds.

She received 11 units of whole blood, FFP – 10 units, Platelet – 6 units and Incubated for 24 hours kept in ICU for 2 days. She was discharged on the 8th post operative day with the baby.

Mrs. X - II case

25 year old primi gravida refered to us with PPH after vaginal delivery. We could not save her, she had gone into irreversible shock and coagulopathy.

Post partum hemorrhage (PPH) is a major cause of maternal mortality worldwide with an overall prevalence of approximately 6%. Africa has the highest frequency of about 10.5%.[1]

In India, postpartum hemorrhage (PPH) prevalence is 17% of all maternal mortality.[2]

In countries with high risk maternal mortality rates, including Africa and Asia, PPH accounts for more than 30% of all maternal deaths.[3]

Deaths from PPH are preventable. Primary PPH is the common form of major Obstetric hemorrhage.

Classification of PPH

Primary PPH is within first 24hrs of delivery and secondary PPH within 24 hrs to 6 weeks of postpartum. PPH is a description of an event not a diagnosis.

Causes of Hemorrhage

Uterine atony at cesarean or after normal delivery accounts for (70-80%) of PPH, Bleeding from uterine incision or its undue extension, towards vaginally or laterally cervical tear, para urethral tear, bleeding from placental bed, morbidly adherent placenta/retained membranes/Blood clots/Placental tissue, coagulopathy, myoma, ruptured uterus, chorioamnionitis, and multiple gestation.

One can Anticipate PPH when following risk factors are present

Polyhydramnios, macrosomia, multiple pregnancy, obstructed labour, multiparity, chorioamnionitis, prolonged labour, accidental hemorrhage, anaesthesia halogen, instrumental delivery, intrauterine manipulation, APH, previous caesarean birth with low anterior placenta, prior PPH, fibroid.

However in most cases of PPH no identifiable risk factors are present.

Caesarean hysterectomy or **internal iliac ligations** are surgical procedure. Intervention should be done after following few steps which are essential.

In the first case in spite of knowing the cause of PPH we had to do hysterectomy and internal iliac ligation.

Timely intervention can prevent the patient from going into irreversible shock. We could have saved the second patient if she was referred to us in time, or hysterectomy had been done in the centre from where she was sent to us.

First person to handle PPH usually are the residents. Time is lost in taking the decision of removal of the uterus particularly in primi gravids as in our second case.

Caesarean Hysterectomy

If timely intervention is not done one is bound to lose the patient. Hysterectomy is a life saving operation in intractable PPH when medical management have failed and other surgical steps (brace suture, bilateral uterine artery ligation, stepwise devascularization, Chow's suture) has failed.

Technically hysterectomy during caesarean section is not simple; usually anatomical land marks and, tissue planes are altered. Moreover fast surgery is needed.

Emergency caesarean hysterectomy is a marker of severe maternal morbidity and near miss mortality.

Incidence reports published in the past 25 years have shown an incidence varying from I in 330 to I in 6978 deliveries.[4]

In developed countries the incidence is reportedly as 1:2000 deliveries.

The incidence is rising worldwide due to the increasing rate of caesarean section resulting in rise in placenta previa and placenta accreta. Canadian study reported rise in hysterectomy from 0.26 to 0.46 per 1000 deliveries from 1991 to 2000 in Canada.[5]

Peri partum hysterectomy may be performed as an emergency to save the life of a woman with PPH or as planned procedure in conjunction with

caesarean section.

The indications of hysterectomy include placenta previa anterior accreta, percreta uterine atony, trauma, extension of incision laterally to uterine, or down toward the bladder or uterine rupture, uncontrolled atonic PPH, failed medical and other surgical modalities.

Decision making

A sequence of conservative measures to be taken to control uterine hemorrhage should be attended before resorting to hysterectomy [table 1]. Guidelines suggested by RCOG.[6]

If hysterectomy is necessary it should be done swiftly. Indecisiveness delays therapy and results in possible fatal hemorrhage. Moreover, there is increased blood loss with increased duration of time before performing the hysterectomy.

This results in irreversible shock, coagulopathy, severe hypovolemia tissue hypoxia, hypothermia and acidosis and ultimately death. The timing of hysterectomy is very important.

In a population based case control study the risk of needing hysterectomy was lowest in women undergoing first vaginal delivery, 1:30,000 and highest in women with a history of two or more prior caesarean section.[7]

Peripartum hysterectomy may be performed as an emergency to save the life of a woman with persistent bleeding, or as planned procedure, often in conjunction with caesarean section. In United States it is performed in 0.8 deliveries[8] and 0.5 percent of cesarean deliveries[9]. Similar results have been reported in Canada and in Europe[10].

Such hemorrhage may be due to abnormal placentation (eg., placenta accreta), uterine atony, uterine rupture, leiomyomas, coagulopathy, or laceration of a uterine vessel not treatable by more conservative measures. The relative frequency of these conditions varies among series and is dependent upon the patient population and practice patterns[11-18]

Indecisiveness delays therapy and results in possibly fatal excessive hemorrhage. Moreover, there is increased blood loss with increased duration of time before performance of hysterectomy.

Table-1. Summary of the Management of Major PPH. RCOG Green Top Guideline No. 52.

Summary of the management of major PPH	
Call for help	Senior midwife/obstetrician and anaesthetist Alert haematologist Alert blood transfusion laboratory Alert consultant obstetrician on-call
Resuscitation	Oxygen mask (15 litres) Fluid balance (2 litres Hartmann's, 1.5 litres colloid) Blood transfusion (O RhD negative or group-specific blood) Blood products (FFP, PLT, cryoprecipitate, factor VIIa) Keep patient warm
Monitoring	14-g cannulae x 2 FBC, coagulation, U&Es, LFTs Crossmatch (4 units, FFP, PLT, cryoprecipitate) ECG, oximeter Foley catheter Hb bedside testing Blood products Consider central and arterial lines Commence record chart Weigh all swabs and estimate blood loss
Medical treatment	Bimanual uterine compression Empty bladder Oxytocin 5 iu x 2 Ergometrine 500 micrograms Oxytocin infusion (40 u in 500 ml) Carboprost 250 micrograms IM every 15 minutes up to 8 times Carboprost (intramyometrial) 0.5 mg Misoprostol 1000 micrograms rectally
Mechanical methods	Intrauterine balloon tamponade Consider interventional radiology (Uterine artery embolisation)
Surgery	Brace suture Bilateral uterine artery ligation Bilateral internal iliac ligation Hysterectomy (second consultant)
Post – operative care	High-dependency unit or intensive care unit

A study of 30,000 women undergoing cesarean delivery reported the risk of peripartum hysterectomy was <1 percent with the first, second, or third cesareans, 2 to 4 with the fourth and fifth procedures, and 9 percent after six or more cesareans[19].

Following steps should be followed when the patient is high risk for caesarean hysterectomy as for example placenta previa anterior as we did with our first case.

Evaluations with ultrasound for possible placenta accrete.

Operation should be scheduled electively during day time, if possible. Diagnosis should be confirmed by MRI if available.

Patients with placenta previa following cesarean delivery or ultrasound findings compatible with placenta accreta, should have more blood products available (10 to 20 units of packed red blood cells, 4 units of fresh frozen plasma, and 5 units of single donor platelets).

Counseling should be done with informed consent. Interventional radiologist or vascular surgeon should be consulted. Urologist to be consulted whenever necessary as in our first case, where MRI confirmed bladder involvement.

Three-way Foley catheter in the bladder to drain urine and to facilitate instillation of fluid to test bladder integrity, if required, intraoperatively should be done. Ureteral stents can be placed preoperatively if the patient is at high risk of parametrial dissection and the surgeon feels they will be helpful.

Intermittent compression stockings are used to reduce the risk of deep vein thrombophlebitis.

A prophylactic antibiotic is given to decrease the postoperative infection. Anesthetists should be informed about possibility of hysterectomy. Experienced surgeon and an experienced assistant should be available.

Hysterectomy — The technique should be simple enough to perform rapidly and should minimize the creation of dead space and raw surfaces because of the possibility of coexistent coagulopathy. Clamp, pedicles and drop techniques should be used to control the bleeding as rapidly as possible. Suturing of the pedicles should be done later on.

Evaluation of bladder and ureteral integrity — Integrity of the bladder can be confirmed by infusing 200 ml of saline mixed with two or three drops of methylene blue into the bladder through the Foley catheter; extravasation of blue fluid signifies a leak. The ureters are inspected to determine that they are intact and patent. This may be tested by injecting one to two ampules (5 ml per ampule) of indigo carmine intravenously; blue urine will spill into the pelvis in 10 to 15 minutes if a ureter has been cut. Cystoscopy or direct visualization of the ureters through a cystotomy should demonstrate urine passing through both ureteral orifices. A ureteral stent can be passed through the ureteral orifice to localize the site of obstruction if required.

Complications are hemorrhage, urinary tract injury, coagulopathy and infection. **Persistent pelvic bleeding** after hysterectomy is controlled by **internal iliac ligation**, pelvic packing or by haemostatic agents.

INTERNAL ILIAC LIGATION

Howard Kelly first pioneered ligation of the internal iliac (hypogastric) artery in the treatment of intraoperative bleeding from cervical cancer prior to this technique being applicable to postpartum hemorrhage[20].

Internal iliac artery supplies the pelvic viscera. Bilateral ligation of the internal iliac arteries is a safe, rapid and very effective method of controlling bleeding from genital tract. In massive post postpartum hemorrhage it can be a life saving surgery. Following ligation of internal iliac artery, there is a reduction of 85 percent in pulse pressure and 48 percent in the blood flow in the arteries distal to the ligation[21]. Thereby the arterial pressure approaches the venous pressure and is rendered more amenable to hemostasis by a simple clot formation.

It has also been reported that there is a high rate of complication and low rate of success for hemostasis if the procedure is not done correctly. Therefore, this procedure should be reserved for hemodynamically stable patients of low parity in whom future child-bearing itself is of paramount concern. Unilateral or bilateral hypogastric artery ligation can be life-saving in patients with massive postpartum hemorrhage[22, 23].

The pelvic vasculature is arranged in such a manner that there is ample collateral circulation[24]. The common iliac artery bifurcates into two main branches – the external iliac artery (which becomes the femoral artery at the inguinal ligament) and the internal iliac (hypogastric) artery which descends into the true pelvis. The latter divides into anterior and posterior branches. It is essential to identify the anterior division because the uterine artery branches off from the anterior division.

Physiology of internal iliac artery ligation

Because of the excellent collateral circulation in the pelvis, vascular compromise does not occur when one or both internal iliac arteries are ligated. In reality, the hypogastric artery distal to the point of

ligation is never emptied of blood because the rich anastomotic network starts to function immediately after ligation[25]. What does occur is the virtual abolition of the arterial pulse pressure. This is associated with reduced mean blood pressure and rate of blood flow in the collateral system. As a result, the trip-hammer effect of arterial pulsations is abolished. The surgeon must be aware that bilateral ligature of the internal iliac artery is more effective than the unilateral procedure in that the patient has less chance of returning to theater for secondary surgery to control hemorrhage. The reduced pressure and lack of pulsation do, however, mean that thrombosis in the vessels may remain *in situ*.

INDICATIONS FOR LIGATION OF THE INTERNAL ILIAC ARTERY

Conditions that may indicate ligation as a prophylactic measure include postabortion bleeding, postpartum hemorrhage, atonic uterus prior to hysterectomy, abruption placenta with uterine atony, abdominal pregnancy with pelvic implantation of the placenta, placenta accreta with intractable bleeding, and prior to total or subtotal hysterectomy when all conservative measures have failed in massive PPH. Good clinical judgement is essential and, if prophylactic ligation is thought to be the best course, then it should not be delayed.

Therapeutic[26]

Therapeutic ligation may become necessary: Before or after hysterectomy for postpartum hemorrhage, when bleeding continues from the base of the broad ligament, profuse bleeding from the pelvic side-wall, profuse bleeding from the angle of the vagina, diffuse bleeding are present without a clearly identifiable vascular bed, in case of ruptured uterus in which the uterine artery have been torn at the site of its origin from the internal iliac artery. Additional indications include atony of the uterus where conventional methods have failed, extensive lacerations of the cervix have occurred following difficult instrumental delivery resulting in PPH, when there is significant bleeding from the lower part of the broad ligament. Internal iliac artery ligation, unilateral or bilateral, may become necessary and should not be delayed in such life-threatening situations.

SURGICAL TECHNIQUES

The surgeon must accurately identify two branches of iliac artery ligation because inadvertent ligation of the external iliac artery will produce an acutely ischemic leg, loss of limb. If the external iliac artery is ligated, the ligature can be cut but it must then be checked for adequate flow, because the inner layer of the wall may have been disrupted. If the artery has been transected, then it needs to be formally repaired and a graft may be required. The attendance of a vascular surgeon becomes essential.

The choice of material for ligating the artery depends on the preference of the surgeon. For example, 1–0 Vicryl and umbilical artery tape have been used. Two ties should be placed firmly but gently in continuity approximately 0.5 cm apart and 0.5–1 cm below the bifurcation.

The peritoneum should be closed with interrupted 2–0 Vicryl because a continuous suture can kink the ureter. The procedure on the left pelvic wall may be slightly more difficult because it is frequently necessary to mobilize the sigmoid flexure at the 'white line' to obtain adequate exposure.

ESSENTIAL SURGICAL CONSIDERATIONS[26]

1) The ureter crosses the common iliac artery at the level of its bifurcation;
2) An incision is made inferolaterally and parallel to the ureter, which can be identified visually for safe identification and dissection;
3) Following such incision, the peritoneal flap under which the ureter runs is displaced medially and retracted away (the ureter may be controlled with a sling for safety);
4) The internal iliac at the point of its bifurcation into the anterior and posterior divisions can be seen and palpated with its vein and the obturator nerve.

It is extremely important not to damage the internal iliac vein. The main arterial branch of the internal iliac is ideal for identification and ligature by passing a right angle, blunt-ended eye needle upon which is threaded a non-absorbable suture such as silk of 0 caliber or vicryl suture of the same caliber and passed between the artery and the vein.

Postoperative care

Intensive care is necessary because these women may be moribund and have required huge blood transfusion. Large hematomas or collections of serosanguineous fluid can be drained through separate stab wounds. Early ambulation is advisable in all cases. An indwelling catheter may be necessary to facilitate adequate assessment of urinary output in women who are at risk of serious morbidity.

Special clinical considerations

The major pitfall associated with ligation of the hypogastric artery is delay. When hemorrhagic shock is irreversible, this operation will not overcome it. Inadequate transfusion is another pitfall in the therapy of patients with severe hemorrhage. Blood loss is often seriously underestimated.

Failure to remember that the vaginal artery is a separate branch of the hypogastric artery, rather than a branch of the uterine artery, may lead the surgeon into the pitfall of an unnecessary and ineffective hysterectomy for control of bleeding. Injury to the external iliac artery from retractors or mistaken ligation of this vessel can lead to lower limb amputation. Also, accidental ligature of one or both ureters would lead to renal function impairment. Accidental incorporation of the anterior division of the sciatic nerve may lead to foot drop.

Most authors consider internal iliac artery ligation to be a very safe procedure. The available data suggest that this operation does not result in necrosis of vital pelvic structures.

Potential failures and consequences

Occasionally, ligation of the hypogastric arteries fails to stem pelvic hemorrhage. The reason for this is not clear, but some suggestions are:

1) Massive necrosis after infection with destruction of the vessels.
2) The presence of large, aberrant branches feeding blood to the area.
3) Dislodgement of clots when blood pressure rises.
4) Concomitant severe venous bleeding; however, this is rare.
5) Coagulopathy with deranged hematological indices.

Conclusion

It is very distressing that in spite of advancement in our profession, post partum hemorrhage is still is the leading cause of maternal mortality.

These deaths are preventable. Mortality results from poor access to health care lack of standard protocols for the management of PPH, improper management of placenta accrete, coagulopathy and non availability of blood transfusion facilities.

Prompt resuscitation of patient, restoration of blood volume, and identification of cause, death can be prevented.

Success of management depends upon systemic management (HAEMOSTASIS)

H–help, A–assess, E-establish etiology ecbolics, availability of blood, M–massage the uterus, O–oxytocin infusion prostaglandin, S–shift to OT, T–tissue and trauma to be excluded and proceed to tamponad with balloon/uterine packing, A- apply compression suture, S – systemic de vascularization, I–interventional radiology with uterine artery embolization, S–sbtotal hysterectomy.

Peripartum hysterectomy is a life saving operation to control massive post partum hemorrhage.

Prompt decision making is important delay resulting coagulopathy, severe hypovolemia, tissue hypoxia, hypothermia, and acidosis, which further compromise the patient's status. Timing is critical to an optimal outcome: hysterectomy should not be performed too early or too late.

Peripartum hysterectomy differs from nongravid hysterectomy in several important respects, most of which make the operation more difficult. Supracervical hysterectomy may be safer than total hysterectomy and is a reasonable option unless there is specific indication for removal of the cervix.

Methods for controlling persistent pelvic bleeding include suture ligation, use of hemostatic agents, and pelvic packing and **internal iliac ligation**. **Complications of peripartum hysterectomy** are hemorrhage, urinary tract injury, coagulopathy, and infection.

Caesarean hysterectomy or uterine artery ligation is done when all medical

modalities and surgical methods have failed to save of the life of the patient.

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Diagnostic and Management Approach in Secondary PPH

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Secondary postpartum hemorrhage [PPH] though less common and less severe than primary PPH is an important cause of maternal morbidity and sometimes mortality. The incidence is about 1% of postpartum women and commonly occurs between 8–21 days postpartum[1]. Since it usually occurs after woman is discharged home, the presentation may be late with approximately 85% requiring hospital admission. Approximately 15% of these women will require a blood transfusion and 1% may undergo hysterectomy.[2,3]

Definition

Secondary postpartum haemorrhage is defined as excessive blood loss from the genital tract occurring more than 24 hrs to 12 weeks after delivery.

Aetiology

The causes for secondary PPH are varied and common causes are listed in Table 1 .

Table-1. Common Causes of Secondary PPH
• Retained placental tissue
• Infections-endometritis, endomyometritis
• Subinvolution of the uterus
• Fibroid uterus
• Injuries-Lower genital tract lacerations/ hematoma, Surgical injury
• Dehiscence of cesarean section scar
• Vascular abnormality – arteriovenous malformation
• Placental abnormality – placenta accreta, percreta and increta
• Choriocarcinoma
• Coagulopathies, bleeding disorders, use of anticoagulants

Risk Factors for secondary PPH :

Table 2 shows risk factors for secondary PPH which should alert the clinician but high index of suspicion is required in all women.

Table-2. Risk factors for secondary PPH
Pre-existing
• A past history of secondary PPH
• Multiparity
• Maternal anemia
• Maternal smoking
Antepartum
• Prelabor rupture of membranes
• Antepartum hemorrhage
• Multiple pregnancy
Intrapartum
• Caesarean Delivery
• Precipitate labor
• Prolonged third stage
• Retained placental tissue or membranes
Postpartum
• Primary PPH
• Puerperal sepsis
• Not breastfeeding

DIAGNOSIS

The diagnosis and management of a secondary postpartum haemorrhage primarily relies on a clinical assessment.

About 60% women present within 2 weeks of delivery. Most patients are hemodynamically stable but the amount of blood loss varies from small irregular bleeding to massive hemorrhage. The detailed history regarding parity, labor, mode of delivery, third-stage or puerperal complications and any relevant medical and family history can provide information relating to cause. Normal postpartum loss

ARTICLE

may continue beyond 6 weeks in up to 25% of women, especially if breastfeeding, and the first period may be heavy, prolonged and painful as a result of an anovulatory cycle[4]. The history of easy fatiguability and abdominal cramping may be present.

Clinical examination may show presence of anemia, pyrexia, uterine tenderness, enlarged uterus and an open cervical Os with offensive lochia.

MANAGEMENT

The main aims of treatment are to provide basic resuscitation, establish a cause for the bleeding, and tailor the treatment (medical and/or surgical) according to the cause.

Resuscitation

Approximately 10% of cases present with massive hemorrhage.[4] Circulating blood volume should be restored, by gaining intravenous access with two large-bore cannulae and administering intravenous fluids initially with physiological saline (up to 2 liters) and then with plasma expanders until blood is available. Blood and blood products must be transfused as early as possible according to the blood lost after obtaining sample for full blood count, coagulation screen but without waiting for investigation results. High concentration oxygen (10–15 l/min) should be administered by a tightfitting mask.[5]

Close observation of vital signs including pulse, blood pressure, oxygen saturation and urine output should be maintained throughout resuscitation

Investigations

Baseline blood tests should include full blood count, coagulation studies, a grouping cross matching. Vaginal swabs should be taken for aerobic as well as anaerobic bacterial growth, including swabs from episiotomy or vaginal tear sites. A mid-stream urine specimen should be collected and, if maternal temperature is more than 38°C, blood cultures should be obtained. Serum beta hCG should be performed if PPH occurs away from delivery when choriocarcinom is suspected and serial assessment is useful.

Ultrasound imaging of the pelvis should be done to rule out retained placental tissue but interpretation may be difficult within 7–14 days of delivery as remaining blood clots may appear as mixed echogenic material similar to retained tissue. The use of duplex color Doppler helps to improve diagnostic accuracy.

Additional imaging should also be considered for specific causes of secondary PPH such as plain chest film and CT scanning for metastases in cases of choriocarcinoma, magnetic resonance imaging (MRI) for placenta accreta and angiography[6] for intractable bleeding of unknown origin.

Treatment

The definitive treatment will depend on the cause. Since majority of cases of secondary PPH are due to subinvolution of the uterus caused by uterine infection and/or retained placental tissue the initial management should include the use of uterotonic agents, administration of antibiotics and consideration of surgical evacuation. Table 3 shows summary of treatment modalities for secondary PPH.

Table 3. Summary of Treatment modalities

Medical	Surgical
Oxytocics	Uterine evacuation
Prostaglandins	Uterine tamponade balloon
Antibiotics	Uterine compression sutures
Tranexamic acid	Hysterectomy
Vasopressin	Pelvic arterial ligation
Clotting factor concentrates	
Chemotherapy	**Radiological**
Oral contraceptive pill	Selective arterial embolization

Uterotonic agents

Oxytocin can be administered as an intravenous or intramuscular bolus (10 units) or in combination with ergometrine 1 ampoule as an intramuscular injection.

Antibiotics

Endometritis is a major contributor to subinvolution of the uterus and although infection may not be confirmed in a large population of cases, antibiotics are always given for secondary PPH. All the sample for microbiological investigations should be taken before antibiotic therapy

is commenced. The common organisms identified include group B streptococcus, Bacteroides sp., Escherichia coli, Clostridium perfringens and group D streptococcus. The broad spectrum antibiotic covering all aerobic [gram positive, negative] and anerobic organism are recommended. Commonly used drugs include amoxicillin with clavulanic acid or a combination of amoxycillin, metronidazole and gentamicin.

Uterine evacuation

Surgical evacuation of the uterus should be considered if retained placental tissue is suspected clinically or on ultrasound examination. This intervention has good success rates, with bleeding stopping promptly in most of the women. Retained tissue was more likely if membranes were incomplete at delivery, primary PPH had occurred or if secondary PPH was judged to be heavy or moderate (compared with light) in volume. In many cases evacuation of uterus may be considered in absence of POCs on ultrasound when abnormal bleeding does not respond to medical management which will also help in arriving at diagnosis.

Retained placental tissue is likely to be associated with infection and, therefore, broad spectrum intravenous antibiotics should be given in conjunction with surgical evacuation. As serum concentrations of most antibiotics peak 1 h after intravenous administration, these should be administered just prior to surgery; however, in women who are hemodynamically stable, it may be appropriate to administer 12–24 h of antibiotic cover prior to surgery[1]. At the time of surgery, uterotonic agents like oxytocin are helpful to aid uterine contractility and control hemorrhage. The method of evacuation may be manual removal of tissue, suction evacuation or sharp curettage with a metal curette. The risk of uterine perforation is much higher in postpartum uterine evacuation and may be further increased in endometritis. Thus the surgery should be performed by experienced medical staff. In woman with PPH after cesarean section, surgical evacuation should be considered very carefully as the possibility of retained placental tissue is low and risk of perforation is more. The need for a second procedure due to incomplete evacuation of retained tissue may also occur. Hysterectomy may be required to control bleeding in up to 5% of cases. In view of these significant complications, women should always be fully counseled of the risks and informed consent obtained. An additional complication is the long term risk of Asherman's syndrome.[7]

Intrauterine balloon tamponade

Uterine tamponade using balloons such as the Bakri or Rüsch balloon, Foley catheter, condom catheter [8,9], should be considered in cases of secondary PPH due to uterine subinvolution/atony once retained placental tissue has been excluded. They have efficacy of more than 95% and can avoid laparotomy.

Other surgical procedures:

Other surgical procedures may be considered in cases of bleeding not controlled with uterine evacuation, bleeding due to morbidly adherent placenta, dehiscence of cesarean section scar, bleeding from a surgical injury or uncontrolled bleeding from a lower genital tract laceration.

Laparotomy may also be required which allows further investigation into the cause of bleeding and treatment by the use of surgical compression sutures, hysterectomy and pelvic arterial ligation as appropriate. The B-Lynch brace[10] suture which is well described for the treatment of primary PPH and has now been reported in hundreds of cases of secondary PPH (B-Lynch, personal communication). The use of a surgical compression suture may avoid the need for hysterectomy in women wishing to conserve fertility. Stepwise devascularisation may also be considered before hysterectomy. Hysterectomy in cases of PPH carries significant risks but can be life-saving and should be considered early rather than late in cases of massive hemorrhage.

Bilateral uterine artery embolization and selective arterial embolization

Pelvic angiography[7] is a helpful tool in the assessment of ongoing hemorrhage and can detect extravasation from uterine and vaginal vessels, uterine artery aneurysm and evidence of an arteriovenous malformations. It also allows the introduction of embolization

agents like absorbable gelatin sponge to arrest bleeding. Embolisation of uterine arteries can be performed bilaterally or unilaterally in cases of a false aneurysm and an arteriovenous fistula.

Other measures

In cases of massive hemorrhage unsuccessfully treated with surgical measures, the use of intravenous tranexamic acid,[11-12] recombinant factor VIIa[13] and local vasopressin[14] have been reported for primary PPH. There are no reports of similar use in secondary PPH but, if available, it may be appropriate to consider their use in combination with other therapies and resuscitative support.

Chemotherapy

The mainstay of treatment for choriocarcinoma is chemotherapy. A low-risk chemotherapy regimen includes the use of methotrexate with folinic acid rescue on a 2-weekly cycle.[15] Medium- and high-risk regimens include the use of etopside, methotrexate, actinomycin, vincristine, cyclophosphomide and 6- mercaptopurine .

Methotrexate can also be considered in secondary PPH in cases of placenta accreta when placenta was left behind at the time of caesarean section.

Coagulopathies

Women on anticoagulants therapy for prosthetic heart valves or thromboembolic disease may develop secondary PPH. Reversal of bleeding due to anticoagulants should follow normal protocols. Vitamin K should be considered in women with uncontrolled bleeding secondary to warfarin use and protamine sulfate may be considered if hemorrhage results from the use of heparin, although this has a much shorter half-life.

Women with inherited coagulation disorders such as von Willebrand's disease and carriers of hemophilia A and B are likely to bleed postpartum if maternal clotting factors are low (<50 IU/dl). Prophylactic administration of desmopressin (DDAVP) and clotting factor concentrates may prevent PPH . The aim is to raise factor levels above 50 IU/dl during labor and delivery, and to maintain these for up to 5 days after delivery.

In the event of PPH, replacement of deficient clotting factors should be made and identification and treatment of the cause be instigated. Hemorrhage from postpartum acquired hemophilia is treated acutely with factor VIII (human or porcine) or recombinant factor VIIa.[16,17] Immuno-suppressive drugs such as corticosteroids, cyclophosphamide and azathioprine may be used to accelerate the disappearance of factor VIII inhibitors, although complete remission is likely to occur spontaneously with time.

Key points

Secondary PPH is an important cause of maternal morbidity and mortality. Basic resuscitation followed by investigation and treatment of the specific cause of hemorrhage are essential.[18]

- Secondary PPH is often associated with endometritis.
- When antibiotics are clinically indicated, a combination of ampicillin (clindamycin if penicillin allergic) and metronidazole is appropriate. In cases of endomyometritis (tender uterus) or overt sepsis, then the addition of gentamicin is recommended.
- Surgical evacuation should be undertaken if there is excessive or continuing bleeding, irrespective of ultrasound findings.
- Uterine Balloon tamponade is useful in cases not responding to evacuation.
- Uterine artery embolisation is an useful modality in intractable hemorrhage.
- Hysterectomy is the last resort but timely decision can prevent maternal mortality.

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Christiaan Neethling Barnard

First Heart Transplantation Surgery

Christaan Barnard invented new heart valves, and performed the first human heart transplant. The 55-year-old Louis Washkansky received the heart transplant. Some of his transplant recipients survived for years.

Dr. Aswath Kumar
Chairperson, Quiz Committee
(2012-2014)
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1. B lynch suture is applied on:
   A. Cervix B. Uterus
   C. Fallopian tube D. Ovaries
2. Treatment of post partum hemorrhage is all except:
   A. Oxytocin B. Syntometrine
   C. Oestrogen D. Prostaglandins
3. All contribute to postpartuhemorrhage, except:
   A. Epidural analgesia
   B. Small for date
   C. prolonged labour
   D. High multiparity
4. Most common cause of postpartum hemorrhage is
   A. Uterine atony
   B. Retained products
   C. Trauma
   D. Bleeding disorders
5. During PPH internal iliac Ligation done at:
   A. Origin of internal iliac artery
   B. Anterior division of internal iliac artery
   C. Posterior division of internal iliac artery
   D. Common iliac artery
6. Most common cause of secondary PPH is:
   A. Uterine inertia B. Retained placenta
   C. Episiotomy D. Cervical tear
7. commonest cause ofpostpartum hemorrhage in multipara is:
   A. Fibroid B. Retained placenta
   C. Uterine atony D. Uterine perforation
8. True about placenta accreta is:
   A. Seen in cesarean scar
   B. Removal should be done under GA in piecemeal
   C. Chorionic villi invade serosa
   D. It is an etiological factor for amniotic fluid embolism
9. Maximum chances of post partum hemorrhage are seen in:
   A. Multiparity B. Primipara
   C. Abnormal lie D. All
10. Which is not common cause of Placent Accreta?
    A. Previous LSCS B. Previous currettage
    C. Previous myomectomy
    D. Previousabrupto placenta
11. Minimum duration between onset of symptoms and death is seen in:
    A. APH B. PPh
    C. Septicema D. Obstructed labor
12. Uterine artery embolisation is done by using:
    A. Thrombin B. Polyvinyl alcohol
    C. Vitamin K D. Iodine
13. Which of the following is not used in post partum haemorrhage:
    A. PGF 2 a B. PGE 2
    C. PGE1 D. Ergometrine
14. Common cause of death in inversion of uterus:
    A. Neurogenic shock
    B. Hemorrhage
    C. Pulmonary embolism
    D. Infection
15. Which of the drug is not commonly used in PPH?
    A. Mifepristone B. Misoprostol
    C. Oxytocin D. Ergotamine
16. Post partum hemorrhage is present when blood loss exceeds:
    A. 200 c.c B. 400 c.c
    C. 500 c.c D. 700 c.c
17. To decrease PPH, drug used prophylactically is:
    A. Oxytocin B. Methergin
    C. Progesterone D. Prostaglandin
18. Complication of manual removal of placenta is/are:
    A. Subinvolution B. Inversion of uterus
    C. Incomplete removal of placenta
    D. All of the above
19. A 30 year old woman para 6 delivers vaginally following normal labour with spontaneous delivery of an intact placenta. Excessive bleeding continues, despite manual exploration, bimanual massage, intravenous oxytocin and administration of 0.2 mg methergin IV, which one of the following would be the next step in the management of this patient?
    A. Paking the uterus
    B. Immediatehysterectomy
    C. Bilateral internal iliac ligation
    D. Injection of PGF 2a
20. The treatment in a case of placenta accreta is:
    A. Manual separation
    B. Hysterectomy
    C. Leave it alone
    D. Hysterotomy and removal of placenta

ANS							
	1.B	2.C	3.B	4.A	5.B	6.B	7.C
	8.A	9.A	10.D	11.B	12.B	13.B	14.B
	15.A	16.C	17.B	18.D	19.D	20.B	

QUIZ

Report on the Narmade Hara Yatra 12

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The team comprised of Dr. Shirin Venkat/ Dr. V. Venkat/Dr. V. Pawar/Mr. D. Mehendale/Mrs. M. Mehendale/Mr. M. Gadgil/ Mrs. A. Mahajan.

The aim was :

- To educate primary Health Care doctors and ANM s (Auxillary Nurse Midwife) about severe preeclampsia and eclampsia management so as to prevent maternal mortality due to these causes and render early adequate care.
- To distribute eclampsia kits graciously sponsored by EMCURE PHARMACEUTICALS to deserving doctors and nurses besides the right authorities along the way.
- To create awareness at school levels amongst adolescents in the rural areas. All this along the north bank of the holy river Narmada which passes through Gujarat and Madhya Pradesh (north bank from Bharuch to Amarkantak), from 8.10.12 to 19.10.12.

The team travelled by train from Pune to Bharuch by the Pune Jodhpur express.A Tempo Traveller awaited them and hereon was their vehicle for the next 10 days. Every day 150/200 kms were covered and the entire distance covered was 1,846 kms. The cost Rs. 80,000/- must mention here the team sponsored themselves.

1. The number of PHC (Primary Health Centers), CSC (Community Service Center), RU (Referral Unit) covered were 8 in all.
2. The number of major events in the three nodal cities along the way were as follows:

   a. At Bharuch Dr. V. Chellappan (President of the local FOGSI branch) Dr. Bhavana Sheth (Secretary) and Dr. Tripathi the CDHO (Chief District Health Officer) made it possible to meet 50 peripherally placed doctors and a workshop was conducted, the doctors enjoyed the interactive Q/A session which won them an Eclampsia kit if they answered correctly.12 kits were distributed here.

   b. At Indore the local FOGSI Office bearers took no initiative whatsoever and hence Dr. Shirin Venkat made contact directly with the Director of Medical services Dr. Sharad Pandit directly. He was so overwhelmed that he spontaneously arranged an event at the Prakashchandra Sethi Govt Hospital the very next day. 12 kits were left in his charge for distribution, he promised to conduct the type of event we had at Bharuch (if only we could have contacted him earier)

   c. At Indore again on a personal level Dr. Shirin Venkat contacted Dr. RAtna Thakur at the Sant Aurobindo Institute of Medical Sciences where another event of educating the postgraduate students was organized. Quite a few of whom came post lecture to say they felt charged and enthusiastic about rendering service in rural areas.

   d. At Jabalpur Dr. Dpankar Bannerji (President local branch FOGSI) Dr. Swaraj Naik (Past President) and D. Nina Srivastav (Secretary) had organized a CME as well as an event with the ANGANWADI workers. Both events were well attended and extremely well organized. 12 kits

were left in their custody for distribution to the right doctors and to continue the good work they are doing.

All doctors involved are deeply appreciated and deserve our warm thanks for their involvement in the mission of helping to reduce the maternal mortality in our country.

We dedicate our effort however, microscopic at the feet of MOTHER NARMADA and in service of the little mothers along her banks.

The team boarded the Patna –Pune express on 19.10.12 at Jabalpur to return early morning on 20.10.12.

Uterotonic use in India

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Background

Haemorrhage, defined as blood loss of 500 ml or more, is a leading cause of maternal death globally[1,2]. Postpartum haemorrhage (PPH) contributes to a higher proportion of maternal mortality in developing countries—particularly in rural settings with limitations in infrastructure and lack of availability of skilled birth attendants and uterotonics for management of PPH[3, 4]. The United Nations Millennium Development Goal 5—reduction of maternal mortality by 75% by 2015[5]—cannot be reached without addressing PPH.

PPH is one of the few obstetric complications for which an effective preventive intervention is available. Active management of the third stage of labour (AMTSL) is a package of interventions that include administration of an uterotonic drug immediately following delivery, controlled cord traction, and fundal massage following delivery of the placenta[6].

Oxytocin is the drug of choice for PPH prevention[6] but feasibility of its use is limited because oxytocin is only available in injectable form and requires refrigeration. Recent calls to expand access to oxytocin for PPH prevention have been accompanied by concerns that the drug could also be used inappropriately for induction and augmentation of labour[7,8,9]. Induction and augmentation of labour should only be performed by highly trained health workers in facilities with access to emergency obstetric care due to the increased risks of complications accompanying these procedures. Inappropriate use of oxytocin—e.g., administering oxytocin prior to delivery in peripheral health facilities, or by low-level health workers—is considered dangerous because the dosage may be difficult to monitor and low-level workers and peripheral facilities may not be able to manage any adverse effects[6,10]. Inappropriate administration of oxytocin may result in hyper-stimulation of the uterus, which can lead to uterine rupture, foetal asphyxia, and/or foetal demise[9,11].

Introduction

A range of research activities related to PPH prevention and treatment have been undertaken in recent years, including studies looking at the use of misoprostol for prevention of PPH, two recent observation of delivery studies (PATH's Oxytocin Initiative and Indian Council of Medical Research/United Nations Population Fund), and studies looking at uterotonic quality, perceptions, and use (Oxytocin Initiative and Population Services International/Gynuity Health Projects).

The India landscape review is part of the Bill and Melinda Gates Foundation–funded Oxytocin Initiative being implemented by PATH. The project seeks to better understand the availability and quality of uterotonic substances and their use during labour and delivery in India.

The three objectives of the landscape review are as follows :

1. Explore knowledge, perceptions, and usage patterns of uterotonic drugs around birth among health care providers and community members.
2. Describe the use of uterotonic drugs at/around delivery in health facilities in 4 districts in Uttar Pradesh and Karnataka.
3. Assess the potency of oxytocin and methylergometrine in a sample of ampoules purchased by mystery clients

PROJECT

from private pharmacies.

The India landscape review was conducted via three complementary studies using qualitative in-depth interviews with health providers and community members (N=280), direct observation of health facility–based deliveries (N=366), and chemical assays to assess the potency of oxytocin and methylergometrine (N=381) using the mystery client method.

Data was collected in four districts in two states: Agra (Uttar Pradesh), Gorakhpur (Uttar Pradesh), Hassan (Karnataka), and Bagalkot (Karnataka). Data was collected between April and November 2011 and dissemination of findings was undertaken between February and May 2012.

Data collection method	Population	Sample size
In-depth Interviews (Objective1)	Medical officers	N=40 (10 per district)
	ANMs/Staff nurses	N=40 (10 per district)
	Chemists/ Pharmacists	N=40 (10 per district)
	Unlicensed 'doctors'	N=40 (10 per district)
	TBAs	N=40 (10 per district)
	Mothers-in-law	N=40 (10 per district)
	New mothers	N=40 (10 per district)
Direct observation of deliveries (Objective 2)	Pregnant mothers	N=366
Mystery client (Objective 3)	Chemist/Pharmacy	N=381

ANM=Auxiliary Nurse Midwife; TBA=traditional birth attendant

The key findings and recommendations listed below reflect inputs received during the dissemination meetings with stakeholders.

Key findings

Induction and augmentation of labour

- Induction of labour is low (2–4%) in the four districts.
- There is extensive augmentation at all levels (home delivery to district hospital delivery).

District	% augmented
Hassan	88
Bagalkot	74
Agra	54
Gorakhpur	93

- Inappropriate augmentation in lower level facilities and home deliveries (by lower level providers such as Auxiliary Nurse Midwives [ANM]/Staff Nurses and non-qualified health providers) appears to be common.
- Inappropriate intravenouspush and intramuscular injection of oxytocin for augmentation was seen in approximately 1/3 of all deliveries observed.
- There were reports of using multiple (up to 5 injections, i.e., 25 IU) uterotonic injections for augmentation.
- There is high demand from family members for uterotonic injections to speed up labour.

Active management of the third stage of labour

- Most physicians report correct knowledge of the use of uterotonics for prevention and treatment of PPH, whereas ANMs report higher levels of correct knowledge for treatment of PPH using uterotonics.
- There is virtually no use of complete AMTSL following Ministry of Health and Family Welfare (MOHFW) guidelines at public health centre, community health centre, and district hospital–levels.
- There is virtually no correct use of uterotonics for AMTSL purposes in the twodistricts in Uttar Pradesh (Agra and Gorakhpur).
- Immediate cord clamping is common and the norm in one district in Karnataka (Hassan) and one district in Uttar Pradesh (Gorakhpur).
- Postpartum use of methylergometrine is common, the norm in the twodistricts in Uttar Pradesh, and is predominantly used after delivery of the placenta.
- Appropriate application of controlled cord traction is nearly universal in the twodistricts in Uttar Pradesh. Application without manual support to the uterus is common in the districts in Karnataka (40–50% of deliveries).
- Application of fundal massage per Medical Officer and ANM guidelines is approximately 40% in all four districts.
- Application of fundal pressure directly after the delivery of the baby is the norm in the two districts in Uttar Pradesh.

Risks related to uterotonic use

There is inconsistent knowledge of the risks associated with uterotonic use among ANMs and unqualified health providers.

"Now villagers all know that during this [labour] we give Pitocin. So without knowing the reason, even though the doctor told them that it should be given only in third stage, they use it without the initiation of any stage. There is no dilation, people are not there. Some village doctor or village woman tells them that she is feeling pain. So without knowing, without checking anything, they make no delay to give it. They don't know even how to give it, they just give the injection directly." (Physician, UP)

Storage of uterotonic drugs in health facilities

- In all four districts, oxytocin and methylergometrine are commonly stored in health facility pharmacies at room temperature.
- In all four districts, methylergometrine is commonly exposed to light when stored in health facility pharmacies.
- ANMs and pharmacists appear to have limited understanding of oxytocin storage requirements.

Uterotonic drug quality and availability

- The availability of uterotonic drugs is not a problem.
- The quality of oxytocin and methylergometrine in private pharmacies is an issue in all four districts. Methylergometrine was more commonly found to be outside of manufacturer's specifications than oxytocin(within specifications=90–110% active ingredient).

District	Oxytocin within specifications*	Methylergometrine within specifications*
Hassan	60.0%	4.3%
Bagalkot	66.7%	0.0%
Agra	50.0%	46%
Gorakhpur	78.0%	56%

Recommendations

- Raise awareness among ANMs, unqualified health care providers, and community members of the risks associated with uterotonicuse—and particularly inappropriate use during labour.
- Reinforce Indian MOHFW Medical Officerand ANM/Staff Nurse and Lady Health Visitor (LHV) guidelines to ensure correct and consistent implementation of AMTSL.
- Ensure staff are aware of drug storage requirements and have resources such as coolers/cool boxes to store uterotonic drugs appropriately.
- Specify drug storage requirements on the product box.
- Undertake further investigation to determine why uterotonic drugs are out of specifications at the point of sale: Quality at the point of manufacture, inappropriate conditions during transport, and inappropriate conditions during storage in health facilities.
- Develop strategies to reinforce appropriate uterotonic use and discourage inappropriate use by providers by addressing thepractices of non-qualified health providers who learn from, and follow higher-level provider practices.
- Reduce inappropriate demand by community members by conducting behaviour change communication interventions targeting the community and Accredited Social Health Activists (ASHAs).

Next steps

The Oxytocin Initiative recently disseminated its India landscape review findings at both the national and state levels. These studies have raised awareness around critical issues related to uterotonic use and misuse during labour and delivery, as well as issues related to uterotonic quality. There is now interest in taking immediate follow-up action to move forward based on the research findings. In the follow-up work, the project aims to: (1) catalyse evidence-based actions, (2) catalyse engagement and actions toward increasing appropriate use of uterotonics for prevention and treatment of PPH and reducing use of uterotonics during the first and second stages of labour, and (3) inform where along the supply chain (covering both public and private actors) in India the quality of uterotonics is compromised.

The Oxytocin Initiative will partner with the Federation of Obstetric and Gynaecological Societies of India (FOGSI) to improve medical practices around augmentation of labour by obstetricians/gynaecologists

and ANMs. Changes in practice will be achieved through support for their continuing medical education (CME) program and through existing FOGSI mechanisms that advocate for best practices in obstetric care. In-service training activities will be complemented by follow-up activities to reinforce training in Uttar Pradesh and Karnataka through conferences and roundtables targeting both private and public medical practitioners. If initial efforts are successful, FOGSI will commit to scalingup activities in other states.

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Rene Theophile Hyacinthe Laennec

Inventor of Stethoscope

In 1816, the Frenchman Rene Theophile Hyacinthe Laennec invented a wooden tube which was capable of isolating the organic noises from the surrounding environment and making them louder.

Forthcoming issue ...

Dear Readers,

It is our pleasure to communicate that theme of our forthcoming issues are as follows –

1. **Infection in Pregnancy**
2. **Antenatal Care**

I invite your contribution in form of article, atypical case situation and quiz on theme of issues.

I also request to send your experience on any difficult situation, your project, work individually or as a group in rural areas, underprivileged area.

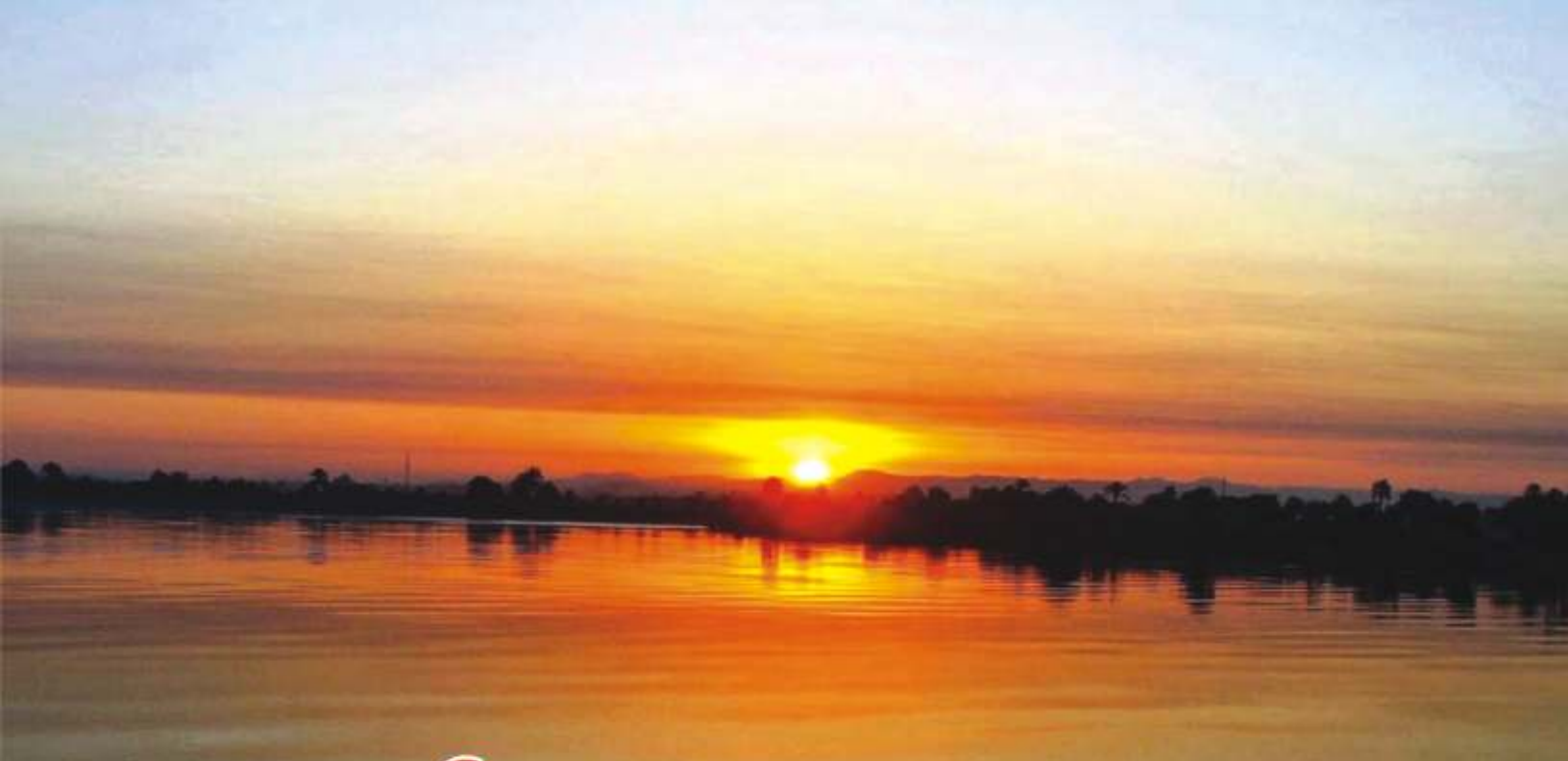
Thanks in advance.

Dr. Sadhana Gupta
Chairperson Safe Motherhood Committee

We thankfully acknowledge

LUPIN
Pharmaceuticals

for their contribution
in Safe Motherhood Bulletin.



नव वर्ष ...

नव उमंग
नव तरंग
जीवन का नव प्रसंग

नवल चाह
नवल राह
जीवन का नव प्रवाह

गीत नवल
प्रीति नवल
जीवन की रीति नवल
जीवन की नीति नवल
जीवन की जीत नवल

- हरिवंश राय बच्चन