



How to prevent and reduce complications of postpartum hemorrhage

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ARTICLE INFO

ORIGINAL ARTICLE

Article History:

Received: 20 May 2016

Accepted: 20 August 2016

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Keywords:

Postpartum hemorrhage,
Cesarean section,
Operative Vaginal Delivery,
Obstetric Complications.

ABSTRACT

Background: Postpartum hemorrhage (PPH) is the leading cause of maternal morbidity and mortality especially in developing countries. In this study we aimed to measure postpartum hemorrhage (PPH), visual- estimation, prevalence and related causes to describe how it is possible to reduce maternal mortality.

Methods: This cross-sectional study was conducted in Mobini-hospital, Sabzevar, Iran in 2014. PPH was evaluated in 1000 parturients in a tertiary hospital. PPH was defined as bleeding more than 500 ml and evaluated by weighing drapes before and after childbirth while the midwife's estimation was written, postpartum. The data was analyzed by spss19, Chi-squared, descriptive and t-test, $p < 0.05$ was meaningful.

Results: Overall incidence of PPH was 4.9%. In cesarean was more than vaginal delivery ($p = 0.030$), more prevalence in emergency cases ($p = 0.043$), blood transfusion was more in vaginal cases (1.2% vs. 0.5%). The midwives estimated PPH 25.6% less than real amount. The causes of PPH were uterine atony (58%), placental residue (11.8%), placental retention, labor canal injury, uterine rupture, placenta previa and coagulation disorders (each 5.9%). Hysterectomy was 0.1%. There was no significant relationship with age, parity and gestational age ($p > 0.05$), significant association with past-history of PPH ($p = 0.011$).

Conclusion: PPH can be properly diagnosed and managed by exact assessment, visual estimation is not a reliable method. Detecting risk factors and decreasing inappropriate interventions help to prevent it.

Introduction

Postpartum hemorrhage (PPH) is one of the main leading causes of maternal morbidity and mortality especially in developing countries (1-4). It causes 8% of maternal death in USA and 34% in Iran (3, 5). It can be with least morbidity if the health care providers of maternity centers have the

knowledge of the related etiologies and also proper approaching. PPH is defined as the bleeding of more than 500ml after vaginal delivery and more than 1000ml after cesarean section or twin delivery (2, 6). It usually happens due to uterine atony, genital tract injuries or failure of the blood coagulation respectively (2).

Numerous factors such as cesarean delivery, prolonged labor, multiparity and improper interventions during labor have been mentioned as risk factors of PPH(7, 8). The global incidence of PPH is reported at 6 % (2, 9) with more prevalence in low-income countries(10-12). PPH in sub-Saharan Africa shows a high incidence at 10.5 % (9). There are different reports concerning incidence of PPH evaluated in various countries (4, 13, 14) . It should be noticed that the method of measuring postpartum hemorrhage effects highly on the prevalence of PPH which is reported in the studies(4, 11, 12, 14, 15), although the difference in organization of prenatal care and management of labor executed in low and high income countries highly influences on the rate of PPH seen in reports. As visual estimation is not enough accurate for evaluation of bleeding, in the present study we did weighing drapes before and after childbirth to find out the exact prevalence and severity of PPH in this region and the level of correctness of hemorrhage estimation.

Methods

This cross-sectional study was conducted in Mobini-hospital, Sabzevar, Iran in 2014. This tertiary hospital is the single center of obstetrical service in the area. After taking approval of ethic committee (medsab.rec.93.35) and also consent forms, a number of 1000 women who were admitted for delivery, vaginal or cesarean, participated in study while a checklist containing demographic data, past medical and obstetrical history was filled by interviewer. Then, the characteristics of the present labor, the degree of bleeding after delivery and the related etiologies were recorded. Beforehand, we had organized a workshop for midwives working in hospital to teach how to measure maternal blood loss after vaginal delivery. The volume of bleeding was measured by weighing clots and blood collected in the dish under delivery-site and also drapes soaked with blood while the drapes had been weighed before childbirth. A digital scale which was become calibrated daily, was the tool of measurement. For making blindness, a midwife non-responsible for delivery did measured the bleeding while the estimation of blood volume accomplished by the midwife who did delivery, the midwives were unaware of their assessment. PPH was defined as blood volume more than 500^{ml} at vaginal delivery and it was categorized as severe in cases of more than 1000^{ml}(6, 10, 16). Because of the mixture of blood and amniotic

flood in cesarean section, it was impossible to measure bleeding by the mentioned method. In this group, PPH was defined whenever the parturient needed more than routine prophylactic regimen for stopping hemorrhage. Meanwhile, resemblance was done among surgeons in point of routine uterotonic prophylactic medications in both vaginal and cesarean delivery. All participants received 40iu oxytocin by infusion after childbirth. Besides prevalence, all cases with PPH were evaluated and analyzed in point of the related etiologies, risk factors , severity of bleeding, transfusion and hysterectomy. Another main part of the analysis was calculation of the interval between the amount of midwives' estimations and the real volume of bleeding. Finally, the collected data was analyzed by spss19, descriptive and t- test, Chi-squared test, while the level of $p < 0.05$ was considered meaningful.

Results

The participants were between 14 and 47 years old (Demographic table 1). 435 (43.5%) primipara cases and 565(56.5%) multipara were arranged in the study. 666 women had vaginal delivery(66.6%) and 334cases underwent cesarean section(33.4%).

Overall incidence of PPH was 4.9% . There was no significant relationship between maternal age, job, education, place of residency, BMI, opiate addiction, parity, premature rupture of membranes, use of magnesium sulfate, gestational age and PPH($p > 0.05$)(table 1).

After adjustment of demographic characteristics and parity, PPH in cesarean cases was more than vaginal ones with significant difference(6.9% vs. 3.9%), ($p = 0.030$). Severe PPH (more than 1000^{ml}) was evaluated at 2.3%. 10 cases (1%) needed to undergo transfusion; 8cases(1.2%) in vaginal and 2 cases(0.5%) in cesarean delivery. There was one case of postpartum hysterectomy due to hemorrhage (0.1%).

PPH in emergency sections was more than elective ones significantly (10% vs. 3.8%), ($p = 0.043$). But anesthetic type, general or regional, had no impact on hemorrhage($p = 0.27$).

According to our findings the women with a history of PPH showed significant increased rate of PPH compared with others ($p = 0.011$). Neonatal weight more than 3800gr was more accompanied with maternal bleeding significantly($p = 0.001$). Uterine atony was the leading cause of PPH at 58%, the other causes included remaining placental tissue(11.8%), placental retention, labor canal injury,

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uterine rupture, placenta previa and coagulation disorders(each 5.9%)(Fig1). Pharmacologic interventions for labor augmentation had significant impact on occurrence of PPH, oxytocin(0.028) and misoprostol(0.006).

Our study showed the care providers of maternity centers estimate the volume of bleeding occurring after vaginal delivery 25.6% lower than real events(2.9% vs. 3.9%).

Discussion

This study aimed to obtain the prevalence, predisposing factors and etiologies of PPH which is the most common cause of postpartum morbidity and mortality among women. The incidence of PPH has globally been reported on 6% worldwide which is comparable with our results at 4.9%. The incidence of postpartum hemorrhage in China was 2.2% in 2011(15), in America at 2.9%(17, 18)and in Canada 5.1% in 2003 with upward trend at 6.2% in 2010(12). Another report of Iran has showed it 6.47%(11). On the other hand, some investigators have reviewed postpartum hemorrhage in point of severity, a meta-analysis showed the prevalence of severe PPH (more than 1000ml blood loss) at approximately 1.86% of all deliveries worldwide(19), but our findings revealed it 2.3%. A glance on relevant articles reveals that the authors have had different views on how to measure the bleeding which certainly have influenced on different incidences of PPH reported. We evaluated it by weighing the blood products whereas the most of the other studies did it by visual estimation which may be associated with 30-50% underestimation(4). Comparably, in Our study underestimation of PPH was evaluated at a level of 25.6%. However, we think this percentage may be less than the level which is seen in real situations because asked all midwives to participate in workshop for learning measurement of bleeding after delivery and so, they were more sensitized on postpartum hemorrhage. With regard to this important problem, the care providers should be very precocious about estimation of the volume of bleeding after delivery and remind that probably hemorrhage had been more than that they have been supposed. Unfortunately, ignorance of accurate estimation of bleeding in maternity centers leads to massive bleeding and hemorrhagic shock in women, yet.

We found that cesarean compared with vaginal delivery is associated with higher PPH

which confirms other studies(18, 20, 21). Although previous studies have showed more bleeding with general anesthesia(17), we did not observe any significant difference between general and regional anesthesia concerning post section hemorrhage. Based on our findings, PPH in cesarean cases was mainly due to uterine atony. Emergency cesareans were more accompanied with PPH than elective cases which makes it necessary to monitor the mentioned cases more sensitively. Frequently the urgent indications are dystocia and prolonged labor and additively, at this situations administered uterotonic agents for labor stimulation act as a synergist for occurrence of post section hemorrhage(20). The researchers who have considered blood transfusion as PPH prevalence has been globally reported it at 1.86% worldwide(19). We found it 1% generally, higher in vaginal delivery at 1.2%. In contrast, 0.5% of our cesarean sections needed to blood transfusion and all were emergency cases. Other studies have been reported it on 0.78%(10), 1.91%(22) and 2.26% (13) following cesarean sections.They also showed higher prevalence in emergency situations. It should be noticed again that transfusion in vaginal delivery was more than cesarean in our study. We believe it is due to unnecessary interventions which is performed during vaginal labor. This is supported by the fact that involved cesarean cases were generally emergency ones who had spent some hours of labor process in maternity center before surgery especially in parturients with labor augmentation(23). Our data supports the previous studies about adverse effects of labor augmentation on hemorrhage, we found either oxytocin or misoprostol had significant impact on PPH, however this is in contrast to findings of some researchers(15).

Emergency hysterectomy is another subject of consideration for reporting PPH. Reports of Nijeria showed it at 2.5 in 1000 deliveries whose reasons were rupture of uterine (61%), uncontrolled bleeding during cesarean (32%) and atony after vaginal delivery (5.9%)(24). Ebrahim et al in his assessment from 1992 to 2011 in England said that postpartum hysterectomy has mainly been due to abnormal replacement of placenta(64%) and atony (26%)(16). We had one post-delivery hysterectomy (1 in 1000 deliveries) due to atony. It was clarified that the difference between investigations in addition to the method of bleeding measurement could be the criteria focused by the researchers; overall PPH, blood transfusion or emergency hysterectomy. Placenta

previa accounts for 5.9% of our cases of PPH. we faced with a case of placenta previa and accreta, however the removal of placenta was possible but with persistent bleeding subsequently. She was G2L1 with past normal delivery who underwent cesarean section due to hemorrhage and placenta previa. Considering the preservation of uterus, we placed rolled long gauzes inside the uterine segment before suturing the uterine incision which was removed at the next day. So, the parturient was managed without need to hysterectomy. Absolutely, in the case of placenta inccreta or perccreta, the response to such a simply conservative management is usually impossible and life-threatening bleeding makes the surgeon perform hysterectomy. Coagulation disorder is another reason of PPH which may be appeared due to background coagulopathy of woman, preeclampsia or placental disorders like abruption(16). 5.9% of our PPH cases showed coagulation disorder which was due to abruption of placenta and managed with pharmacologic interventions.

Based on our study, the causes of PPH were respectively uterine atony(58%), remaining residual placental tissue(11.8%), placental retention(5.9%), labor canal injury(5.9%), uterine rupture(5.9%), placenta previa(5.9%) and coagulation disorders(5.9%). Another study showed atony(80%) and subsequently, labor canal injury and placental retention, as well. Totally, uterine atony is the leading cause of PPH in all studies such as America 78.4%(17), French 78.49%(25) and Tehran 72.2%(10). Most existing documents account multiparity as a risk factor for atony(15), although Sosa & Et al declared that parturition more than three times has a protective effect against PPH(4). Our findings which were extracted from 1000 cases did not show any significant difference between primipara and multipara women. Also, in our data maternal Body Mass Index(BMI) had no significant impact on PPH. But in consistent with other authors we found neonatal macrosomia as a risk factor for atony and PPH(1).

Retained placenta is a potentially life threatening condition, about 15-20% of induced deaths from PPH are due to retained placenta(4, 26). We found it 5.9% in our PPH cases. Generally, when placenta does not deliver for more than 30 minutes after childbirth, medical methods like IV oxytocin, intraumbilical oxytocin injections, rectal misoprostol and finally manual removal are advised(25). Residual placental tissue

was more than retained placenta in our study at 11.8% which is in agreement with Tehran at 12.6%(10). It is one of the reasons of late PPH which may highly jeopardizes maternal life some times. Certainly, exact inspection of placenta after vaginal delivery can significantly prevent this undesired phenomenon(27).

Labor canal injury showed 5.9% in our study. Other studies have reported it on 16.4%(10) and 6.9%(28). Missing cervical trauma can be extremely life threatening. As most often bleeding is attributed to atony, neglectence of cervical injury and delay in appropriate management is relatively prevalent. So, thinking of cervical rupture is very important to prevent hemorrhagic shock. Steady hemorrhage without response to uterotonic agents and uterine massage can be an alarm for this injury(7). According to our and the other findings women with hemorrhage following delivery are at increased risk of PPH in the subsequent pregnancy(14). This may be due to repetition of each etiologies of bleeding, inability of uterus to contract, susceptibility of coagulopathy or insufficient strength of cervix. To verify, we faced a case of PPH due to cervical rupture that was occurred in a multiparous woman who this event had been repeated in her two past vaginal deliveries. Consequently, awareness of adventures of previous labor outcomes would be very beneficial for preventing PPH or doing a more thorough management for bleeding after delivery. An occasion of uterine rupture(5.9%) was seen in our investigation which was comparable with another report at 7.1%(29). It was due to vaginal birth after cesarean(VBAC). As bleeding in the mentioned case did not stop by usual management and also a suspicious site of uterine rupture was found by manual examination, laparotomy was done. Fortunately, the rupture of uterine segment was repaired successfully and the patient was managed without need to hysterectomy.

In conclusion, accurate estimation and evaluation of PPH is an important factor for getting a harmless delivery. Underestimation of PPH is not low and can be a threat for maternal outcomes. Although uterine atony is the leading cause of PPH, it should be remembered that the other etiologies consist near to half of the causes. Therefore, concentrating merely on atony and not considering assessment of the other etiologies can be very perilous. In order to prevent these neglected cases we believe to examine uterus and labor canal accurately to find residual placenta or injury in all cases of persistent hemorrhage. On

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the other hand, risk factors such as instrumental or surgical delivery, interventions during labor, neonatal weight and previous PPH should be regarded as predisposing factors. Although other factors like parity, maternal BMI and addiction did not appear as risk factors in our study, they must be regarded sensitively, as well. Totally, anticipation of hemorrhage with considering demographic characteristics of the woman, existing risk factors, circumstances during labor progression and route of delivery is most often possible. So, we recommend preparing a risk

assessment checklist for women concerning PPH and fulfilling it by the care-providers in two times; firstly at the time of maternal admittance and secondly at the time of delivery. In our belief, the awareness of maternal susceptibility to PPH helps midwives to do proper approach in either prevention or well-timed diagnosis and management of PPH. Certainly, saving health of women during labor leads to improvement of their physical and psychological status which subsequently contributes in promotion of family and public health.

Table 1: Demographic information of participants

Variables	Demographic Information	PPH(%)	NO PPH(%)	Pvalu
Mothers age	<18	0.1	5.9	0.49
	18-35	4.3	78.4	
	>35	0.5	10.8	
Job	Employed	0.4	6.6	0.4
	Housewife	4.5	88.5	
Mothers education	Illiterate	0.1	2.6	0.6
	Less than 12 years	1.8	41.1	
	More than 12 years	3.00	51.4	
Location	Urban	3.3	62.7	0.44
	Rural	1.6	32.4	
Mothers BMI	Thin (below 19.8)	0.4	14.6	0.18
	Normal (19.8-26)	2.9	51.8	
	Overweight (26-29)	0.9	16.4	
	Obese (over 29)	0.7	12.3	
Drug abuse	Yes	0.0	2.7	0.25
Parity	Primipar	2.5	41/00	0.17
	Multipar	2.4	54.1	
Premature rupture of membranes	ROM	4/00	72.3	0.23
	Intact	0.9	22.8	
Use of magnesium sulfate	Yes	0.4	4.5	0.06
	No	2.8	92.3	

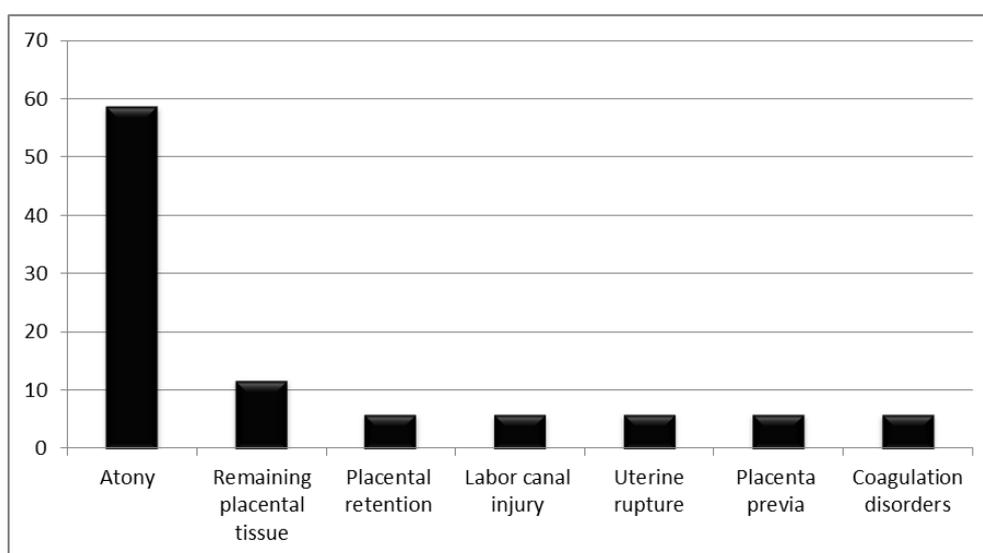


Fig. 1: Causes of PPH

Acknowledgement

We appreciate Deputy of Research in Sabzevar Medical University, the parturients, our colleagues, maternity in chief and midwives of Mobini hospital who helped us during this assessment.

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