REVIEW ARTICLE

Recent Advances in the Management of Postpartum Hemorrhage

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Introduction

Postpartum hemorrhage, defined as the loss of more than 500 ml of blood after delivery, occurs in up to 18 % of births. Blood loss exceeding 1000 ml, is considered physiologically significant and can result in hemodynamic instability (1). Even with appropriate management, approximately 3% of vaginal deliveries will result in severe PPH. It is the most common maternal morbidity in developed countries and a major cause of death world wide Globally about 11% of women having live births have severe PPH amounting to 14 million women a year(2). The major burden of this is borne by women in underdeveloped and developing countries. The incidence is higher in operative deliveries especially when conducted under general anesthesia.The incidence is said to be 3.9% in vaginal deliveries & 6.4% in cesarean deliveries (1).

Uterine atony is the most common cause of PPH, followed by traumatic PPH. Pregnancies having hypertension, antepartum hemorrhage, multiple gestation, overdistended uterus, uterine fibroids etc have a much higher incidence of atonic PPH. Expectant management and mismanagement of third stage of labor obviously results in much greater incidence of PPH. Causes of traumatic PPH are genital tract lacerations, uterine rupture and uterine inversion (3). Coagulation defects like acquired haemophilia is a life threatening condition & can lead to postpartum hemorrhage (4). Morbidity from PPH mainly includes surgical interventions, sepsis and severe anemia.

Complication from PPH (1) include orthostatic hypotension, anaemia and fatigue. Postpartum anaemia increases the risk of postpartum depression. Blood transfusion may be necessary and carries associated risk. Inmost severe cases hemorrhagic shock may lead to anterior pituitary ischemia, dilutional coagulopathy and death also may occur. Delayed PPH, bleeding after 24 hours as a result of sloughing of the placental eschar or retained placental fragments, can also occur.

Prediction of PPH (1): Risk Factors for PPH includes a prolonged third stage of labor, multiple pregnancy, and history of postpartum hemorrhage. However, PPH also occurs in women with no risk factors. At every delivery strategies for minimising the effect of postpartum hemorrhage include identifying and correcting anaemia before delivery, being aware of mother's beliefs about blood transfusions and eliminating routine episiotomy. Rexamination of the patient's vital signs and vaginal flow before leaving the labor room.

Prevention of PPH: Active management of third stage of labor is evidence based, feasible and low cost intervention to prevent postpartum hemorrhage and can prevent 60-70% of atonic PPH. Active management which involves administering a uterotonic drug with or soon after the delivery of the anterior shoulder, controlled cord traction with simultaneously counter pressure to the uterus suprapublically and usually early cord clamping and cutting the cord, decreases the risk of PPH and shortens the third stage of labor with no significant increase in the risk of retained placenta. After the delivery of placenta, give gentle massage of the uterus to promote uterine contraction and to minimize bleeding (5).

Management of PPH:PPH can be managed either medically or surgically or by both methods. Immediate resuscitation of hypovolemia should be done with large bore I/V canulae. I/V fluids, Oxygen inhalation and examination to rule out the cause of PPH. Blood sample is taken for ABO/RH grouping and cross matching.

Medical Management (6,7,8,9): ***Oxytocin*** is the current drug of choice for prevention of PPH. The main advantages are rapid onset of action & lack of side effects.Oxytocin stimulates the upper segment of the myometrium to contract rhythmically, which constricts blood vessels and reduces blood flow through uterus.

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10 IU should be injected I/M or 20 units in 1L of NS may be infused at a rate of 250 ml per hour.***Methylergonovine (Methergine)*** and ergometrine are ergot alkaloids that cause generalised smooth muscle contraction in which the upper and lower segments of the uterus contract tetanically. Methergine 0.2 mg administered I/M may be repeated as required at intervals of two to four hours. It cause side effects like H.T, nausea and vomiting. It should not be used in woman with H.T, H/O migraine or raynaud's phenomenon. ***Syntometrine*** i.e 5I/U oxytocin + 0.5 mg ergometrine appears to be associated with a small reduction in the risk of PPH of 500-1000ml, but an increase in side effects (vomiting, hypertension) when compared to oxytocin alone. ***Prostaglandins*** enhance uterine contractiliy and cause vasoconstriction. The prostaglandin most commonly used is 15methyl-PGF2 or carboprost. Carboprost can be administered intramyometrial or I/M in a dose of 0.25mg; the dose can be repeated every 15 minutes for a total dose of 2mg (max. of 8 doses). Carboprost has been shown to control PPH in upto 81% of patients. Hypersensitivity is the only absolute contraindication but carboprost should be used with caution in patients with asthma or H.T. Side effects include nausea, vomiting, diarrhoea, H.T., headache, flushing and pyrexia. ***Misoprostol*** or PGE1 It increases uterine tone and decreases postpartum bleeding. It can be administered sublingually, orally, vaginally and rectally. Doses vary from 200 to 1000 µg administered rectally. It causes side effects like shivering, pyrexia & diarrhoea. Although it is widely used in the treatment of PPH, it is not approved by U.S food and Drug Administration for this indication. Use of trenexamic acid has also been reported.

Recombinant activated factor VII is an interesting & promising haemostatic agent in the management of life threatening PPH unresponsive to conventional treatment.(10,11)Compression of the aorta against sacral promontory & bimannual compression of uterus (12). Bleeding unresponsive to oxytocin : Continued bleeding after uterotonic agents administrations may be from unrecognised genital tract lacerations; including in some cases uterine rupture. Thus if bleeding persists, no time should be lost in haphazards efforts to control hemorrhage but the following management should be initiated immediately.

1) Bimanual Uterine compression :- The technique consists of simply of massage of the posterior aspect of the uterus with abdominal hand and massage through the vagina of the anterior uterine aspect with the other first. 2) Obtain help.3) Start blood transfusion.4) Explore the uterine cavity manually for retained placental fragments or lacerations.5) Throughly inspect cervix and vagina after adequate exposure.6) Add a second large bore I/V catherer so that crystalloides with oxytocin is continued at the same time as blood is given.7) A foleys catheter is inserted to monitor urine output which is a good measure of renal perfusion.

Surgical Management: *Transvaginal uterine packing* (13):- About 8 to 10 M sterilized gauge is used to pack the uterine cavity from fundus to the cervix and total vaginal packing. Proper antibiotic coverage should be given. *Distended condom* (13):- A simple rubber catheter is put into condom and is doubly tied with a thread and is passed into uterine cavity and a tight pack is applied in the vagina with gauze and condom inflated with fluids by connecting catheter to the drip set. This causes uterine temponade & arrest bleeding. Sangstaken Blackmore tube or Foley's Catheter with a large bulb within the uterine cavity (12).

Conservative Surgical Approach

Uterine Artery Ligation: The objective is to decrease blood flow to the uterus as about 90% of the uterine blood supply in pregnancy comes from these vessels. 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 anastomoses with uterine artery in the region of the uterine aspect of the uteroovarian ligament. A suture is placed on the ovarian artery through an a vascular area in mesovarium. Procedure is repeated on the other side.

Vaginal Artery Ligation:B-Lynch suture (Brace suture). It controls atonic PPH by providing an effective compression of the placental bed. This method is simple, effective and relatively safe life saving procedure.

Internal Iliac Ligation (17,18,19)**:** 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 and arterial pressure system into one with pressure approaching those in venous circulation and leads to hemostasis via clot formation. The immediate risk is injury to common iliac vein. Other side effects are central pelvic ischemia resulting into perineal skin breakdown and postischemic lower motor damage & ureteric leison..

Angiographic Arterial Embolization (20,21)**:** This is a new technique when medical and conservative methods of bleeding control fail, then embolization or hystereteny is the option. It is a conservative approach and offers a very high success rate. It is done by injecting gelatin particles through the internal iliac artery. It offers temporary blockade. Use of Polyvinyl alcohol particles is however permanent. Various studies report a success rate of 75 - 100%.

Hysterectomy (22)**:** It can be subtotal hysterectomy or total abdominal hysterectomy. It reflects failure of all other methods to control PPH incidence is 1 in 331 to 1 in 6978 deliveries. The common indications are as : a) Abnormal placentation with placenta increta, acreta and percreta b) Repture uterus if tears are extensive and general condition of patient is poor. c) Atonic PPH. Post operatively patient requires lot of support to recover from surgery Hysterectomy is a last option, yet timely use can be life saving.

Recent litrature: Recently International Fedration of Gynaecologist and Obstetcians on the management of the third labour strongly recomended uterine message after delivery as a simple, non expensive technique which can be applied in low resourced setting to prevent PPH (23).In one of the recent study, Uterine artery embolization ,an interventional radiology technique in the management of gynecological or obstetrical hemorrhage has been shown sucess rate of 80% (24).

Conclusion: Even after so much pharmacological and surgical advances, very few practical solutions are available to decrease PPH related morbidity and mortality. Use of newer drugs like misoprostol, reactivated factor VII a and trenexamic acid have shown some promise as potential solution to this life threatening condition. Though hysterectomy is the definitive treatment in women with severe PPH but in patients who desire future fertility, newer surgical procedures like uterine compression suture and arterial embolization are effective weapons.

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