Original Article

Redefining postpartum hemorrhage

S. Adhikari, K. D. Bista, A. Rana
Correspondence to: S. Adhikari, Dept of Ob/Gyn, TUTH, IOM

In the prospective study conducted in TUTH; 300 women with the active management of labour were enrolled; visual estimation of blood loss (volume criteria) was found to poorly correlate with changes in hemoglobin and hematocrit with unacceptably low sensitivity (3.4%) and specificity (93.4%) compared to the hemoglobin criteria (sensitivity 80.7% & specificity 93.9%) or the hematocrit criteria (sensitivity 89.7% & specificity 88.1%); thus suggesting redefinition of PPH in order to identify larger number of women with this problem; which may aid to bring down the morbidity and mortality associated with PPH.

Introduction

Postpartum hemorrhage is traditionally defined as bleeding in excess of 500ml in the first 24 hours following delivery (WHO 1990) [1]. This quantitative definition of PPH has been challenged by various studies because by visual estimation blood loss is underestimated by 30-50% and even after objective measurement; an accurate estimation of blood loss is unreliable. [2-5] Blood mixed with amniotic fluid or urine and that dispersed on sponges or linen or on the floor cannot be measured and slow bleeding from an episiotomy or perineal tear may go unnoticed.

This study aims to evaluate the correlation of clinical definition of PPH (estimated blood loss of >500ml) with laboratory definition (peripartum fall in hemoglobin and/or hematocrit level by at least 10% from before to 24 hours after delivery) so that none of the PPH go untreated at TUTH where we still follow the volume criteria of PPH (blood loss >500ml).

Study Design:

Descriptive study.

Setting:

This study was conducted in the labour room and maternity ward at Tribhuvan University Teaching Hospital, Maharajgunj, Kathmandu.

Duration:

This study was conducted over 8 months period from 1st Falgun 2060 to 30th Kartik 2061 (13th February to 16th November 2004).

Sample size

During the period of the study 2342 women delivered at TUTH, out of them 1653(70.5%) had normal vaginal delivery and among them 319 women (19.30% of those who had normal vaginal delivery) were enrolled into the study. The adequacy of sample was determined by enrolling >10% of the population (women having normal vaginal delivery) into the study. Later 19 of them were excluded because they either failed to have a normal vaginal delivery (10) or failed to have their postpartum blood sample taken for repeat Hb/Hct estimation (9). Finally a total of 300 women completed the study.

Sampling Technique

Purposive sampling.

Inclusion criteria

- Singleton live pregnancy at or above 37 weeks of gestation, Cephalic presentation, Spontaneous onset of labour and spontaneous vaginal delivery

Exclusion criteria

- Grand multipara (parity >5).
- Women undergoing instrumental delivery or Caesarean section.
- Women having an increased risk of PPH- hypertension, eclampsia and preeclampsia, polyhydramnios, jaundice and bleeding diathesis, prolonged and precipitated labour
- Women with previous uterine scar or known uterine anomaly.
- Women with antepartum haemorrhage or those with history of postpartum haemorrhage
- Women with Hb 8 gm%.

· Women who needed augmentation of labour with oxytocin.

Study Procedure

On admission to the labour room all women fulfilling the above mentioned inclusion criteria and in active stage of labour (4cms or more cervical dilatation) were selected and informed about the trial. A written informed consent was taken from all those willing to participate. These women were monitored till delivery with the use of partograph, as is the protocol at our institute. All women who later required augmentation of labour or use of any other drug like valethamide bromide, drotavarine or hyoscine butryl bromide were excluded from this study to make the sample homogeneous in regards to labour variables.

After the cervix was fully dilated, in the expulsive phase of second stage of labour when the bearing down sensation and the anal gaping was seen, women were transferred to the labour table. All these women then had 1ml of blood drawn for the initial Hb and Hct estimation. Labour, delivery and the third stage were managed similarly in all these women according to the hospital protocol.

If the women failed to have a normal vaginal delivery (instrumental delivery, caesarean section or vaginal delivery with third degree, complete perineal tear, bad cervical or vaginal mucosal tear or laceration) they were excluded from the study.

Active management of third stage was done with either 10U oxytocin or 200 mg methergin intramuscularly with the delivery of the anterior shoulder of the baby. Early clamping of the umbilical cord and controlled cord traction was performed during uterine contraction by Brandt and Andrew's technique. Placenta was manually removed if not delivered within 30 minutes. Uterine massage was done for 10 – 15 minutes after expulsion of placenta until the uterus became well contracted after which women were instructed to massage their uterus every 15 minutes for the next 2 hours.

Placentas were examined to rule out retained bits of placenta and membranes. Episiotomy wound, tears and lacerations if present were immediately repaired. If excessive hemorrhage occurred it was managed according to the mandate individually. After delivery they were monitored (pulse, BP, uterine contraction and vaginal bleeding) in the labour room for one hour and transferred to the maternity ward when they were haemodynamically stable. The amount of blood loss was visually estimated by the researcher at the end of the delivery from the blood collected in the placenta-receiving bowl and any additional loss was added up before transferring the patient to the ward after 1 hour of observation in the labour room.

Cases were followed up in the ward for the next 24 hours. Any additional blood loss was added up to the initial estimation of blood loss. After 24 hours of delivery a second blood sample was drawn (1ml) for repeat Hb and Hct estimation. All samples were analyzed at the TUTH laboratory in the same computerized machine within 6 hours of collection. The changes in Hb and Hct level before and 24 hours after the delivery was recorded and the percentage of fall in the value was calculated.

Statistical Tools

After the primary data collection, analysis was done with the help of a computer using student's T-test. The computer program used was SPSS version 11.5.

Results

Demographic variables

The age of women enrolled in the study ranged from 17 to 37 years. Maximum number of women belonged to 20-29 years age group (82%) and the mean maternal age was 23.6 years. Approximately half of the women were nulliparous (54%) and 94% women were booked at TUTH. The mean gestational age was 39^{+6} weeks and the range was 37^{+1} weeks to 41^{+2} weeks.

Labour Variables:

The mean duration of labour was 6 hours and 47 minutes and ranged from 4hrs 10mins to 11hrs 25mins. Vaginal delivery with episiotomy or with 2° tear was observed in 51% women. Normal vaginal delivery with intact perineum was observed in 30% and normal vaginal delivery with laceration or a 1° tear was seen in 19% women. The mean birth weight of the babies was 3045.5 grams and the range was from 2700 grams to 4205 grams. The average placental weight was 499.8 grams and the range was from 400 to 700 grams. The mean 3rd stage of labour in these women was 6.1 minutes.

Table 1: Visually estimated blood loss (n= 300)

Average blood loss	Estimated blood loss		
(ml)	<500 ml	500-1000ml	>1000 ml
121.6 ± 210.3	284	13	3

The amount of third stage loss in the study population ranged from 50 to 1200ml and the average blood loss observed was 121.6ml.The number of women having a blood loss of <500ml was 284, 500- 1000ml was 13 and >1000ml was 3.

Table 2: Assessment of Hb & Hct (n =300)

Characteristics	Hb (gm%)	Hct(%)
Mean Pre delivery	12.8 ± 1.1	39.7 ± 3.2
Mean post delivery	11.5 ± 1.3	34.7 ± 3.7
Mean fall	1.3 ± 0.9	4.9 ± 2.9

Mean pre- delivery Hb was 12.8 gms% and the mean post-delivery Hb was 11.5 gm%. The average fall of Hb was 1.3 gms. The mean pre-delivery Hct was 39.7% and the mean post delivery Hct was 34.7%. The mean fall in Hct was 4.9%.

Table 3: Defining PPH by various criteria

≥500 ml	≥10% Fall in Hb	≥10% Fall in Hct
16	105	121

By taking the volume criteria only 16 women were diagnosed as having PPH but when Hb criteria was adopted PPH was diagnosed in 105 women and this figure rose to 121 when Hct criteria was taken. All patient who had PPH from visual criteria also had >10% fall in Hb and > 10% fall in Hct (range 21 – 24%). Blood transfusion was needed in 5 patients. All these women as recognized to have PPH from Hb and Hct criteria but by visual estimation only 2 of them were recognized. Thus PPH was grossly under diagnosed when volume criteria was used. Since we were not able to follow up all these women we don't know of any morbidity they may have suffered at home due to unrecognized PPH from visual estimation of blood loss, notably failing lactation, puerperal sepsis, etc.

Table 4: Correlation between various measures of PPH……Cont

	EBL ≥500 ml	Fall in Hb ≥10 %:	Fall in Hct ≥10 %:
Sensitivity	3.4 (95%CI 1.1- 8.9)	80.7 (95%CI 72.2- 87.1)	89.7 (95%CI 82.0- 94.5)
Specificity	93.4 (95%CI 88.4-96.4)	93.9 (95%CI 89.1- 96.8)	88.1 (95%CI 82.5 – 92.1)
Positive predictive value	25.0 (95%CI 8.3-52.6)	89.7 (95%CI 82.0 -94.5)	80.7 (95%CI 72.2 -87.1)
Negative predictive value	59.5 (95%CI 53.5-65.2)	88.1 (95%CI 82.5-92.1)	93.9 (95%CI 89.1-96.8)

Visual estimation of blood loss poorly correlated with changes in hemoglobin and hematocrit. Taking Hct as the gold standard in diagnosis of PPH. Volume criteria was observed to have an unacceptably low sensitivity (3.4; 95%CI 1- 8.9) and specificity (93.4; 95% CI 88.4-96.4) compared to the hemoglobin criteria (sensitivity 80.7; 95%CI 72.2- 87.1 and specificity 93.9; 95%CI 89.1- 96.8) or the hematocrit criteria (sensitivity 89.7; 95%CI 82.0- 94.5 & specificity 88.1; 95%CI 82.5 – 92.1).

Discussion

Similar findings obtained from the above results and the observations made by various other authorities indicate that visual estimation of blood loss carries a very low mean value and explains why the quantitative definition of PPH is clinically inadequate that has presented practical problem. To overcome these problems the American College of Obstetrics and Gynecology (2001, revised 2004) have recommended that PPH should be defined as peripartum fall in hemoglobin and/or hematocrit level by at least 10% from before delivery to 24 hours after delivery[6]. Several other studies have also observed that this is a better definition than the volume criteria of PPH [7-12].

PPH is one of the leading causes of maternal mortality and morbidity in both the developing and developed world. Women suffer from prolonged morbidity and mortality if undiagnosed. There is no excuse for missing the diagnosis of PPH especially in a tertiary center and a teaching hospital. In addition postpartum collapse has been noticed to occur irrespective of the amount of blood loss. Hence a redefining PPH would mean reduction in maternal mortality and morbidity.

Conclusion

Consideration for redefining Postpartum hemorrhage as peripartum fall in hemoglobin and/or hematocrit level by at least 10% makes a sensible approach as it has accurately picked up a larger number of cases that otherwise would have been unnoticed by traditional quantitative criteria. This could provide a timely therapy for PPH, hence making an effort in preventing prolonged morbidity and mortality, which could have occurred unnecessarily.

Recommendation

All women coming for an institutional delivery should have a paired Hb and Hct level tested to diagnose PPH timely and to institute adequate therapy.

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