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Original Research Paper

Study of analysis of post-partum hemorrhage (PPH) in cesarean section

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ABSTRACT:
Introduction: Postpartum hemorrhage is defined as a blood loss of more than 500 mL, estimated with a vaginal birth or more than 1000 mL estimated with a caesarean delivery (PPH)[1]. Atonicity of the uterus is the most common cause of PPH. Primary postpartum hemorrhage (PPH) can occur in any pregnant woman without any risk factors[3,4] including in prepartum anemia[5], prolonged labor[6,7], induction of labor[8], delivery by Caesarean section[8,9] history of severe PPH[10], multiple pregnancies[10], preeclampsia[10], mothers with older ages[9], fetal macrosomia[9], and multiparity. Secondary consequences of bleeding include shock, adult respiratory distress syndrome, disseminated intravascular coagulation, acute renal failure, loss of fertility, and pituitary necrosis. Presebt study was planned with an objective to assess clinical profile, incidence, risk factors & outcome of caesarean section patients associated with PPH. **Materials and Methods**: With Ethics Committee approval and participant consent, 990 patients of LSCS were included in the study over a period of 6 months. A proforma was used to collect data. 990 participants enrolled in this study out of which 98 landed in PPH during LSCS, over a period of 6 months (oct 2023-march 2024). Out of 990 participants, data sub-groups were studied. After the patient underwent LSCS, management of PPH was analyzed. Maternal outcomes were further analyzed. Incidence calculation according to pre-operative history (demographic details, high risk factors, stage of labour and preceding antenatal factors). **Observations and Results**: The incidence of PPH was more in the age group 26-35 (62%) and least in the age group of >35(5%). Multipara (61%) were found at more risk for PPH compared to primipara (29%) and grandmultipara (10%). Incidence is found to be higher in singleton pregnancy (92%) than multiple gestation (8%) due to this study including more number of singleton pregnancies. PPH incidence is found to be highest in patients with pre-ecclampsia (43%) as compared to maternal anemia (41%), placenta previa (9%), Previous history of PPH (5%) and PAS (placenta accreta spectrum) (2%). antenatal risk factors such as previous caesarean section (46%), fetal macrosomia (9%), Polyhydramnios(8%), maternal obesity (morbid and class III (7%) were identified. 19% cases of induced labour resulted PPH. Whereas 10% of these cases had a prolonged second stage whereas 1% of cases were due to obstructed labour As more number of cases were performed under spinal anaesthesia , more was the reported incidence of PPH in these cases (95%) compared to general anaesthesia (5%). 81% cases of PPH had a blood loss of 1000 – 1500ml, whereas 16% cases had a blood loss of 1500 – 2000ml and only 1% of cases had a blood loss of >2000ml. 71% of cases required only PCV transfusion whereas 6% of cases required PCV, FFP and platelet transfusion. All cases of post-partum haemorrhage were managed medically (uterotonic agents) out of which 19% patients required surgical interventions including stepwise devascularisation (12%), bilateral uterine artery ligation (3%), uterine haemostatic sutures (2%) and obstetric hysterectomy (2%). 92% cases of PPH were managed in the ward, 6 % cases needed ICU admission, out of which 5 cases had a prolonged ICU stay and 1 case needed ventilatory support. 2% of cases had post-operative wound infection which required re-suturing. **Conclusion**: This study lays emphasis on the incidence, associated antenatal, intrapartum and postpartum risk factors as well as the management of PPH. Through this study it was concluded that the incidence of PPH in our tertiary care institute was approximately 9.9%. Most of the cases were managed successfully with medical management. Many of these cases needed PCV transfusions. Nearly 1/10th of these cases were managed in the ICU. Although most of the cases of PPH were managed only with medical management, a few of these cases needed surgical intervention with only 2 cases needing Obstetric hysterectomy.

Keywords: caesarean delivery (CD), PPH, fetal macrosomia

INTRODUCTION:

Postpartum haemorrhage is defined as a blood loss of more than 500 mL, estimated with a vaginal birth or more than 1000 mL estimated with a caesarean delivery (PPH)[1]. Atonicity of the uterus is the most common cause of PPH as when the placenta separates, inadequate contraction and retraction of the uterine musculature prevent the ruptured uterine sinuses from being sufficiently squeezed, which results in ongoing bleeding[2]. However, Primary postpartum haemorrhage (PPH) can occur in any pregnant woman without any risk factors[3,4] including in prepartum anemia[5], prolonged labor[6,7], induction of labor[8], delivery by Caesarean section[8,9] history of severe PPH[10], multiple pregnancies[10], preeclampsia[10], mothers with older ages[9], fetal macrosomia[9], and multiparity. During identification of risk factors for PPH in Caesarean section differences exist in patient, especially who undergo prelabour caesarean delivery (CD) and caesarean delivery (CD) after onset of labour or induction of labour as chorioamnionitis and oxytocin exposure[11,12,13], increases the risk of atonic PPH after labour induction. Compared to vaginal delivery, women undergoing caesarean delivery (CD) incur the highest risk of PPH and haemorrhage-related morbidity[16,17].

Severe postpartum haemorrhage (PPH) is an important cause of maternal morbidity. Secondary consequences of bleeding include shock, adult respiratory distress syndrome, disseminated intravascular coagulation, acute renal failure, loss of fertility, and pituitary necrosis[1]. Implementation of measures to lower the risk of maternal morbidity requires PPH prediction. International PPH Collaborative group has encouraged more studies using clinically-rich data for better understanding risk factors associated with PPH[18]. Once risk factors for PPH are identified, clinical predictive rules could be developed which could optimize patient outcomes by improving planning, timely mobilization of staff, resources such as preparing for blood products, obtaining additional venous access, and preparing additional equipment for PPH management before bleeding onset[19,20]. Present study was planned with an objective to assess clinical profile, incidence, risk factors & outcome of caesarean section patients associated with PPH

AIMS:

Study of analysis of post-partum hemorrhage (PPH) in cesarean section in tertiary care centre

OBJECTIVE:

1. To study incidence of post-partum haemorrhage (PPH) in caesarean section
2. To analyse the risk factors
3. study the management
4. To evaluate maternal outcome

MATERIALS AND METHOD:

With Ethics Committee approval and participant consent, 990 patients of LSCS were included in the study over a period of 6 months. A proforma was used to collect data. It included parameter details such as-

- Age
- Parity
- Gravida status
- Stage of Labour
- Operative history (mode of anesthesia, type of uterine incision)
- Antenatal risk factors (Induction of labour, prolonged second stage, obstructed labour, placental abruption, multiple pregnancies,)
- According to stage of labour
- Management
- Maternal outcome

990 participants enrolled in this study out of which 98 landed in PPH during LSCS, over a period of 6 months (oct 2023-march 2023). Out of 990 participants, data sub-groups were studied. After the patient underwent LSCS, management of PPH was analyzed. Maternal outcomes were further analyzed. Incidence calculation according to pre-operative history (demographic details, high risk factors, stage of labour and preceding antenatal factors)

Inclusion Criteria:

990 pregnant women >18 years old who underwent elective/emergency Cesarean sections during the study period of 6 months

Exclusion Criteria:

No exclusion criterion

Operational definition:

A. PPH definition:

1. **WHO definition**: Blood loss more than 500ml after vaginal delivery and blood loss more than 1 L after cesarean section. Severe PPH blood loss more than 1 L.
2. **ACOG definition:** Blood loss more than 1 L, irrespective of the type of delivery . Bleeding associated with signs and symptoms of hypovolemia.
3. **Clinical definition:** Fall in hematocrit by more than 10% at the time of admission and delivery. Excessive bleeding needing blood transfusion

B. **RCOG definition**:

a) **Mild PPH:** blood loss 500-1000 ml.

b) **Major PPH:** blood loss >= 1000 ml.
c) **Severe blood loss** >=2000 ml.

Statistical Analysis:
Statistical analysis was performed using medcalc software. Data were expressed as frequency with percentages N (%). Appropriate statistical test was used to evaluate statistical significance of data and association between two variables. Statistical significance was assumed if P value less than 0.05.

Observation and Result:

Table 1: Distribution of study subjects according to age

Sr No.	Age group	Number of cases (N=98)	Percentage
1	**18 to 25**	32	33 %
2	**26 to 35**	61	62 %
3	**>35**	7	5 %

The incidence of PPH was more in the age group 26-35 (62%) and least in the age group of >35(5%).

Table 2: Distribution of study subjects according to parity

Sr No.	Parity	Number of cases (N=98)	Percentage
1	**Primipara**	28	29 %
2	**Multipara**	60	61 %
3	**Grand multipara**	12	10 %

Multipara (61%) were found at more risk for PPH compared to primipara (29%) and grandmultipara (10%).

Table 3: Distribution of study subjects according to type of gestation

Sr No.	Type of gestation	Number of cases (N=98)	Percentage
1	**Singleton**	90	92 %
2	**Multiple gestation**	8	8 %

Incidence is found to be higher in singleton pregnancy (92%) than multiple gestation (8%) due to this study including more number of singleton pregnancies

Table 4: Distribution of study subjects according to associated antenatal factors in pregnancy

Sr No.	Associated antenatal factors	Number of cases (N=98)	Percentage
1	**Anaemia**	40	41 %
2	**Pre-eclampsia**	42	43 %
3	**Placenta Previa**	9	9 %
4	**PAS (Placenta accreta spectrum)**	2	2 %
5	**Previous history of PPH**	5	5 %

To conclude PPH incidence is found to be highest in patients with pre-ecclampsia (43%) as compared to maternal anemia (41%), placenta previa (9%), Previous history of PPH (5%) and PAS (placenta accreta spectrum) (2%).

Table 5: Distribution of study subjects according to antenatal risk factors of PPH

Sr No.	Antenatal risk factors of PPH	Number of cases (N=98)	Percentage
1	**Previous caesarean section**	45	46 %
2	**Bleeding diasthesis**	1	1 %
3	**Fetal Macrosomia**	9	9 %
4	**Polyhydramnios**	8	8 %

5	**Maternal obesity (morbid and class III obesity *BMI>30*)**	7	7 %
6	**No identifiable risk factor**	28	27 %

In this study, antenatal risk factors such as previous caesarean section (46%), fetal macrosomia (9%), Polyhydramnios(8%), maternal obesity (morbid and class III – 7%) were identified.

Table 6: Distribution of study subjects according to intrapartum risk factors of PPH

Sr No.	Intrapartum risk factors of PPH	Number of cases (N=98)	Percentage
1	**Induced labour**	19	19 %
2	**Prolonged second stage**	10	10 %
3	**Obstructed labour**	1	1 %
4	**No identifiable risk factor**	68	68 %

In this study, 19% cases of induced labour resulted PPH. Whereas 10% of these cases had a prolonged second stage whereas 1% of cases were due to obstructed labour

Table 7: Distribution of study subjects according to type of anaesthesia

Sr No.	Mode of Anaesthesia	Number of cases (N=98)	Percentage
1	**Spinal**	94	95 %
2	**General**	4	5 %

As more number of cases were performed under spinal anaesthesia , more was the reported incidence of PPH in these cases (95%) compared to general anaesthesia (5%).

Table 8: Distribution of study subjects according amount of blood loss

Sr No.	Blood Loss	Number of cases (N=98)	Percentage
1	**1000 - 1500ml**	80	81 %
2	**1500 - 2000ml**	16	16 %
	>2000 ml	2	1 %

To conclude, 81% cases of PPH had a blood loss of 1000 – 1500ml, whereas 16% cases had a blood loss of 1500 – 2000ml and only 1% of cases had a blood loss of >2000ml

Table 9: Distribution of study subjects according to type of blood and blood product transfusion

Sr No.	Blood and blood product transfusion	Number of cases (N=98)	Percentage
1	**PCV**	71	71 %
2	**PCV+FFP**	20	21 %
3	**PCV+FFP+Platelet transfusion**	7	6 %

To conclude, 71% of cases required only PCV transfusion whereas 6% of cases required PCV, FFP and platelet transfusion

Table 10: Distribution of study subjects according to management

Sr No.	Management	Group A Number of cases	Percentages
1	**Medical** (uterotonic agents)	98	100 %
2	**Surgical**	19	19 %
	Stepwise devascularization	12	12 %
	Bilateral uterine artery ligation	3	3 %
	Internal iliac artery ligation	0	0 %
	Uterine hemostatic suture (b lynch)	2	2 %
	Obstetric hysterectomy	2	2 %

All cases of post-partum haemorrhage were managed medically (uterotonic agents) out of which 19% patients required surgical interventions including stepwise devascularisation (12%), bilateral uterine artery ligation (3%), uterine haemostatic sutures (2%) and obstetric hysterectomy (2%).

Table 11: Distribution of study subjects according to maternal outcome

Sr No.	Maternal outcome	Number of cases (N=98)	Percentage
1	**Ward stay**	90	92 %
2	**ICU stay** **Prolonged ICU stay (>9 days)** • **Ventilator support**	6 5 1	6 % 5 1
3	**Post operative infection**	2	2

To conclude, 92% cases of PPH were managed in the ward, 6 % cases needed ICU admission, out of which 5 cases had a prolonged ICU stay and 1 case needed ventilatory support. 2% of cases had post-operative wound infection which required re-suturing

DISCUSSION:

Postpartum haemorrhage (PPH) continues to be a major source of morbidity among mothers worldwide. Unfortunately, there is a still lack of knowledge regarding its risk factors in many low- and middle-income nations. It's critical to comprehend the proportional contributions of the various risk factors for PPH. Present study was undertaken in 990 pregnant women >18 years old who underwent elective/emergency Cesarean sections during the study period. Total 990 participants who underwent a caesarean-section were analyzed. Demographic and clinical data including age, parity, type of pregnancy, operative history (mode of anesthesia, type of uterine incision) PPH risk factors (Placenta previa, GDM, Pre-eclampsia, Prior history of D&C or D&E, Prior history of myomectomy, Predelivery hemoglobin <8 g/dl, Prior Caesarean section), maternal morbidity & management were recorded from study enrolled patients. All data were compiled & analyzed. In present study majority of cases of Caesarean sections i.e., 61 (62 %) were between age group 26 to 35 years followed by 32 (33 %) cases which were from age group 18 to 25 years. Only 7 (5 %) cases were > 35 years old. In similar study by Hosseinzadeh et al (2023)[21] pregnant women were between age 18 years old and the maximum age of the participants was 45. Median (interquartile range) age was 31 (9) years. Dereje Zewdu et al (2023)[22] in their study found < 20 years cases 2 (3.45), 20–34 years 13 (2.26) & ≥ 35 years as 11 (11.46). In present study maximum cases i.e., 60 (61 %) were found multipara. In majority i.e., 90 (92 %) cases pregnancy was singleton. Amongst risk factors for PPH, Placenta previa was found in 9 (9 %) cases, Pre-eclampsia in 42 (43 %), prior history in 9 (9 %), Placenta accreta spectrum in 2 (2 %), Previous history of PPH in 5 (5 %). Prior Caesarean section found in 45 (46 %). In similar study by Dr. Alexander J. Butwik et al (2017)[23] they found clinical variables as placenta previa, multipara and general anaesthesia had the highest adjusted chances for severe PPH during prelabor CD. Clinical variables including predelivery haemoglobin ≤9.9 g/dl, multiple pregnancies, and general anaesthesia had the highest adjusted chances for severe PPH during intrapartum CD. Dereje Zewdu et al (2023)[22] in their study found women with age ≥ 35 years, poor ANC follow-up (< 2 visits), twin pregnancy and severe preeclampsia had severe PPH. Banu D et al (2024)[24] in their study found 72% (n=36) of participants had parity range of 1-2. 22% (n=11) had a history of previous PPH. Pre-eclampsia, a crucial concern, was recorded in 10% cases. In present study mode of anaesthesia was spinal in 94 (95 %) cases & general anaesthesia was required in 4 (5 %) cases. In maternal morbidity ICU stay was found required in 6 (6 %) cases. Wound infection was found in 2 (2 %) cases. In similar study by Dereje Zewdu et al (2023)[22] classic incision was significantly associated with severe PPH. Banu D et al (2024)[24] in their study found severe preeclampsia, CS scar ≥ 2, antepartum haemorrhage, maternal age ≥ 35 years, vertical incision, and general anaesthesia were risk factors associated with severe PPH among women who underwent CD.

Present study observed that mothers presented with GDM, Pre-eclampsia, Predelivery haemoglobin & Prior Caesarean section developed PPH. Pre-eclampsia contributed due to the multifactorial pathogenesis of preeclampsia, resulting in hypertension and coagulation abnormalities to cause bleeding that evolves into PPH. Mothers presented with previous CS scar ≥ 2 have 4.08 times more chance of having PPH when compared to mothers with one and no cesarean scar[25]. Presence of CS scar might cause uterine atony due to the formed adhesion and increased risk of abnormal placentation. Mothers with advanced age ≥ 35 years contribute

because obstetric complications and interventions increase as maternal age increases to[26].

CONCLUSION:

- This study lays emphasis on the incidence, associated antenatal, intrapartum and postpartum risk factors as well as the management of PPH.
- Through this study it was concluded that the incidence of PPH in our tertiary care institute was approximately 9.9%.
- Most of the cases were managed successfully with medical management. Many of these cases needed PCV transfusions.
- Nearly 1/10th of these cases were managed in the ICU
- Identification of antenatal risk factors such as maternal anaemia and pre-ecclampsia helped us in management of these cases.
- Factors causing overdistention of uterus such as multiple pregnancies and polyhydramnios were significant antepartum risk factors of PPH
- Induction of labour and prolonged second stage of labour contributed as significant intrapartum risk factors for PPH.
- Due to early detection and timely intervention, most cases did not record blood loss of > 2000 ml or progress to severe PPH.
- Although most of the cases of PPH were managed only with medical management, a few of these cases needed surgical intervention with only 2 cases needing Obstetric hysterectomy.

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