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Original Research Article

Visual estimation of blood loss post delivery: How accurate are we in a poor resource setting

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Johnson Akuma Obuna[1,2]*, Innocent Okafor[1], Chidebe Christian Anikwe[1], Brown Nnamdi Ejikeme[1,2] and Justus Ndulue Eze[1,2]

[1]Department of Obstetrics and Gynaecology, Federal Teaching Hospital, Abakaliki, Nigeria
[2]Department of Obstetrics and Gynaecology, Ebonyi State University, Abakaliki, Nigeria

*Corresponding Author E-mail: Obuna2003@yahoo.com

Tel.: +2348035763952

To determine how accurate visual estimation of postpartum blood loss is. Cross-sectional prospective study was done in department of Obstetrics and Gynaecology Federal Teaching Hospital Abakaliki among 450 pregnant women who delivered between January 2017 and August 2017. Pre- and postpartum venous blood samples were taken from women who met the inclusion criteria for determination of haematocrit. Postpartum blood loss was estimated visually by the primary clinician conducting the delivery. Actual blood loss was calculated using the difference between the pre and postpartum haematocrit and was compared with visually estimated blood loss. Data collected was analysed using IBM SPSS Statistic version 20 and represented with simple percentages, chi square and odd ratio. P < 0.05 is statistically significant. The mean age of the study population was 29.8 ± 4.7 years. The mean visually estimated and calculated blood loss was 497.2 ± 254 ml and 885.7± 864 ml respectively. Prevalence of PPPH by calculation was 55.9% for vaginal delivery (47.1% by EBL) and 27% for caesarean section (7.6% by EBL). Visual estimation accurately estimated actual blood loss in 30% of women. Accuracy of estimation is not influenced by mode of delivery (OR = 1.18, 95% CI 0.48-2.89).The accuracy of visual estimation of postpartum blood loss is low. Clinicians should adopt more accurate methods of postpartum blood loss estimation in our environment.

Keywords: Delivery, PPH, visual estimation of blood loss

INTRODUCTION

Primary post-partum haemorrhage (PPPH) is defined as blood loss of equal or greater than 500ml following vaginal delivery or 1,000ml or more following caesarean section. Primary postpartum haemorrhage is one of the leading causes of maternal mortality and morbidity (World Health Organization, 2012; Lalonde, 2012; Lertbunnaphong et al., 2016).

Almost 358,000 women die each year in childbirth, mainly in low-income countries. More than half of all maternal deaths occur within 24 hours of giving birth; severe bleeding in the postpartum period is the single most important cause. Depending on the rate of blood loss and other factors, such as pre-existing anaemia, untreated postpartum haemorrhage (PPH) can lead to hypovolaemic shock, multi-organ dysfunction, and maternal death, within two to six hours

Accurate estimation of post-partum blood loss is critical in the timely diagnosis of primary post-partum

haemorrhage as essential ingredient in the prevention of maternal morbidity and mortality associated with it.

The ideal method of estimation of actual post-partum blood loss has remained a subject of controversy among obstetricians Most times estimation of blood loss especially in a- poor resource setting like ours is hurriedly done visually with its attendant consequence of missing the early diagnosis of primary post-partum haemorrhage(Lertbunnaphong et al., 2016).

Several methods exist for estimation of post-partum blood loss but the gold standard appears to be Photospectometry (ACOG, 2006; Lertbunnaphong et al., 2016) due to its accuracy. However, this method is costly, cumbersome and cannot be useful at all levels of healthcare. It is therefore not clinically relevant but more suitable for research purposes (American College of Obstetricians and Gynecologists, (ACOG, 2006; Schorn, 2010; Lertbunnaphong et al., 2016).

Other methods include the use of swabs after delivery to estimate blood loss. Though this is inexpensive, it is cumbersome and tedious, creating more workloads for labour ward staff and therefore useless in a busy labour ward (ACOG, 2006; Patel et al., 2006; Lertbunnaphong et al., 2016).The use of the difference in pre and post-partum haemoglobin concentration in the calculation/estimation of post-partum blood loss though appears to be accurate, it does not solve the urgency needed in early diagnosis of PPPH as it takes more time to get post-partum haemoglobin. More so in a –low resource setting, many indigent patients may not afford to pay for it.

The use of a gravimetric method or weighing of blood collected in all delivery materials on a sensitive scale, to diagnose PPPH has also been found to be sensitive(Al Kadri et al., 2011). Direct collection of blood with calibrated pans or kidney dish can also be used in the estimation of post-partum blood loss. However, the challenge associated with this method is the possible inclusion of mixture of liquor or urine with blood.

All these methods appear to be more accurate and more sensitive in the diagnosis of PPPH compared to visual method but clinically cumbersome and burdensome.

Many Obstetricians have questioned the continuous use of visual blood estimation post-partum when many studies have put a question mark in its efficacy in achieving the real purpose of attempting to estimate blood loss post-partum which is early diagnosis of primary post-partum haemorrhage (Lertbunnaphong et al., 2016).This study is poised to re-examine the accuracy of visual estimation of blood loss post-partum in order to re-evaluate its usefulness in diagnosing PPPH especially in a poor-resource setting like ours.

Objective

To determine how accurate visual estimation of postpartum blood loss isand its usefulness in a poor resource setting like ours with limitations in blood loss measurement.

MATERIALS AND METHODS

This was a cross-sectional prospective study done in the Department of Obstetrics and Gynaecology Federal Teaching Hospital, Abakaliki, among 450 pregnant women who delivered between January and August 2017 inclusive. Pre- and postpartum venous blood samples were taken from women who met the inclusion criteria for determination of haematocrit and consented. The haematocrit was determined using centrifuge method. Postpartum blood loss was estimated visually by the primary clinicians (Senior Resident doctors and Consultants) who conducted the delivery, and the actual blood loss was calculated using the difference between the pre- and postpartum haematocrits and compared with the resultof visual estimation. The data collected was analysed using IBM SPSS Statistic version 20 and represented with simple percentages, chi square and odds ratio. $P < 0.05$ is statistically significant. Ethical permission was obtained

RESULTS

The mean age, weight and parity of the women was 29.8 years, 77.8 kg, and 2.9 respectively; 220 had Caesarean section, and 37.1% did not have previous history of caesarean section (Table 1).

There was a significant difference between the preoperative and post-operative haemoglobin concentration. Also, the mean haemoglobin difference was 5.4 g/dl, the mean blood loss by visual estimation was 497.2 ml while the mean by formula method was 885.7 ml, and there was statistically significant difference between the two (Table 2).

Only 137 or 30.4% of the 450 women studied had accurate blood loss estimation. This consisted of 32.2% of the 230 who delivered vaginally and 28.6% of the 220 who delivered by caesarean section. Estimation was not accurate in the rest (Table 3).

Using the visual method, the blood loss was underestimated in 41.1% of the participants and overestimated in 28.9%. Also, the incidence of postpartum haemorrhage was 1.1% compared to 12.4% by the formula method for patients who delivered vaginally, and 12.0% versus 6.4% for patient who delivered by caesarean section (Table 4).

Table 5, shows that the mode of delivery, pre-operative and postoperative haemoglobin, type of skin incision and nature of anaesthesia had no significant influence on the accuracy of blood loss estimation by visual method.

DISCUSSION

Visual estimation of postpartum blood loss, a simple and convenient method of estimation of post-partum blood has been a routine practice for a long time, despite the fact that it has been widely acclaimed to be inaccurate, ridden with

Table 1. Socio demographic and operative characteristics of the study population, N = 450.

Items	Number	Mean(SD)
Age(years)	25	29.8(4.7)
Weight(kg)	62	77.8(12.5)
Parity	7	2.9(1.9)
Mode of Delivery	**Number(N=450)**	**Percentage**
Vaginal	230	51.1
Caesarean section	220	48.9
Total	450	100.00
Methods of Anaesthesia	**Number(N=450)**	**Percentage**
Spinal	**121**	**55.0**
General	**99**	**45.0**
Total	**220**	**100.0**

Table 2. Haematocrit value and blood loss estimation of the population

Items	Range	Mean(SD*)	T(P value)
Haematocrit value			
Pre-operative	10.3	10.6 (1.6)	
Post-operative	9.0	9.4 (1.9)	- 6.14 (0.001)
Hb** difference Blood loss estimation	5.0	5.4 (1.2)	
Visual method	1380	497.2 (254.2)	4.3 (0.001)
Formula method (standard)	4347	885.8 (863.7)	

* Standard deviation, **Heamoglobin

Table 3. Comparison of estimation of blood loss using the visual method Vs Formula method in determination of the incidence of Postpartum haemorrhage

Item	Frequency (%)
Accurate	135 (30.0)
Under estimate	185 (41.1)
Overestimate	130 (28.9)
Incidence of PPH*	
Vaginal delivery	**230 (100.0)**
Visual method	5 (1.1)
Formula method	56 (12.4)
Caesarean delivery	**220 (100.0)**
Visual method	54 (12.0)
Formula method	29(6.4)

*Postpartum haemorrhage

errors and notorious for underestimation of post-partum blood loss (Patel et al., 2006; Toledo et al., 2007; Schorn, 2010; Al Kadri et al., 2011; Tixier et al., 2011; Lertbunnaphong et al., 2016). Our study agrees with this assertion.

In a study in Singapore, visual estimation of blood loss was also found to be inaccurate leading to gross under diagnosis of PPPH (Lertbunnaphong et al., 2016). In the Singapore study, visual estimation of post-partum blood loss was found to be 27.6% accurate. This agrees with our study with accuracy of 30%.

Studies have shown that the incidence of PPPH was much lower when visual estimation of post-partum blood loss was applied in vaginal delivery (Schorn, 2010; Tixier et al., 2011; Lertbunnaphong et al., 2016). These studies agree with our study. In this study, the diagnosis of PPPH was 1.1% following vaginal delivery but using Hb calculation, the incidence of PPPH was higher, 12.4% for vaginal delivery.

In the study in Saudi Arabia the incidence of PPPH was very low 1.47% using visual estimation of post-partum blood loss (Al Kadr et al., 2011). This is similar to the findings in our study (1.1%).

Other studies have shown that the magnitude of

Table 4. Relationship between mode of delivery (N = 230 for SVD, 220 for CS*) and accuracy of blood loss estimation using Visual blood estimation

Level of accuracy	Mode of delivery	
	SVD* (%)	CS** (%)
Accurate	74 (32.2)	63 (28.6)
Not accurate	156 (67.8)	157 (71.4)

* Spontaneous vaginal delivery, **Caesarean section

Table 5. Cross tabulation of the accuracy of blood loss estimation by visual method with mode of delivery and other obstetric variables

Items	Accurate	Not Accurate	OR 95% CI
Vaginal delivery	50	1.18	(0.48-2.89)
Caesarean section	87	210	
Pre-delivery Hb***			
< 10	32	85	0.82 (0.30-2.21)
≥ 10	105	228	
Post deliveryHb***			
< 10	50	170	0.49 (0.20-1.17)
≥ 10	87	143	

*Odds Ratio; **Confidence Interval; ***Haemoglobin

underestimation increases as the amount of blood loss is increased (Tixier et al., 2011; Lertbunnaphong et al., 2016) . This was however different in our study where the incidence of PPPH was over-estimated as 12.0% following Caesarean section where greater volume of blood is usually lost compared with calculated method which gave incidence as 6.4% . May be the clinicians in those studies did not take cognizance of the possible mixture of liquor with blood during Caesarean section.

In a Cochrane study carried out in February 2018, there was insufficient evidence to support the use of one method over another to estimate blood loss after vaginal birth (Prasertcharoensuk et al., 2000;Virginia Diaz et al., 2018).

The weakness of this study include that visual estimation of post-partum blood loss was only compared with calculated Hb difference. It would have been better to compare it with other methods. The study also did not report the number of women who had anaemia after birth or infection, or the risk of developing serious conditions (such as disseminated intravascular coagulation, DIC, liver or renal failure brain affectation, or being admitted to intensive care). Other shortcomings include inter-observers' error in reading the PCV and visual estimation of blood loss since it involved different laboratory techinicians and clinicians respectively. The possibility of dehydration and haemoconcentration on the patients cannot be ruled out and therefore could have affected the results of PCV.

In conclusion, this study has demonstrated how inaccurate visual estimation of blood loss is in the diagnosis of PPPH. However, the impact of various methods of post-partum blood loss estimation on the maternal and neonatal outcomes should be evaluated to determine the superiority of the various methods over one another. Until this is done we may continue to patronize visual estimation despite its short coming.

CONCLUSION

The accuracy of visual estimation of postpartum blood loss is comparatively low. We recommend that clinicians should adopt more accurate methods of postpartum blood estimation, even in poor resource settings like ours.

Conflict of Interests

The authors declare that there is no conflict of interests regarding the publication of the paper.

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