

Post Partum Haemorrhage : A Review of Prevention And Management

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Abstract

One of leading causes of severe maternal morbidity and mortality worldwide is postpartum haemorrhage. It is defined as a blood loss of 500 ml or more within 24 hour after birth. The most common cause of postpartum haemorrhage is uterine atony, the second cause is retained placenta, the other etiology are the lower segment as an implantation site, placenta previa, placenta accreta, coagulopathy and genital tract trauma. In this review, we describe the current state of the literature as it applies to postpartum haemorrhage, focusing on prevention and management aspects, as well as relevant obstetric consideration necessary to treat this challenging problem. Postpartum haemorrhage after birth is preventable through use of prophylactic uterotonics during the third stage of labor with timely and appropriate care and management. Active management of the third stage of labor is a well-established protocol that has been shown to significantly reduce the incidence of postpartum hemorrhage. Skill of birth attendance and adequate caregivers training have important roles in increasing maternal safety. For safer motherhood, a holistic approach are needed.

Keywords : *Postpartum haemorrhage, prevention, management*

Background

Postpartum haemorrhage is one of leading causes of severe maternal morbidity and mortality worldwide. (Abedzadeh-kalahroudi, 2015)(Smit, Chan, Middeldorp, & Roosmalen, 2014)(Smit, Sindram, Woiski, Middeldorp, & Roosmalen, 2013). Each year, postpartum hemorrhage is diagnosed in 14 million women, of them 140,000 die and 1.6 million will become anemic. (Abedzadeh-kalahroudi, 2015) and the speed at which it kills; without intervention, 88% of women who die of postpartum hemorrhage die within four hours of delivery (Prata, Bell, & Quaiyum, 2014). Postpartum haemorrhage is commonly defined as a blood loss of 500 ml or more within 24 hour after birth, while severe PPH is defined as a blood loss of 1000 ml or more within the same timeframe. (WHO, 2012) In many cases, postpartum haemorrhage after birth is preventable through use of prophylactic uterotonics during the third stage of labour with timely and appropriate care and management. (Than et al., 2017). Prevention and management of PPH are

discused in this review from an interdiciplinary standpoint.

Review of Literature

Pathophysiology of Post Partum Haemorrhage

The Four T's - Tone, Trauma, Tissue, and Thrombin, is the mnemonic for specific cause of PPH. **Tone.** *Uterine atony* is the most common cause of PPH (Evensen, 2015). Primary PPH due to uterine atony occurs when the relaxed myometrium fails to constrict the blood vessels that traverse its fibers, thereby allowing hemorrhage. Since up to one-fifth of maternal cardiac output, or 1000 ml/min, enters the uteroplacental circulation at term, PPH can lead to exsanguination within a short time (R.U. Khan and H.El-Refaey, 2012). Whilst uterine atony is responsible for 75–90% of primary PPH, traumatic causes of primary PPH (including obstetric lacerations, uterine inversion and uterine rupture) comprise about 20% of all primary PPH. Significant but less common causes of PPH include congenital and acquired

clotting abnormalities, which comprise around 3% of the total. Failure of the uterus to contract may be associated with retained placenta or placental fragments, either as disrupted portions or, more rarely, as a succenturiate lobe. The retained material acts as a physical block against strong the uterine contraction which is needed to constrict placental bed vessels.(R.U. Khan and H.El-Refaey, 2012)

Trauma. *Uterine Inversion* is rare, occurring in about one in 2,500 deliveries. Fundal, adherent, or invasive implantation of the placenta may lead to inversion; the role of fundal pressure and undue cord traction are uncertain. The patient may show signs of shock (pallor, hypotension) without excess blood loss. Upon inspection, the inverted uterus may be in the vaginal vault or may protrude from the vagina, appearing as a bluish-gray mass that may not be readily identifiable as an inverted uterus. Roughly half the time, the placenta is still attached and it should be left in place until after reduction to limit hemorrhage (Evensen, 2015). *Uterine Rupture.* The risk is significantly increased in women with previous classical uterine incisions or a myomectomy that goes completely through the uterine wall; these women should not have a trial of labor and should be delivered by elective cesarean at 37 to 38 weeks (Spong CY, Mercer BM, D'Alton M, Kilpatrick S, Blackwell S, 2011). Risk of uterine rupture is increased to a lesser extent with shorter intervals between pregnancies or a history of multiple prior cesarean sections, particularly with no previous vaginal delivery (Evensen, 2015).

Tissue. Retained tissue (placenta, placental fragments, and blood clots) prevents the uterus from contracting enough to achieve optimal tone. *Retained Placenta.* Retained placenta is the unborn placenta up to 30 minutes or more after the baby is born (Evensen, 2015). This is because the placenta has not been

separated from the uterine wall or the placenta has been released but has not yet been born. Retained placenta is the second most common etiology of postpartum hemorrhage (20% - 30% of cases). This event must be diagnosed early because placental retention is often associated with uterine atony for the primary diagnosis so that it can make a misdiagnosis. In retained placenta, the risk for PPH are 6 times in the normal labour (Ramadhani, 2011). *Placenta previa.* Atonic PPH is a recognized complication and, even if cesarean section is performed, severe intraoperative bleeding is a significant risk. In placenta previa, the placental site is located in an abnormally low position. (R.U. Khan and H.El-Refaey, 2012). *Placenta accreta.* Placenta accreta is morbid adherence of placenta such that it invades the myometrium. Placental adherence is also associated with a deficiency of decidua in the lower segment, the most common cause of which is endometrial scarring secondary to previous history of cesarean section or myomectomy, endometritis, evacuation of retained products of conception or uterine abnormalities (R.U. Khan and H.El-Refaey, 2012).

Thrombin. Coagulation disorders, a rare cause of PPH, are unlikely to respond to the uterine massage, uterotonics, and repair of lacerations. Coagulation defects may be the cause and/or the result of a hemorrhage and should be suspected in those patients who have not responded to the usual measures to treat PPH, are not forming blood clots, or are oozing from puncture sites (Evensen, 2015).

The other cause of PPH are the lower segment as an implantation site and genital tract trauma. **The lower segment as an implantation site.** The presence of lower segment implantation makes hemorrhage and placental retention much more likely. The lower segment arises from the cervical isthmus. The isthmus is the region joining the muscle fibers of the

corpus uteri to the dense connective tissue of the cervix. Thus, the major part of the lower segment arises from the cervix, with an uncertain smaller portion coming from the corpus uteri. (R.U. Khan and H.El-Refaey, 2012). **Genital Tract Trauma.** Genital tract trauma i.e vaginal or cervical laceration can cause postpartum haemorrhage (WHO, 2012).

Active Management of the Third Stage of Labor

The world health organization (WHO), international federation of gynecologists and obstetricians (FIGO), and the international confederation of midwives (ICM) recommended active management of the third stage of labor (AMTSL) for reducing the risk of PPH in all vaginal deliveries. AMTSL is a well-established protocol that has been shown to significantly reduce the incidence of PPH. AMTSL consists of administration of a prophylactic uterotonic after delivery of the newborn, fundal massage, delayed cord clamping and controlled cord traction. (Natarajan et al., 2016).

A Refocused Approach to Prevention of PPH Using AMTSL; **Uterotonic:** Ensure that every woman is offered a uterotonic immediately after the delivery of the baby. Oxytocin is the preferred drug to prevent PPH. **Delayed cord clamping:** Delay clamping the cord for at least 1-3 minutes to reduce rates of infant anaemia. **Controlled Cord Traction (CCT) :** Perform CCT, if required. 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.(WHO, 2012) **Postpartum vigilance:** Immediately assess uterine tone to ensure a contracted uterus; continue to check every 15 minutes

for 2 hours. If there is uterine atony, perform fundal massage and monitor more frequently.(WHO, 2013) Continuous uterine massage is not recommended as an intervention to prevent PPH for women who have received prophylactic oxytocin, because the massage may cause maternal discomfort, require a dedicated health professional, and may not lead to a reduction of blood loss.(WHO, 2012) **Oxytocin quality and supply:** Ensure a continuous supply of high-quality oxytocin. Maintain the cool chain for oxytocin, and remember that potency is reduced if oxytocin is exposed to heat for long periods. (WHO, 2013)

Prevention of Post Partum Haemorrhage

Prophylactic uterotonic

Oxytocin and ergometrine–oxytocin

Oxytocin, the gold standard for PPH prevention and treatment(Raghavan et al., 2016). Oxytocin 5 iu and oxytocin 10 iu have similar efficacy in preventing PPH in excess of 1000 ml. Ergometrine–oxytocin was associated with a small reduction in the risk of PPH (blood loss of at least 500 ml) (Mavrides E, Allard S, Chandrachan E, Collins P, Green L, Hunt BJ, Riris S, 2016). A higher dose of oxytocin after vaginal delivery was more effective than a low-dose regimen in preventing PPH after a vaginal delivery using a primary outcome of any treatment of uterine atony or haemorrhage. Compared with 10 iu, administering 40 iu or 80 iu of prophylactic oxytocin did not reduce overall PPH treatment when given in 500 ml over 1 hour for vaginal delivery (Tita AT, Szychowski JM, Rouse DJ, Bean CM, Chapman V, Nothorn A, 2012)

Prostaglandins

Two Cochrane reviews addressed the use of prostaglandins for the prevention of PPH (Tuncalp Ö, Hofmeyr GJ, 2012)(Oladapo OT, Fawole B, Blum J, 2012) Neither intramuscular prostaglandins (such as carboprost, a 15-methyl prostaglandin F2a

analogue) nor misoprostol (a prostaglandin E1 analogue given orally or sublingually) were preferable to conventional injectable uterotonics (oxytocin and/or ergometrine) for routine prophylaxis. (Tuncalp Ö, Hofmeyr GJ, 2012) Furthermore, another systematic review (Gizzo S, Patrelli TS, Di Gangi S, Carrozzini M, Saccardi C, Zambon A, 2013) concluded that oxytocin is superior to misoprostol in the prevention of PPH. Appraisal of the evidence from both the Cochrane reviews, suggests that, for women delivering vaginally, oxytocin 10 iu by intramuscular injection is the regimen of choice for prophylaxis in the third stage of labour. Intramuscular oxytocin should be administered with the birth of the anterior shoulder, or immediately after the birth of the baby and before the cord is clamped and cut. This strategy has been endorsed in the NICE intrapartum care guideline (Excellence, 2014)

Carbetocin

Carbetocin is a longer-acting oxytocin derivative to prevent PPH. Use of carbetocin resulted in a statistically significant reduction in the need for further uterotonics compared with oxytocin for those undergoing a caesarean, but not for vaginal delivery. However, there were no statistically significant differences between carbetocin and oxytocin in terms of risk of PPH (Su LL, Chong YS, 2012). Guidelines from the Society of Obstetricians and Gynaecologists of Canada recommend that carbetocin (100 micrograms given as an intravenous bolus over 1 minute) should be used for the prevention of PPH in elective caesarean deliveries. Prophylactic use of carbetocin resulted in significantly less blood loss and incidence of PPH in cesarean than in vaginal deliveries (Chen et al., 2016)

Tranexamic acid

The use of tranexamic acid in the prevention of PPH in women considered to be at low risk of PPH was addressed in a Cochrane review (Novikova N, Hofmeyr

GJ, 2015). This found that blood loss greater than 400 or 500 ml was less common in women who received tranexamic acid in addition to the usual uterotonic agent after vaginal birth or caesarean section in a dosage of 1 or 0.5 g intravenously. Tranexamic acid was effective in decreasing the incidence of blood loss greater than 1000 ml in women who had undergone caesarean section (RR 0.43, 95% CI 0.23–0.78; four studies; 1534 women), but not vaginal birth. Mean blood loss until 2 hours postpartum was lower in the group of women who received intravenous tranexamic acid postpartum (mean difference -77.79 ml; 95% CI -97.95 to -57.64; five studies; 1186 women). The authors of the Cochrane review on the use of tranexamic acid in the prevention of PPH conclude that further studies are required to investigate the risk of serious adverse effects, including thromboembolic events, and the use of tranexamic acid in women considered to be at high risk of PPH.

Misoprostol

Misoprostol, an oral prostaglandin E1 analogue (Smith, Gubin, Holston, Fullerton, & Prata, 2013), manufactured in tablet form and is taken orally for PPH prevention (three 200 mcg tablets, total dose 600 mcg). It is a reasonable alternative, especially in home birth settings where a qualified provider or injectable oxytocin are unavailable (Smith et al., 2014). The Guide Development Group (GDG) considered 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. (WHO, 2012)

Cord Management and Uterine Massage

The cochrane review (Hofmeyr GJ, Abdel-Aleem H, 2013) included two randomised controlled trials. The first trial included 200 women who were randomised to receive uterine massage or no massage

following delivery of the placenta, after active management of the third stage of labour including use of oxytocin. The numbers of women with blood loss more than 500 mL was small, with no statistically significant difference (risk ratio (RR) 0.52, 95% confidence interval (CI) 0.16 to 1.67). There were no cases of retained placenta in either group. The mean blood loss was significantly less in the uterine massage group at 30 minutes (mean difference (MD) -41.60 mL, 95% CI -75.16 to -8.04) and 60 minutes after trial entry (MD -77.40 mL, 95% CI -118.71 to -36.09). The need for additional uterotonics was significantly reduced in the uterine massage group (RR 0.20, 95% CI 0.08 to 0.50). For use of uterine massage before and after delivery of the placenta, one trial recruited 1964 women in Egypt and South Africa. Women were assigned to receive oxytocin, uterine massage or both after delivery of the baby but before delivery of the placenta. There was no added benefit for uterine massage plus oxytocin over oxytocin alone as regards blood loss greater than or equal to 500 mL (average RR 1.56, 95% CI 0.44, 5.49; random-effects) or need for additional use of uterotonics (RR 1.02, 95% CI 0.56 to 1.85). The two trials were combined to examine the effect of uterine massage commenced either before or after delivery of the placenta. There was substantial heterogeneity with respect to the blood loss 500 mL or more after trial entry. The average effect using a random-effects model found no statistically significant differences between groups (average RR 1.14, 95% CI 0.39 to 3.32; random-effects)

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.(WHO, 2012). Randomised trials have compared different uterotonics (oxytocin, ergometrine–oxytocin, misoprostol, carbocin and 15-methyl prostaglandin F2a) for prophylaxis in women delivering by caesarean section. Oxytocin 5 iu by slow intravenous injection is recommended for prophylaxis in the context of caesarean delivery (Mavrides E, Allard S, Chandrachan E, Collins P, Green L, Hunt BJ, Riris S, 2016)

Management of Post Partum Haemorrhage

WHO Recommendations for PPH treatment; **The use of uterotonics** (oxytocin alone as the first choice) plays a central role in the treatment of PPH. **Uterine massage** is recommended for the treatment of PPH as soon as it is diagnosed and **the initial fluid resus- citation with isotonic crystalloids** is recommended. **The use of tranexamic acid** is advised in cases of refractory atonic bleeding or persistent trauma-related bleeding. **The use of intrauterine balloon tamponade** is recommended for refractory bleeding or if uterotonics are unavailable. **Bimanual uterine compression, external aortic compression, and the use of non-pneumatic anti-shock garments** are recommended as temporizing measures until substantive care is available. If there is persistent bleeding and the relevant resources are available, uterine artery embolization should be considered. **If bleeding persists despite treatment with uterotonic drugs and other conservative interventions, surgical intervention should be used without further delay. If the third stage of labour lasts more than 30 minutes, CCT and IV/IM oxytocin (10 IU) should be used to manage the retained placenta. If the placenta is retained and bleeding occurs, the manual removal of the placenta should be expedited. Whenever the manual removal of the placenta is undertaken, a single dose**

of prophylactic antibiotics is recommended.(WHO, 2012)

Conclusion

Postpartum hemorrhage as a preventable cause of maternal mortality and morbidity, skill of birth attendance and adequate caregivers training have important roles in increasing maternal safety. Active management of the third stage of labor is recommended to prevent PPH. There many uterotonic agents that can be used for the prevention of PPH. Midwives and obstetricians should be familiar with the effects of such drugs and their use if necessary. A holistic approach, including more attention to all parturients, especially women with anemia and women in low-resource societies; active management of the third stage of labor; access to more effective uterotonic agents; and high quality retraining programs for midwives and other skilled birth attendance are needed for safer motherhood

Disclosure

The authors report no conflicts of interest in this work

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