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Massive primary postpartum haemorrhage: Setting up standards of care

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Original Article

Massive Primary Postpartum Haemorrhage: Setting Up Standards of Care

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Abstract

Objective: To review practice of massive primary postpartum haemorrhage management and develop a protocol.

Methods: Cross-sectional study conducted at the Department of Obstetrics and Gynaecology at Aga Khan University Hospital, Karachi between January 1, 2003 and July 31, 2004. Women with primary postpartum haemorrhage and had blood loss ≥1000ml were included in the study. Medical record files of these women were reviewed for maternal mortality and morbidities which included mode of delivery, possible cause of postpartum haemorrhage, supportive, medical and surgical interventions.

Results: Approximately 3% (140/4881) of women had primary postpartum haemorrhage. 'Near miss' cases with blood loss ≥1500ml was encountered in 14.37% (20/140) of these cases. Fifty-six percent (18/32) of the women who had massive postpartum haemorrhage delivered vaginally. Uterine-atony was found to be the most common cause, while care in High Dependency Unit (HDU) was required in 87.5% (28/32) of women. In very few cases balloon tamponade (2-cases) and compression sutures (2-cases) were used. Hysterectomy was performed in 4-cases and all of them encountered complications. Blood transfusions were required in 56% of women who had massive postpartum haemorrhage.

Conclusion: This study highlights the existence variable practices for the management of postpartum haemorrhage. Interventions to evaluate and control bleeding were relatively aggressive; newer and less invasive options were underutilized. Introduction of an evidence-based management model can potentially reduce the practice variability and improve the quality of care (JPMA 56:26;2006).

Introduction

Postpartum Haemorrhage (PPH) is one of the major causes of maternal mortality and morbidity worldwide. It is estimated that 600,000-800,000 women die in childbirth each year.[1] A blood loss up to 500ml at delivery is regarded as 'physiologically normal'. It is part of the normal mechanism that brings the mother's blood parameters to their normal non-pregnant levels and a healthy pregnant woman can cope with it without any difficulty.[2,3] Traditionally, primary PPH is defined as bleeding from the genital tract of 500ml or more in the first 24 hours following delivery of the baby.[4] Incidence of primary PPH has been reported as 5% of all deliveries in the literature.[5] Owing to the relatively low risks with this level of blood loss and lesser clinical relevance, a new definition of massive postpartum haemorrhage has been introduced, being the loss of greater than 1000ml or 1500ml of blood.[6] As estimation of blood loss is usually subjective, severe haemorrhage has been defined as estimated blood loss >1500ml, peripartum fall in hemoglobin concentration ≥4g/dl or acute transfusion of 4 or more units of blood.[7] The most common consequences of PPH include hypovolaemic shock, disseminated intravascular coagulopathies (DIC), renal failure, hepatic failure and adult respiratory distress syndrome (ARDS).[8] As every woman is potentially at risk of postpartum haemorrhage, active management of the third stage of labour should be offered to women, which includes administration of uterotonic agents; controlled cord traction; and uterine massage after delivery of the placenta.[1] Although risk factors for postpartum haemorrhage are known,[9] it is not always possible to successfully prevent it. Therefore it is important to manage this life threatening condition promptly and effectively.

We report review of our experience in managing massive primary postpartum haemorrhage. Furthermore, based upon current best available evidence and our experience, we propose a protocol with 'level of care' and 'time lines' for the management of postpartum haemorrhage.

Patients and Methods

A cross-sectional study of women delivering at Aga Khan University Hospital, Karachi between January 1, 2003 and July 31, 2004 were included if they were labeled as primary postpartum haemorrhage by ICD-9-CM10 (666.00, 666.02, 666.04, 666.10, 666.12, 666.14) and had blood loss >1000ml. Cases with blood loss between 1000 and 1500ml were labeled as "Massive haemorrhage", whereas those with blood loss of ≥1500ml were labeled as "Near miss". In our hospital active management of third stage of labour is offered to all women. The blood loss is measured by the

Table 1. Characteristics of study patients with massive postpartum haemorrhage (blood loss 1000 -1500 ml).

Mode of delivery	Cause of PPH	No. of cases	Interventions following PPH	Post PPH specific complication
Spontaneous vaginal	Uterine atony	2	Additional uterotonics	None
Spontaneous vaginal	Vaginal haematoma	2	EUA, Haematoma drainage	None
Instrumental	Uterine atony	1	Additional uterotonics	None
Instrumental	Vaginal haematoma	2	EUA Haematoma drainage	None
Instrumental	Cervical tear	1	EUA Suturing	None
Elective caesarean	Uterine-angle extension	1	Suturing	None
Emergency caesarean	Uterine atony	3	Additional uterotonics	None

subjective assessment of soaked swabs, estimation of blood clots, and blood in the suction bottle; along with the objective assessment of drop in haemoglobin levels and need for blood transfusion.

Medical record files of the study patients were reviewed for maternal mortality and morbidity which included, mode of delivery (spontaneous vaginal, instrumental vaginal, elective caesarean section or emergency caesarean section), possible cause of postpartum haemorrhage (uterine atony, vaginal haematoma, adherent placenta, cervical tear, uterine angle extension), supportive and medical interventions (additional uterotonics including oxytocin, ergometrine and / or prostaglandin F2 a, intrauterine Tamponade balloon, blood transfusions, need for care in High Dependency Unit), surgical interventions (examination under anaesthesia, intrauterine packing, caesarean hysterectomy, suturing of vaginal, cervical or uterine angle tears, drainage of vaginal haematoma and manual removal of placenta). Descriptive statistics of study variables are presented for 'Massive haemorrhage' and 'Near miss'.

Results

During the study period, 2.9% (140/4881) of women had 'postpartum haemorrhage' of blood loss ≥500, while 'massive haemorrhage' of ≥1000ml was encountered in 0.7% (32/4881) of cases. Two-third of these women had blood loss of ≥1500 ml and were labeled as 'Near miss.'

Our study patients included 9 (28.1%) spontaneous vaginal deliveries, 9 (28.1%) instrumental vaginal deliveries, 6 (18.7%) elective caesarean sections and 8 (25.1%) emergency caesarean sections. Most common cause of haemorrhage was uterine atony 18 (56.3%), followed by 5 (15.7%) cases of vaginal haematoma, 5 (15.7%) cases of cervical or vaginal tears, 4 (12.5%) cases of adherent placenta, 2 (6.2%) cases of uterine angle extension and only 1 (3.1%) case of retained placenta. As supportive and medical interventions, 28 (87.5%) required admission to 'High Dependency Unit', and 18 (56.3%) required blood transfusions, 8 (25%) required additional uterotonics only. Intrauterine Balloon Tamponade was used in 2 (6.2%) cases only. As part of surgical interventions, 14 (43.8%) cases were subjected to examination under anaesthesia (EUA). Details of additional interventions are specified in Tables 1

Table 2. Characteristics of patients who delivered vaginally and were Near-Miss (blood loss = 1500 ml).

Case No.	Mode of delivery	Cause of PPH	Interventions following PPH	Post PPH specific complication
1.	Spontaneous vaginal	Uterine atony Cervical tear	EUA Intrauterine packing	None
2.	Spontaneous vaginal	Uterine atony	EUA Intrauterine packing	None
3.	Spontaneous vaginal	Uterine atony Retained placenta	EUA Manual placental removal	None
4.	Spontaneous vaginal	Uterine atony	EUA Intrauterine balloon tamponade	Fever
5.	Spontaneous vaginal	Uterine atony	EUA Intrauterine balloon tamponade	None
6.	Instrumental	Abruption Uterine atony	Additional uterotonics	None
7.	Instrumental	Cervical tear	EUA Suturing	None
8.	Instrumental	Cervical tear	EUA Suturing Intrauterine packing	None
9.	Instrumental	Vaginal and cervical tear	EUA Vaginal packing Suturing	None
10.	Instrumental	Vaginal haematoma	EUA Haematoma drainage	Fever

Table 3. Characteristics of patients who delivered by Caesarean section and were near-miss (blood loss = 1500 ml).

Case No.	Mode of delivery	Cause of PPH	Interventions following PPH	Post PPH specific complication
1	Elective caesarean	Adherent placenta	Manual placental removal	
			Additional uterotonics	None
2.	Elective caesarean	Adherent placenta	Caesarean hysterectomy	Urinary bladder injury
3.	Elective caesarean	Uterine angle extension	Suturing	None
4.	Elective caesarean	Uterine atony	Caesarean hysterectomy	Fever
5.	Elective caesarean	Adherent placenta	Caesarean hysterectomy	Fever
6.	Emergency caesarean	Uterine atony	B-Lynch suture	None
7.	Emergency caesarean	Uterine atony	Intrauterine packing	None
8.	Emergency caesarean	Uterine atony	B-Lynch suture	None
9.	Emergency caesarean	Adherent placenta	Caesarean hysterectomy	Maternal death
10.	Emergency caesarean	Uterine atony	Additional uterotonics	None

and 2. Other additional surgical interventions included suturing of vaginal, cervical or uterine-angle tears in 7 (20%) cases, drainage of vaginal haematoma in 5 (15.6 %) cases, intrauterine packing in 4 (12.5%), caesarean hysterectomy in 4 (12.5%), B-Lynch sutures in 2 (6.2%) and manual removal of placenta in 1 (3.1%) patient. There was 1 (3.1%) maternal death, 1 (3.1%) case of urinary bladder injury, 5 (15.6%) of postpartum fever of ≥38.5ºC, while no subsequent complication occurred in 25 (78.1%) cases.

In women who had blood loss between 1000-1500ml, 8/12 had vaginal delivery. Uterine-atony and vaginal-haematomas were the most common reasons for haemorrhage. This group required least interventions and there were no subsequent morbidities (Table 1). None of these women required blood transfusion.

In the Near miss cases (blood loss ≥1500ml) who delivered vaginally, uterine-atony occurred mostly in women who did not have instrumental delivery. Women in whom uterine-atony was the primary cause of bleeding, 3 had intrauterine packing, 2 had Foley catheter Balloon Tamponade and 1 required additional uterotonics only. Fever >38°C occurred in two women who responded to antibiotic therapy (Table 2).

Of women who had blood loss ≥1500ml after caesarean delivery, 50% had the caesarean section as an elective procedure. In this subgroup, 3-caesarean hysterectomies were done including 1-maternal death and 1-urinary bladder injury. In the emergency caesarean section subgroup, 1 - woman had caesarean hysterectomy and 2 - women responded to modified B-Lynch suture. (Table 3). In the Near miss group 85% (17/20) of women required more than 4-units of packed red cell transfusion. Four of these women also received transfusion of Fresh Frozen Plasma (FFP).

Discussion

We encountered primary postpartum haemorrhage in 2.9% of women. While significantly higher rates of 5-17% have been reported following deliveries in the UK.[11] Postpartum haemorrhage is a leading cause of maternal mortality and morbidity accounting for approximately 4% of maternal deaths in the developed countries.[12] This figure is higher in the developing world where emergency obstetric care is not universally available. Despite the repeated practice recommendations, the confidential report continues to document substandard care in up to 60% of cases.[13]

Prompt resuscitative measures and the cause-directed management is the mainstay of treatment for PPH, and includes fluid and blood administration, use of uterotonics, uterine massage, repair of lacerations, removal of retained products of conception and intrauterine balloon tamponade. If these measures are unsuccessful in controlling the bleeding, the next step is usually surgical either conservative or aggressive like uterine bracing suture application, vessel ligation, or hysterectomy.[14] However, by the time surgery is performed, the patient has usually received multiple transfusions of blood and blood products. This may lead to the development of life threatening systemic complications, such as DIC, ARDS, etc. thereby further increasing the morbidity and mortality of any subsequent surgical procedure. It is therefore evident that in order to manage such acute emergencies there should be clear cut guidelines in every obstetric unit to manage this condition.[15] By strictly adhering to guidelines and practice drills, significant reduction in the incidence of massive haemorrhage from 1.70% to 0.45 % has been reported.[16]

In our study, there was underutilization of measures like 'Intrauterine Balloon Tamponade' and 'Uterine Compression Sutures', both being used in 2-patients each.

Avoidance of surgery has been reported in 87.5% of cases with 'Tamponade test'[17], while less complex forms of B-Lynch suturing technique can provide a simple first surgical step to control bleeding.[18] More aggressive techniques were attempted possibly due to less familiarity and experience with the newer and simpler techniques. Episiotomy haematoma was identified as one of the commoner and avoidable cause of blood loss between 1000 and 1500 ml. Prompt suturing along with better suturing technique would further reduce the rate of massive PPH.

Based upon current best available evidence and our experience, we recommend a protocol with 'level of care' required for various degrees of blood loss. It is indeed extremely difficult to make accurate assessment of blood loss following delivery. At our institute, we encourage estimation of blood loss following delivery. This has enabled them to promptly undertake appropriate additional interventions. We have also described the additional interventions according to the degree of estimated blood loss, along with responsible persons and 'time lines' to standardize management of postpartum haemorrhage (Appendix). Other obstetric units may adopt this protocol to reduce practice variability and rate of postpartum haemorrhage in their setup.

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Appendix. Management Protocol at Tertiary Hospitals for Postpartum Haemorrhage.

Level of care	Degree of blood loss	Principal interventions	Additional interventions	Responsible person	Support staff	Timeline
I	Bleeding from the genital tract is 500ml or more in the first 24 hours following delivery of the baby by vaginal or abdominal route (More than usual blood loss)	Immediately call a senior doctor i.e. Senior resident / Instructor / Consultant	Reassure patient Ensure proper light	Person conducting the delivery	Nurse Receptionist	10 - min
		Confirm administration of: Oxytocin 5-units and Ergometrine 0.4 mg as intramuscular injection at delivery of anterior shoulder baby, or Oxytocin 10-units as intravenous injection in case of contraindication to ergometrine use	Confirm: Controlled cord traction after delivery of baby, and uterine massage after delivery of placenta	Senior doctor who was called for help	Person who conducted the delivery, and Nurse	
		Request laboratory to cross-match at least 2-pints of blood if not already done	Assistant to person who conducted the delivery	Nurse	Porter	
		Secure at least two intravenous lines with large gauge needles of # 16 or 18	Start intravenous fluids replacement with Normal Saline or Ringers Lactate	Nurse	Nursing assistant	
		Perform bimanual uterine-massage	Empty the urinary bladder with catheter	Senior doctor	Junior doctor Nurse	
		Inspect vulva, vagina and cervix for tears	Drain vaginal haematomas and repair tears	Senior doctor	Junior doctor Nurse	
		Ensure completeness of placenta	Recover placenta by controlled cord traction	Senior doctor	Junior doctor Nurse	
		Initiate measurement of blood loss	Start collecting blood clots, soaked gauze-pieces, inko-pads and drape-sheets to be weighed later	Nurse	Nursing assistant	
		Initiate documentation	Record timings of events and interventions along with patient's response	Nurse	Junior doctor	
II	Bleeding from the genital tract is between 750 - 1000 ml (Intermediate blood loss)	Oxytocin 10-units intravenous injection boluses (repeat upto four doses within 10 minutes with intervals of 2 ½ min)	If available simultaneously give: Misoprostol 600-mcg orally / rectally, or 'PG F 2a' 5-mg intramyometrial injection Inform patient about possibility of additional interventions to control postpartum	Senior doctor	Junior doctor Nurse	10 - min

Level of care	Degree of blood loss	Principal interventions	Additional interventions	Responsible person	Support staff	Timeline
III	Bleeding from the genital tract is between 1000 - 1500 ml (Massive blood loss)	Balloon-Tamponade with at least 200 ml of fluid in the balloon (Two or more Foley catheter of # 24 or Special Tamponade Balloon if available)	Inform patient that additional interventions are needed now Simultaneously commence a rapid running concentrated oxytocin infusion (with Oxytocin 40-units in Normal Saline 500ml). Consider blood transfusion as per clinical judgement of blood loss and patient status	Senior doctor / Consultant	Junior doctor Nurse	5 - min
IV	Bleeding from the genital tract is 1500 ml or more (near-miss)	Commence blood transfusion as per clinical judgment of blood loss and patient status.	Prepare patient to be transfered to the operating room.	Nurse	Nursing assistant Receptionist	15 - min
		Perform examination under general anaesthesia (EUA) in the operating room.	Take consent from patient / family for possible interventions. Explore vagina, cervix and uterine cavity.	Consultant	Senior/junior doctor	
		Reassess for retained placenta / retained products of conception.	Manually remove the placenta Gentle curettage of uterine cavity.	Consultant	Senior/junior doctor	
		Reassess for vaginal haemtoma.	Drain haematoma	Consultant	Senior/junior doctor	
		Reassess uterine atony	Uterine packing / reinsertion of Balloon Tamponade. Increase concentration of oxytocin infusion (Oxytocin 80-units in Normal Saline 500ml)	Consultant	Senior/junior doctor Nurse	
		Laparotomy for vertical and/ or transverse brace-suturing of uterus (B-Lynch modifications)	Ligation of internal iliac artery (anterior division) or tying uterine vessels.	Consultant	Vascular surgeon	20 - min
V	Bleeding from the genital tract is uncontrolled (life threatening)	Subtotal abdominal hysterectomy if other measures fail	Inform patient's family about the decision of proceeding with hysterectomy. Correction of disseminated intravascular coagulation (DIC).	Consultant	Additinal Ob-consultant Senior doctor Junior doctor	30 - min
R	Recovery Phase	Transfer patient to high dependency unit Review patients status frequently. Seek appropriate and as needed consults. Transfer patient to routine care area only and when patient is stable.	Document information given to patient or her family including the counselling done. Document whether or not any specimens were obtained and sent to the laboratory. Report incident to person incharge maternal morbidity and mortality.	Senior doctor	Consultant Junior doctor Nurse	24 - hr