



The incidence of postpartum hemorrhage after spontaneous and induced vaginal delivery versus elective and emergency caesarian section

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Abstract


Postpartum hemorrhage (PPH) is the leading cause of maternal mortality. All women who carry a pregnancy beyond 20 weeks' gestation are at risk for PPH and its sequelae. Although maternal mortality rates have declined greatly in the developed world, PPH remains a leading cause of maternal mortality elsewhere. The aim of this study is to investigate the incidence of PPH in patients delivered by different modality and identify the importance risk factors. A Cross sectional study of 9674 patients admitted to the labor or obstetrics ward and theater unit during the period of 5-months duration from^h of January to the³¹th of December 2015. The results of this data indicated that the identified risk factors of PPH are essential to increase effective care and eventually increased the maternal survival.

Keywords: Postpartum Hemorrhage; Assessment of blood loss; Labour; Maternal Survival

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Received December 02, 2015; accepted March 11, 2016; published April 18, 2016

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Introduction

Postpartum hemorrhage defined as blood loss more than 500 ml after vaginal delivery and 1000 ml after C/S either within 1st 24 hr. following child birth this is called primary PPH [1], and can occur up to 6 weeks following delivery this called secondary PPH, or the presence of any sign and symptoms of low blood volume for condition to be exist [2].

A major PPH is defined as such when there is continued bleeding and failure to respond to first-line management and cases where blood loss is approaching or exceeding 1000mL [3]. During pregnancy the plasma volume increases by 50% and the red blood cell volume increases only by 20-30%. Consequently, the hematocrit decreases on lab value; this is not a true



decrease in hematocrit, however, but rather due to the dilution. The white blood cell count increases and may peak at over 20 mg/mL in stressful conditions. Conversely, there is a decrease in platelet concentration to minimal normal values of 100-150 mil/mL [4].

A pregnant woman will also become hypercoagulable, due to increased liver production of coagulation factors, mainly fibrinogen and factor VIII (this hypercoagulable state along with the decreased ambulation (exercise involving legs) causes an increased risk of both DVT and PE), women are at highest risk for developing clots, or thrombi, during the weeks following labor. The increased flow in the right iliac artery after birth compresses the left iliac vein leading to an increased risk for thrombosis (clotting) which is exacerbated by the lack of ambulation following delivery.

Both underlying thrombophilia and cesarean section can further increase these risks [3]. PPH occur more commonly in those who already have low count of RBC, occur more common in (large for gestation age) uterus like multiple pregnancy, poly-hydramnious, big size baby...etc., more common in obese and older patients over 40 years old. In developing world about 1.2% of deliveries are associated with PPH and when PPH occur about 3% of women died [1]. Globally it results in 44000 - 86000 death per year making it the leading cause of death during puerperium [5].

Delayed diagnosis and poor management of postpartum hemorrhage (PPH) are associated with increased mortality and morbidity. Accurate

measurement of the amount of blood lost after childbirth helps to quickly diagnose life-threatening hemorrhage [6].

Innovations in measuring blood loss could improve the timely management of PPH. Although active management of the third stage of labor can prevent up to 60% of PPH cases, PPH continues to have a devastating impact on women in resource-poor settings where home births are common and hospitals or health facilities are often inaccessible. Technologies that can help clinicians estimate postpartum blood loss more accurately could improve management of PPH, reduce cases of severe PPH (blood loss greater than 1,000 mL), and reduce Morbidity and mortality due to PPH. Methods to estimate postpartum blood loss include direct collection of blood in pans, gravimetric measurement of sponges (weighed before and after use), or blood collection drapes or mats [7].

An ideal technology or method should estimate blood loss in real time, provide an accurate estimation of threshold volumes, permit early diagnosis of PPH (at least 500 to 1,000 mL of blood loss), have a high specificity and sensitivity, be practical and easy to use, be low cost, and require minimal Equipment [8, 9].

Due to poor facility and limited our resources the research depends on weighting method and estimating blood loss by soaked packs.

Method and Material

This is a cross sectional study carried on Al-Zahraa teaching hospital from 2nd of January to the 2nd of October 2015, in



labor word, operative theater, and emergency word. The patients in this study divided into two groups, the 1st group was delivered vaginally either by spontaneously or by induction and the 2nd group by Caesarian section either emergency or elective in Al-Zahraa theatre. The interview of patients occurs in labor word and obstetric word and emergency word (for patient with 2ndry PPH that referred to our hospital).

The total number of patients was 9674, 6137 of them were delivered vaginally (4785 of them were spontaneous vaginal delivery and 1352 by induction of labor). The number of caesarian sections were 3537 (2043 were emergency and 1494 were elective). Confirming the patient who diagnosed to have PPH by our colleague (residents) or our seniors doctor and then interviewing the patient or her relative by taking her history, any medical disease or any drug use, measure her vital signs and recognizing if she had any signs of hypovolemia like pallor, tachypnea, cold extremities...etc.

During their resuscitation we perform measurement of her blood loss by ELISA weighting method and counting any soaked gauze then follow up the patient to see if steps of management enough to arrest bleeding or if she needs transfer to theater for farther management with continuous estimation of her blood loss.

Though there are different methods use to estimate the blood loss as mentioned in introduction but due to poor and limited facilities here we use Eliza weighting methods. By weighting the pad before and after use which weight about 70-80 g dry and weighting

it after get soaked with blood and calculating the amount of blood by [every 1 g of blood = 1 ml [10] by subtracting the weight of dry pad and adding the amount of blood that collected from soaked gauze if present according to the Pictorial Reference Guide. This method uses to the patients who delivered vaginally.

While the patient who delivered by CS, estimating her blood loss by collection of soaked gauze, weighting of Eliza pad if present and blood which collected in sucker's tank if use during the operation, if this bleeding occurs intra-operatively after delivery of placenta or postoperative at observation room in theater or obstetric word, recording the amount of bleeding and estimate its severity according to the following:

500-1000 ml is mild PPH; 1000-1500 ml is moderate PPH; and ≥ 1500 ml is severing PPH [11, 12, 13].

Identify the cause and which management plans done and at which hours the bleeding occurs and following up the patient in the word.

Statistical analysis

Statistical analysis was done by using SPSS (statistical package for social sciences) version 20 in which we use ANOVA test (analysis of variance with LSD for numerical data and chi square test for categorical data. Relative risk has been measured according to the equation incidence among exposed/incidence among non-exposed. P value less or equal 0.05 regarded significant.

Results

The number of patients enrolled were 159 women with post-partum hemorrhage. There were 146(91.8%) complained of primary PPH and 13 (8.2%) complained of secondary PPH. The incidence of PPH during this period was 1.64%. The nulliparous women (55), 15(27.3%) in spontaneous vaginal delivery, 26(47.3%) in induced delivery, 5(9.1%) in elective CS and 9 (16.3%) in emergency CS. While the parity from 1-4 the number was 95 from which were 39(41%) in spontaneous vaginal delivery, 16(16.8%) in induced delivery, 17(17.9%) in elective CS and 23 (24.2%) in emergency CS. While the parity ≥ 5 the number was 9 from which were 7(77.8%) in spontaneous vaginal delivery, 1(11.1%) in elective CS and 1(11.1%) in emergency CS.

Table 1.

Association between parity and mode of delivery.

Mode of delivery	Nulliparous (n=55)	1-4 (n=95)	≥ 5 (n=9)	p value
Spontaneous vaginal delivery	15(27.3%)	39(41%)	7(77.8%)	0.010
Induced vaginal delivery	26(47.3%)	16(16.8%)	0(0%)	<0.001
elective CS	5(9.1%)	17(17.9%)	1(11.1%)	0.321
emergency CS	9(16.3%)	23(24.2%)	1(11.1%)	0.397

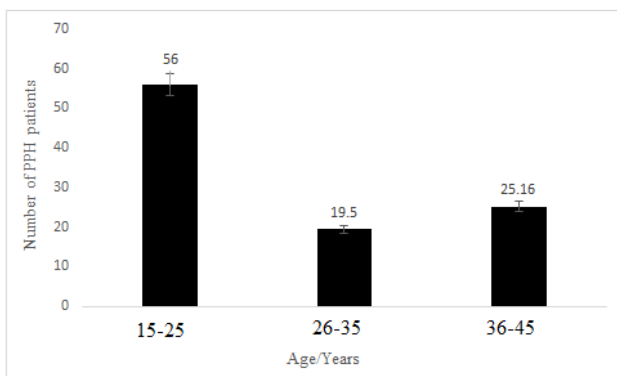


Figure 1.

The percentage of PPH patients to their age.

Table 2.

Causes of primary PPH

The cause	No. of patients	Percentage
Atony	81	55.5 %
Trauma	33	22.6%
Retain products	25	17.1%
Coagulopathy	7	4.8%

Table 3.

Causes of secondary PPH

	Frequency	Percent
Trauma	3	23.1
Uterine atony	1	7.7
Endometritis	5	38.5
Retained placental piece	4	30.8
Total	13	100.0

Table 4.

Association between PPH and medical illness

Chronic disease	Spontaneous VD	Induced VD	Elective C/S	Emergency C/S
I TP	2	1	0	0
HT	3	3	4	4
Anemia	4	1	0	1
DM	1	2	0	0
Asthma	0	0	1	0
SLE	0	0	0	1

Table 5.

Time of bleeding of primary PPH

Time	Frequency	Percent
0-6 hr	129	88.4
7-12 hr	10	6.8
13-18 hr	7	4.8
Total	146	100.0

Table 6.

Incidence of PPH in different modes of delivery

MOD		Percent	P value	Relative risk (95% CI)
Vaginal delivery	Induced	3.1% (42/1352)	<0.001	2.48(1.63-3.76)
	Normal	1.27% (61/4785)		
C/S	Elective	1.53% (23/1494)	0.858	0.95(0.53-1.67)
	Emergency	1.62% (33/2043)		
Delivery	Vaginal	1.678% (103/6137)	0.723	1.06(0.75-1.49)
	C/S	1.58% (56/3537)		

Table 7.

Association between mode of delivery and gravid

	Primigravida	Multigravida	P value
Induced	26	16	<0.001
Non induced	15	46	
	42	62	

Table 8.

Association between type of PPH and severity of bleeding

		Group		P value
		primary PPH	Secondary PPH	
PPH	MILD	111	11	0.603
		76.03%	84.62%	
	MODERATE	27	1	
		18.5%	7.7%	
	SEVER	8	1	
		5.5%	7.7%	
Total		146	13	
		100.0%	100.0%	

Table 9.

Association between MOD and type of PPH

		Group		P value
		primary PPH	Secondary PPH	
MOD	VD	95	8	0.798
		65.07%	61.5%	
	CS	51	5	
		34.9%	38.5%	
Total		146	13	
		100.0%	100.0%	

Discussion

Postpartum hemorrhage (PPH) is a major cause of maternal mortality and morbidity worldwide. Several recent publications have noted an increasing trend in incidence over time. The international PPH collaboration was convened to explore the observed trends and to set out actions to address the factors identified [14]. Our survey provides a comparison of PPH incidence between four groups of patients which are the spontaneous and induced vaginal delivery and emergency and elective caesarian section.

In the developing world about 1.2% of deliveries are associated with PPH

and when PPH occurred about 3% of women died. Globally it results in 44,000 to 86,000 deaths per year making it the leading cause of death during pregnancy. In this study 4773 patients were delivered spontaneously, 61 patients. A (1.27%) had PPH; the nulliparous women compose of 15 patients. (27.3%) of spontaneous vaginal delivery patients that had PPH, and 46 patients.

A (75.4%) are multiparous women due to more liability for uterine atony, preeclampsia, gestational diabetes mellitus, placenta previa and abruptio placentae. Other published studies have reached varying conclusions, identifying nulliparity [16], or high parity [15, 16, 17] as risk factors for PPH. The goal of induction of labor is to achieve successful vaginal delivery as natural as possible taking in our account the indication for induction of labor.

Most of PPH patients were primiparous women having indication for induction of labor (like postdate with reduced fetal movement, prolong pre-labor rupture of membrane and other indication). As in study of Dean Leduc [18]. In caesarian section our study show little non-statistical increment in emergency than elective C/S, while our finding for high parity in patient delivered by elective C/S as the first C/S due to either obstetric complication like abnormal lie, fibroid or due to patient request for C/S & tubal ligation. In general number of patients complain from PPH is more than elective CS and this increment increase with parity. This result agree with Magann [19].

The PPH is more common in teenage and early twenties as in Agustín Conde-



Agudelo study due to high risk for endometritis, operative vaginal delivery [20], so its associated with increased risk of PPH. While other study [21] which found that risk factors for PPH are related to complication of 2nd and 3rd stage of labor only not due to maternal age.

Also this increment in PPH incidence in age more than 36 and especially in extreme age (more than 40 year old) [22], that because preeclampsia, gestational diabetes mellitus, placenta previa and abruptio placentae, were higher in the women aged ≥ 40 years, that's goes on with other published data [22], and inconsistent with results of Lao study [23] that assume that advance maternal age significantly increased obstetric risk factors, complications, cesarean delivery and large-for-gestational age infants, but no difference in the attributed risk and cause of PPH.

Most important and major finding in the current study is that the most common cause of postpartum hemorrhage was uterine atony. Normally, contraction of the uterine muscle compresses the vessels and reduces flow; Which compose about 55.5% of primary PPH patients, either due to cause from labour itself like prolong and precipitate labour or dysfunctional labour which needs father augmentation with oxytocin or pregnancy complications like polyhydramnios, macrosomia, multiple pregnancy and chorioamnionitis. After that trauma comes which about 22.6% occurs due to either cervical and vaginal laceration or operative delivery. Less common is the retained product and

coagulopathies that is evident by the other study [24].

The statistical analysis of different causes of secondary postpartum hemorrhage show that the most common cause of secondary postpartum hemorrhage was uterine infection and retained products [25]. Cervical and vaginal tear also emerged as one of the cause of delayed or secondary postpartum hemorrhage in contrast to the other study [26] which mentioned the retained uterine products are the most common cause of secondary postpartum hemorrhage.

In this study we have 3 cases diagnosed previously with ITP all of them develop primary PPH due to continuous bleeding despite the replacement of platelets, inconsistent with study of Michal [27, 28, 29], which regards the patient with ITP in general deserve special attention should be given due to its may complicated with PPH [30-34].

In current study 14 patients. complaining from hypertension and develop haemorrhage among large number of hypertensive women who admitted in this period to our hospital, early recognize of this problem, adequate investigation and management of complication lower the risk of PPH in this group of patients [21], but due to most of these cases complain from PPH are diagnosed as pre-eclampsia and develop bleeding which vary between mild and sever and threatening the life of patient. Anemia is preventable cause but due to poor maternal anti-natal care in our community make this condition is problematic to some women as in other study.



In diabetes there is no direct significant increase risk of PPH for diabetes mother in our study these 3 diabetic women develop primary PPH due to uterine atony firstly because of macrosomic baby or polyhydraminus which indirectly affect the PPH [28]. The asthma itself is not a cause for PPH but drugs used for asthma like sympathomimetic drugs could cause PPH, in our study we had only one asthmatic patient in elective CS develop PPH so we can't analyze the risk according to that data due to small sample but in general no other asthmatic patients come to us with PPH.

Other studies like study [29], assume the asthma increases risk of antepartum and postpartum haemorrhage. current study other data [30] regards that asthma increase risk for other complication like IUGR, even hypertension during pregnancy but not for PPH. Regarding the SLE we have 2 patients admitted during this period one of them had PPH in emergency CS category [31] which consider the SLE women have more complicated pregnancy antenatally and even postpartum period as compare with other normal population.

Any woman who give birth can have PPH which can threaten her life now we have many pharmacological and technological development for prevention and treatment which can greatly reduce primary PPH within only first hours after delivery and limit its serious squeal, the safety of third stage, use of active management of 3rd stage, incidence of PPH and its complication will remain linked however to the wider issue of reproductive health in general, and more specifically to finding and

training needed to rise the standard care offered to women in labour.

Most cases of primary PPH (88.4%) occurred within the first 6 hours after delivery due to either uterine atony or laceration or retained pieces of concepts which needed active management to control and cessation of bleeding. And less number the PPH occur with following hours either due to small laceration which passed unrecognized immediately after delivery or retained product [32].

Induction of labour is increasingly practiced in most maternity unit. Old resources [32] claimed that induction of labour by ARM and oxytocin titration didn't increase the incidence of PPH, our finding add one more important factors when considering induction of labour specially in primigravidas, PPH should be added to the list of complication of induction of labour [33].

The increase incidence of PPH after induced labour is not due to entirely to the fact that induced cases are more likely to be complicated, normal oxytocic regime make the uterus contract much harder than usual for shorter time so that when the fetus delivered the uterus may become atonic and exhausted and the cervix may be damaged.

In spite of the use of oxytocin in the 3rd stage of labour the uterus that has been exposed to quite high doses of oxytocin all day will therefore probably respond poorly to an intramuscular or intravenous bolus of the same or similar dose. There was small but statically not significant differences incidence of PPH between elective and emergency CS but there is small increase of PPH in



emergency CS than elective due to most emergency cases is complicated and this increment either intraoperative or post operation.

This table show that 146 patients, had primary PPH and 13 patients, had secondary PPH receive immediate management, 111 patients. with primary PPH (76.3%) had mild PPH, and 11 patients (84.62%) respond to that management while 27 patients (18.5%) with primary PPH had moderate bleeding and one patients (7.7%) had moderate bleeding and 8 patients (5.5%) with primary PPH developed severe bleeding due to failure of response to immediate management, all these patients with moderate and sever bleeding require farther management in operative theater, 7 of these patients ended with hysterectomy and massive blood transfusion and some of them require repair of genital track injury and manual removal of placenta under general anesthesia [34].

The number of PPH patients in vaginal delivery is 103 (64.8%) while in caesarian delivery 46 patients (35.2%). In our study vaginal delivery more complicated by PPH than caesarian section group attribute to the uterine atony, prolonged or precipitate labor in addition to the risk of injury to the birth canal, hematomas formation and needs of assisted delivery which may increase the risk of bleeding [35, 36].

Inconclusion, labor records of 9674 patients between vaginal delivery and caesarian section where studied to compare the incidence of PPH after induced labour with that after spontaneous labor and between emergency and elective C/S. The

discovery is an increase incidence of PPH in the induced group and emergency C/S. also there is increased in the incidence of PPH in the early age women (15-25y).

This analysis confirmed that the incidence of PPH was increased after induction of labor; among primiparous was nearly twice that after spontaneous labour, due to prolong uterine exposure to oxytocin make it difficult to contract after delivery or due to traumatic delivery. These finding indicate that PPH is another complication of induction that needed to be taken into account when induction in being considered.

Acknowledgments

This work was supported by a grant from NIH, and by a local University grant (0120546460, 2014).

Competing interests

Author declare that We have no competing interests.

Authors' contributions

PBG was involved in conception and design of the study, involved in data collection and drafting of the final manuscript. AMA was involved in conception and design of the study, and offered a critical review of the manuscript for intellectual content. PBL was involved in conception and design of the study, and data collection. All the authors have read and approved the final version of the manuscript.



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