

# Comparison of Causes of Postpartum Haemorrhage Following Vaginal Deliveries and Caesarean Sections in a Tertiary Care Hospital of Pakistan

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## ABSTRACT

**Aim:** To review the causes of postpartum haemorrhage (PPH) among vaginal and caesarean deliveries in a tertiary care teaching hospital of Pakistan

**Study design:** Descriptive retrospective study

**Methods:** The study was conducted in the Department of Obstetrics & Gynaecology, Lahore General Hospital, Lahore, from 1<sup>st</sup> January 2006 to 1<sup>st</sup> January 2009. The medical records of all the patients who had PPH were reviewed and its cause was determined. The data was tabulated and analyzed statistically by SPSS version 20. The Chi square test was used to establish association between the mode of delivery and PPH, p value < 0.001 was taken as statistically significant.

**Results:** The total number of deliveries during the study period was 8713. Out of these 215 had PPH, the overall rate of PPH was 2.46%. Spontaneous vaginal deliveries (SVDs) occurred in 6025 cases, out of these 130 had PPH (2.13%), while out of 2479 cesarean sections (C/Ss) 72 developed PPH (2.90 %). The instrumental vaginal deliveries were 159 and 13 had PPH (8.16%). The leading cause of PPH in SVD and instrumental delivery group was genital tract trauma, whereas in caesarean section (C/S) group was uterine atony. Severe intractable PPH occurred mainly in C/S group i.e., 25 out of 27 cases and two expiries occurred.

**Conclusion:** PPH is preventable by simple and cost effective measures. A careful decision making regarding the mode of delivery should be done and a regular audit of all cases of PPH should be performed to determine strategies to reduce the morbidity and mortality.

**Keywords:** Post-partum haemorrhage, genital tract trauma, uterine atony, mode of delivery

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## INTRODUCTION

Postpartum hemorrhage (PPH) is recognized as the major killer globally, killing one woman every minute of every hour every day<sup>1</sup>. According to the World Health Organization (WHO), the global maternal mortality rate (MMR) in 2010 was as high as 210 maternal deaths per 100,000 live births and the MMR in the developing countries was 15 times higher than in developed countries<sup>2</sup>. In addition to these deaths, mothers suffer from serious morbidity in near miss cases which is a more valid estimate of the impact of PPH on maternal health and a rise in social, economic and emotional burden on societies as a whole particularly in Africa and Asia. According to the WHO, 20 million mothers per year suffer from serious morbidity due to PPH<sup>2</sup>. Maternal morbidity to maternal mortality ratio in an Irish study was found to be 27: 1 and 77% of these cases were due to massive obstetric haemorrhage<sup>3</sup>.

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The tragedy of PPH afflicts malnourished, poor and uneducated mothers more than the prosperous, educated fellow women. However PPH is still one of the leading causes of maternal mortality and morbidity in USA and UK. The fifth goal of the Millennium Development Goals (MDG 5) i.e., to improve maternal health is far from its targets. The two targets for assessing MDG 5 are reducing the maternal mortality ratio (MMR) by three quarters between 1990 and 2015, and achieving universal access to reproductive health by 2015<sup>4</sup>.

PPH occurs unpredictably in 2/3<sup>rd</sup> of cases and uterine atony i.e., failure of the uterus to contract adequately is the most common cause (>90% cases) and its prevalence is said to be on rise<sup>5</sup>. According to a study the rate of PPH has increased from 1.5% in 1999 to 4.1% in 2009 and rate of atonic hemorrhage has increased from 1% in 1999 to 3.4% in 2009 while the risk of PPH due to morbidly adherent placenta has markedly increased<sup>6</sup>.

In addition to other causes, mode of delivery has been implicated as a factor increasing the risk of PPH. According to a Scottish confidential audit the rate of major hemorrhage was 4.4/1000 in 2007, the major cause was uterine atony and in 2/3<sup>rd</sup> of the cases mode of delivery was caesarean section<sup>7</sup>.

## METHODS AND MATERIALS

In this descriptive retrospective study, the medical record of every patient who suffered from PPH in the Department of Obstetrics & Gynaecology, Unit II, Lahore General Hospital, from 1<sup>st</sup> January 2006 to 1<sup>st</sup> January 2009 was studied. The functional definition of PPH was an excessive blood loss vaginally following birth of the baby causing change in vital signs (pulse, blood pressure) and / or requiring blood transfusion. Visual impression of the excessive blood loss was based on pallor of the patient, the number of sanitary pads soaked, visual estimate of the amount / size of blood clots, in case of vaginal delivery and caesarean section (C/S). The amount of blood present in the suction bottle of the suction apparatus used during the caesarean section and the number of surgical sponges soaked. Clinically, PPH was diagnosed by the change in the vital signs i.e., weak pulse more than 90 beats per minute, blood pressure less than 90/60mmHg and signs of shock such as pallor, sweating and cold clammy extremities.

The management of PPH was done according to the Department's Protocol for PPH management. Team approach was initiated with the senior consultant obstetrician and anaesthetist, senior registrar, postgraduate trainees, house officers, staff nurses and paramedical staff. In addition the blood bank personnel and pathology laboratory staff were also involved.

Initial resuscitation was done by taking double intravenous (IV) line with a wide bore IV cannula for the replacement of fluids by using crystalloid infusion (ringer lactate solution), colloid infusion (Haemacel), blood transfusion, and fresh frozen plasma (FFPs) as early as possible when indicated after careful blood grouping, cross matching and screening.

Uterine atony as a cause of PPH was established by abdominal examination eliciting a soft, boggy uterus. Uterine massage and uterotonic drugs in order of Oxytocin 10 units IV stat, Misoprostol 800µg placed rectally, Methergin 0.2mg intramuscular (only in selected cases), were used to initiate uterine contraction and tone. Blood grouping and rhesus typing, complete blood count, coagulation profile was sent immediately.

After initial resuscitation, the patient was examined systematically in operation theatre to determine the underlying cause and to rule out the presence tears to vulva, vagina, cervix, and hematoma formation in cases with vaginal deliveries. Ultrasonography was used to confirm the presence of retained tissues or placenta. In cases of PPH at C/S, a senior obstetrician was involved at an early stage especially in cases with placental abnormalities like placenta previa or morbid adherence placenta, and

repeat caesarean sections. Compression sutures, figure of eight sutures in placental bed or B-Lynch brace sutures were used to control bleeding. In cases of PPH resistant to conservative medical treatment or conservative surgical compression sutures, obstetrical hysterectomy was done as a life saving measure.

## RESULTS

During the study period the total number of deliveries which occurred was 8713. Out of these 215 patients suffered from PPH. 6015 women were delivered vaginally, out of these 130 had PPH. While severe PPH not responding to conservative medical treatment occurred in 2 patients out of the 130 cases. However, 2479 patients delivered by C/S and out of these, 72 patients developed PPH and in 25 of these patients the PPH was severe and intractable.

159 patients had instrumental vaginal deliveries and out of them 13 patients developed PPH. However, the PPH in these cases was not severe and responded to either medical or surgical treatment. Comparative data of the 3 types of modes of delivery (MOD) and occurrence of PPH is shown in Table 1.

On statistical analysis of the data it was determined that the overall prevalence of PPH in this study was 215 out of 8713 deliveries i.e. 2.46%. Chi square test revealed significant association between the mode of delivery and PPH, p value <0.001. Chi square test for trend showed increasing trend for PPH from SVD to Instrumental delivery, p value < 0.001. Uterine atony, tears and trauma, retained placenta and inversion of uterus were the main causes of PPH in the study. However, trauma was more often associated with vaginal deliveries (both instrumental and spontaneous deliveries) as compared to caesarean sections. In the C/S group uterine atony was the leading cause.

An analysis of the risks associated with severe PPH showed that 25(92.52%) out of 27 cases of severe PPH occurred in patients delivered by caesarean section. Two expiries also occurred in the same group. Indications of caesarean sections were closely related with the risk of PPH. As can be seen from data of table 3, placenta previa, rupture uterus and previous caesarean sections contributed significantly to the group of patients who suffered serious morbidity, even near miss cases and two patients expired. As table 4 shows, 19 patients had obstetrical hysterectomies to save their lives however, 7 patients were saved by B-Lynch Brace Suture and one patient expired before any help could be extended to her. There were 6 cases of inversion of uterus, out of these 3 were delivered vaginally and 3 inversions occurred during C/S but all were

managed successfully by immediate replacement of delivery were related to efforts to pull at the placenta before it got separated from its bed. The cases of inversion of uterus at cesarean

Table 1: Year-wise comparative data of modes of delivery and PPH.

MOD / Year	Total No. of deliveries	No. of PPH cases	% of PPH	Commonest cause of PPH
<b>SVDs</b>				
2006	1985	52	2.61 %	Trauma
2007	2122	52	2.45 %	Trauma
2008	1968	26	1.32 %	Trauma
<b>Total</b>	<b>6015</b>	<b>130</b>	<b>2.13 %</b>	
<b>Caesarean sections</b>				
2006	719	22	3.05 %	Atony
2007	744	22	2.95 %	Atony
2008	1016	28	2.75 %	Atony
<b>Total</b>	<b>2479</b>	<b>72</b>	<b>2.90 %</b>	
<b>Instrumental vaginal deliveries</b>				
	<b>Forceps + Ventouse</b>			
2006	62 + 12	9	12.16 %	Trauma
2007	33 + 11	4	9.09 %	Trauma
2008	38 + 3	0	0	
<b>Total</b>	<b>133 + 26</b>	<b>13</b>	<b>8.16 %</b>	
<b>Grand Total</b>	<b>8713</b>	<b>215</b>	<b>2.46 %</b>	

Table 2: Comparison of mode of delivery and the cause of PPH

Mode of delivery	No. of cases of PPH	Tears / trauma	Uterine atony	Inversion of uterus	Retained placenta
SVDs	130	65(50%)	47(36.15 %)	3 (2.3 %)	15(11.5 %)
C-sections	72	25(34.72 %)	44(61.1 %)	3(4.1 %)	-
Instrumental	13	11(84.6 %)	2(15.4 %)	-	-
<b>Grand total</b>	<b>215</b>	<b>101</b>	<b>93</b>	<b>6</b>	<b>15</b>

Table 3: Comparison of indications of C/S with intractable hemorrhage

Year	Placenta previa	Rupture uterus	Obstructed labour	Twin pregnancy	Previous c/sections	Fetal distress	Placental Abruption
2006	4	0	1	0	2	2	0
2007	2	3	1	0	0	2	0
2008	1	1	0	2	2	1	1

Table 4: Comparison of Obstetrical outcomes and mode of delivery in cases of severe intractable and massive PPH

Year	MOD	Cause of PPH	No. severe PPH cases	B-Lynch suture	Brace	Obstetrical Hysterectomy	Expiry
2006	C/S	Atony	9	3		5	1
	SVD	Atony	1	1		-	-
2007	C/S	Trauma /atony	8	3		5	-
	SVD	-	0	0		0	-
2008	C/S	Atony	8	0		8	1
	SVD	Atony	1	0		1	-

## DISCUSSION

In the current study, the prevalence of PPH was 2.46%, which is not much different from the range reported in literature that is 5-18%<sup>8</sup>. The risk of severe PPH is reported as only 0.8% with active management of 3<sup>rd</sup> stage of labour and 4.9% with expectant management<sup>9</sup>; and in our study the overall prevalence of severe intractable PPH was 0.30% (27 case in 8713 deliveries) and 1% of caesarean section patients (25 cases in 2479 C/Ss) had a severe refractory hemorrhage. This low occurrence of severe

PPH in our unit was due to routine use of active management of third stage of labour in all the deliveries and use of misoprostol per rectum for those associated with high risks for PPH like multiple pregnancy and prolonged labour. As evident in table 4, a relatively larger proportion of caesarean sections were complicated by massive haemorrhage and intractable PPH each year during the study period, as compared to those delivered vaginally. This may be related to the indications for caesarean sections as given in table 3 i.e., placenta previa, obstructed labour, rupture uterus and previous caesarean

sections. The most common reason for PPH in both the C/S group and the SVD group was uterine atony. The occurrence of PPH during C/S was managed by utero-tonics drugs and B-Lynch Brace suture in 7 out of 27 cases and a total of 19 cases during the study period had obstetrical hysterectomies, whereas, one patient died before any of the operative measure could be adopted. Overall, two expiries occurred in the entire caesarean section group.

The data from the current study highlights that cesarean sections and instrumental deliveries are more likely to be complicated by PPH, and the decision of first cesarean section, and vaginal birth after cesarean section should be taken with utmost care and where possible it should be avoided but without compromising the fetomaternal welfare. According to Cook et al repeat cesarean sections are associated with significantly higher risk of placenta previa (16%) and placenta accreta (14%) leading to PPH<sup>10</sup>.

Further literature review studies has shown that a woman with one previous cesarean section had approximately 3 times risk of having a placenta previa at the time of delivery versus women with no previous C/S and this risk rises with the increasing numbers of caesarean sections and increases to 45 times for those patients with 4 or more caesarean sections<sup>11</sup>. Likewise, the risk of placenta accreta increases to more than 4 times for those with one previous C/S. All these contribute to higher risk of obstetrical hysterectomy and higher risk of maternal mortality and the risk of postpartum maternal death increases by 3-folds with C/S compared with vaginal delivery<sup>12,13</sup>.

Recent studies in Canada, USA, UK and Australia indicate an unexpected increase in PPH over past ten years. Although the maternal mortality is low, the maternal morbidity is quite significant in its impact on quality of life of these patients<sup>14</sup>. A recent study by Fullerton et al supports this observation and shows that significantly fewer women conceive a second pregnancy after a caesarean section complicated by PPH in their 1<sup>st</sup> pregnancy<sup>15</sup>. Most studies on relation between the mode of delivery and the risk of severe PPH show that caesarean delivery is associated with a higher risk of severe PPH compared to vaginal delivery<sup>16,17</sup>.

A study conducted in Karachi, reports the occurrence of massive hemorrhages after vaginal delivery and uterine atony as the most important cause of PPH (in 56.3% cases)<sup>18</sup>. However, Holm et al report that planned caesarean section was associated with a decreased risk of PPH compared with intended vaginal delivery<sup>19</sup> and short term medical outcome was found to be no different when planned vaginal delivery was compared with planned

caesarean section<sup>20</sup>. Prevalence of PPH was significantly higher in vaginal delivery group than in caesarean section group in an American study<sup>21</sup>, while in our study SVDs were mostly complicated by traumatic PPH and had lowest risk (2.13%) of PPH. This group was associated with the lowest morbidity and no mortality when compared to other two modes of deliveries.

Caesarean delivery is argued to be a protection from pelvic floor dysfunction associated with vaginal delivery particularly after forceps delivery<sup>22</sup>. In our study the instrumental deliveries (133 cases of forceps delivery and 26 cases of ventouse delivery) were not associated with severe refractory haemorrhage, however the leading cause for PPH was genital tract trauma. This mode of delivery revealed highest risk of PPH occurring in 13 cases of out of 159 instrumental deliveries (8.16%). The importance of evaluation of patients with dysfunctional labour by a senior obstetrician for the most appropriate route of delivery cannot be over-emphasized. It has been seen that planned caesarean section versus instrumental delivery is associated with less risk of blood loss due to PPH as well as damage to pelvic floor especially anal sphincter<sup>23</sup>.

Although it is difficult to compare the risk of PPH by mode of delivery or other obstetric interventions like induction of labour<sup>24</sup> these comparisons may lead to development of guidelines and protocols for a more careful assessment of patient and decision about the mode of delivery that is least injurious for the patient and her baby. Taking into consideration the results of our study we would emphasize the need of effective counseling of patients who wish to have elective caesarean section and want to avoid vaginal delivery.

## CONCLUSION

In order to achieve the Millennium Development Goals set by the United Nations in 2000 to reduce maternal mortality by three-quarters by 2015, maternal deaths related to postpartum haemorrhage (PPH) must be significantly reduced. In addition to appropriate training of health workers in developing countries, we need evidence-based guidelines on the safety, quality, and usefulness of the various interventions for all medical practitioners involved in obstetrics. These will provide the foundation for the strategic policy and programme development needed to ensure realistic and sustainable implementation of appropriate interventions.

PPH is preventable by simple cost effective measures and careful decision making regarding the mode of delivery, and following the up to date

guidelines and protocol for the decision making and management of obstetrical patients.

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## ERRATUM

The name of **Dr. Rakhshanda Toheed** was wrongly printed as Rakhshanda Toheer in her original article title "**Maternal Risk Factors among Pregnant Internally Displaced Person Women in Mardan, Pakistan**" published in *Pakistan Journal of Medical & Health Sciences*, Lahore, page No. 609-13; Vol. 7, Issue 3, Jul.-Sept., 2013 ISSN 1996-7195. This typographical error is regretted.