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Study of Primary Postpartum Haemorrhage at Term in A Tertiary Care Hospital

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Abstract
Background: *Postpartum Haemorrhage is a leading cause of maternal death responsible for approximately 68,500 deaths a year, 99.7% occurring in developing countries. It therefore represents a significant global health burden, disproportionately affecting those in the world's poorest countries. The aim of this study was to determine the prevalence, risk factors and management of primary postpartum haemorrhage in patients who delivered at a tertiary health care center in Goa.*
Methods: *A prospective observational study was conducted in term patients who delivered at a tertiary health care center in Goa over a period of 18 months.*
Results: *Incidence of postpartum haemorrhage during the study period was thus 1.62%. In most cases who had postpartum haemorrhage, no risk factor could be identified (25.4%). In cases with known risk factors, placenta praevia (14.9%) was commonly identified. Other risk factors commonly identified were PIH (15.7%), previous caesarean delivery (14%) and GDM (12.2%). Medical Management of Postpartum Haemorrhage at Goa Medical College was found to be in accordance with WHO recommendations for the same. In addition uterine artery ligation, uterine compression sutures, internal iliac ligation and obstetric hysterectomy were found to be commonly used surgical modalities in the management of PPH.*
Conclusions**:** *Good antenatal care, diligent management of labour and prompt response can greatly reduce the morbidity and mortality associated with postpartum haemorrhage*
Keywords: *Postpartum Haemorrhage, Placenta Praevia, Previous LSCS, Obstetric Hysterectomy*

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I. Introduction

Postpartum haemorrhage (PPH) is the most life threatening and often unexpected complication encountered by obstetricians in their practice. It remains one of the major causes of maternal death in both developed and developing countries[1]. According to recent statistics it accounts for approximately 68,500 deaths a year, 99.7% occurring in developing countries[2]. In developing countries, the estimated mortality rate is 140,000 per year or one maternal death every 4-min due to postpartum hemorrhage (PPH)[3].

In India, studies have shown PPH to account for 26.5% of maternal deaths[4]. It thus represents a chink in the armour in India's quest to achieve a maternal mortality ratio of 70 per lakh live births by 2030 as envisaged by the Sustainable Development Goals.

PPH is a consequence of several different pathologies that can occur in isolation or combination: uterine atony, genital tract trauma, retained placental tissue and coagulation dysfunction[1]. An individual's risk of excessive blood loss will be influenced by numerous pre existing or by pregnancy- related factors.

Incidence and severity of postpartum haemorrhage varies widely depending on the population studied and the obstetric practice. Postpartum haemorrhage related adverse clinical events will also vary depending on the individual. For example, the same blood loss could have no clinical consequence in a healthy woman but be a life threatening event in a woman with anaemia.

The accurate quantification of blood loss can be challenging. Visual estimation of blood loss has been shown to be inaccurate, with underestimation worsening at larger volumes[5]. Direct measurement of blood with an under- buttock calibrated drape correlates with laboratory based methods, although its accuracy depends on the timely placement without contamination of amniotic fluid or urine[5]

Many a times the management of postpartum haemorrhage is delayed to the detriment of the patient because the estimation of blood loss is inaccurate. Therefore accurate practical methods to estimate the blood loss would aid in the proper management of postpartum haemorrhage.

The maternal mortality rate due to atonic postpartum haemorrhage can be reduced by antenatal care, identification of high risk patients, active management of third stage of labour, and prompt management of patients who have postpartum haemorrhage.

The aim of this study was to determine the prevalence, risk factors and management of primary postpartum haemorrhage in patients who delivered at Goa Medical College.

II. Methods

The study was conducted in the Department of Obstetrics and Gynaecology, Goa Medical College.

Study Design: Prospective observational study.

Duration of Study: 18 months

Case definition: PPH was defined as blood loss of 500 ml or more during and after childbirth in case of vaginal delivery, and blood loss of 1000ml or more in case of caesarean section, or any amount of blood loss that caused hemodynamic compromise like tachycardia, hypotension, tachypnoea, or oliguria or that necessitated blood transfusion.

Inclusion Criteria:

- Women with PPH with gestational age of at least 37 weeks
- All modes of delivery (vaginal, instrumental and caesarean section)
- Women with blood loss >500ml in cases of vaginal delivery, blood loss > 1000ml in cases of caesarean section
- Women with any amount of blood loss post partum that causes hemodynamic instability.

Exclusion Criteria:

- Women with haemophilia, Von Willebrand disease and other coagulopathies.
- Women on anticoagulants
- Women who refuse blood transfusion(Jehovah's witnesses)
- Cases who delivered outside Goa Medical College and later were referred with complications

Active management of third stage of labour was performed in all patients.

Blood Loss at delivery was estimated using a combination of BRASSS V drape**(Figure I)**, visual and gravimetric methods.

The BRASSS-V drape was developed by the University of Missouri-Kansas City, Jawaharlal Nehru Medical College, Belgaum collaborative team specifically to estimate postpartum blood loss. The drape has a calibrated and funnelled collecting pouch, incorporated within a plastic sheet that is placed under the buttocks of the patient immediately after the delivery of the baby.

Figure I: BRASSS V Drape used for estimation of blood loss at delivery

Management of PPH

The team managing PPH included senior obstetricians, anaesthesiologists and haematologists.Emergency resuscitative measures included immediate intravenous access and fluid administration of crystalloids and colloids prior to the arrival of blood and blood products. Bimanual uterine massage was carried out. Blood transfusion: in the form of blood components which included packed cells, fresh frozen plasma, cryoprecipitate, and platelet transfusion. Bimanual uterine massage was carried out.

Medical Management: Uterotonic agents such as oxytocin, ergometrine, 15 methyl Prostaglandin F 2α (carboprost), 15 deoxy-16 hydroxy-16 methyl PG E1 (Misoprostol), Tranexamic acid were used alone or in combination.

Surgical Management: In the event of failure of medical management additional surgical methods were undertaken:

- Proper exploration of the genital tract under appropriate anaesthesia:
- Repair of vaginal/ cervical tear in cases of traumatic PPH
- Vaginal packing
- Manual removal of placenta in cases of retained placenta
- Repair of rupture of previous caesarean section scar
- Uterine artery ligation(unilateral or bilateral)
- Uterine compression suture
- Hypogastric artery ligation(unilateral or bilateral)
- Obstetric hysterectomy(subtotal/ total)

Detailed history and clinical data were recorded of the cases which satisfied the inclusion criteria using a standard pre formulated proforma.

Statistical Analysis: The data accrued was entered in a Microsoft Excel worksheet and analysed using Statistical Package for the Social Sciences (SPSS) 22 software.

III. Results

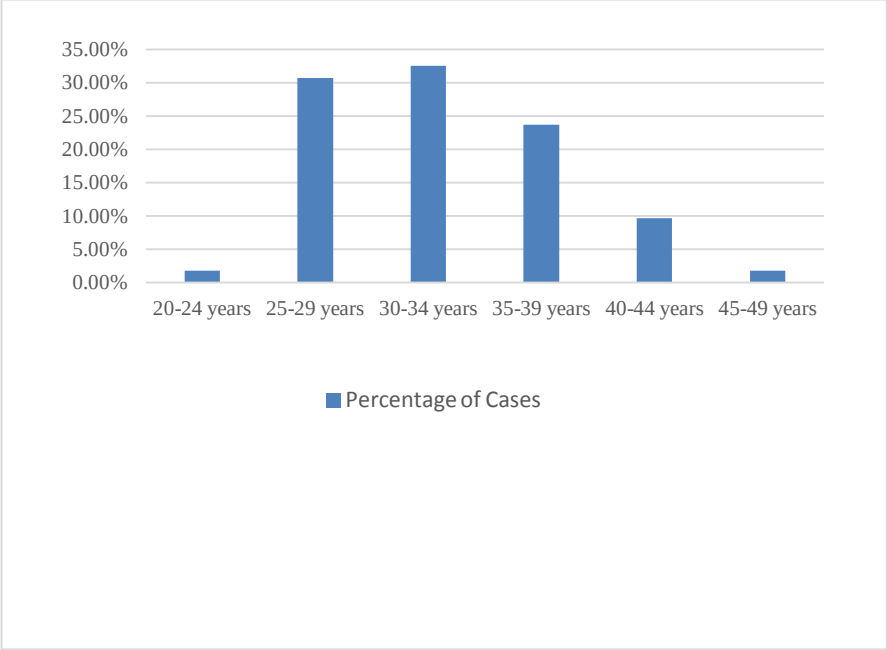
- The total number of cases of PPH observed during the study period was 114. Total number of deliveries during the same period was 7,025. ***Incidence of PPH*** during the study period was thus 1.62%.
- In most cases who had PPH, no ***risk factor*** could be identified (25.4% cases). In cases with known risk factors, placenta praevia (15.7% cases), PIH (14.9% cases), previous caesarean delivery (14% cases) and GDM (12.2% cases) were commonly identified. Other risk factors found were placental abruption (6.1% cases), anaemia (5.2% cases), and adherent [placenta (5.2% cases) and multiple gestations (4.3% cases)

Table I: Risk factors for PPH

RISK FACTORS FOR PPH	NUMBER OF CASES
No known risk factor	29
Placenta praevia	17
Pregnancy induced hypertension	18
Previous caesarean delivery	16
Gestational Diabetes Mellitus	14
Placental abruption	7
Fibroid	1
Multiple gestation	5
Anaemia	6
Uterine anomaly	3
Adherent placenta	6
Foetal malposition	5

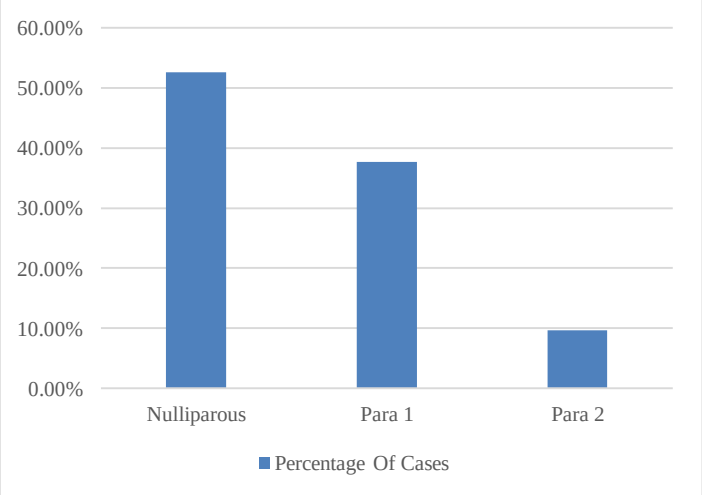
- PPH was commonest in the ***30-34 yea***r old age group (32.5%)

Table 2 : Distribution of patients with primary postpartum haemorrhage by age



- PPH was more common in ***nulliparous*** women (52.6% cases) as compared to multiparous women (47.4%).

Table 3: Distribution of patients with primary postpartum haemorrhage by parity



- PPH was more commonly observed among ***unbooked***(53.5%) as compared to booked cases (46.5%).
- PPH was more commonly observed in patients who delivered ***babies <3kg*** (61.3%) as compared to patients who delivered babies >3kg (38.7%).
- Amongst the patients who had PPH, misoprostol was the ***inducing agent*** most commonly associated with PPH (19 cases) followed by syntocinon (16 cases) and then dinoprostone gel (11 cases).
- ***Surgical modalities*** for control of PPH included uterine artery ligation (6 cases of unilateral uterine artery ligation and 13 cases of bilateral uterine artery ligation), internal iliac artery ligation (1 case), brace sutures (3 cases) and obstetric hysterectomy (10 cases**).**

Surgical Modalities Used for Management Of Postpartum Hemorrhage	Number Of Cases
Uterine Artery Ligation(unilateral)	6
Uterine Artery Ligation(bilateral)	13
Internal Iliac Artery Ligation	1
Uterine Compression Sutures	3
Obstetric Hysterectomy	10

Table 4: Surgical Modalities Used for Management of Postpartum Haemorrhage

- 50% of ***obstetric hysterectomies*** done amongst cases included in the present study were done for adherent placenta**.**

Table No 5: Indications for Obstetric Hysterectomy.

Indication for Obstetric Hysterectomy	Number of cases
Placenta accrete	2
Placenta increta	1
Placenta percreta	2
Atonic uterus	3
Rupture Uterus	2

- 54.4% of cases with PPH required ***transfusion of blood and blood products***. 54% of cases were transfused only packed cells, 14% were also transfused FFPS, 4 % were also transfused platelets, 3 % were also transfused cryoprecipitate.
- 9.65% cases with PPH required ***ICU admission***.
- Two ***maternal deaths*** with PPH as the inciting cause (AKI and VAPP were the direct cause)were observed during the study period. Three patients went into hypovolemic ***shock*** and were successfully revived by prompt resuscitation. Two patients went into ***disseminated intravascular*** coagulation secondary to the haemorrhage. Two patients went into ***acute kidney injury*** requiring dialysis.

IV. Discussion

The ***incidence*** of PPH in the present study was found to be 1.62%

Kodla et al found the incidence of severe obstetric haemorrhage at a tertiary hospital in Maharashtra to be 0.9%[6]. Ghosh et al in a study of 55,938 patients who delivered vaginally at primary health centers in Bihar, found the incidence of PPH to be 2%[7]. While a study conducted by Shirin et al in 4 government hospitals in Afghanistan, reported an incidence of 2.5%[8].

This ***wide discrepancy in the incidence of PPH*** reported in various studies could be attributed to an ***absence of consensus regarding the definition*** of PPH. The studies by Kodla et al[6], Ghosh et al[7] and Shirin et al all[8] used a differing amount blood loss to define PPH of 1.5L, 500mL, 1000mL respectively.

The ACOG in their latest guideline defines postpartum hemorrhage as cumulative blood loss greater than or equal to 1,000 mL or blood loss accompanied by signs or symptoms of hypovolemia within 24 hours after the birth process (includes intrapartum loss) regardless of route of delivery[9]. This is in contrast to the more traditional definitions of postpartum hemorrhage as an estimated blood loss in excess of 500 mL after a vaginal birth or a loss of greater than 1,000 mL after a cesarean birth.

Another factor which could explain the differing incidence of PPH reported in various studies is the ***different methods used to estimate blood loss***. Although quantitative measurement is more accurate than visual estimation for identifying obstetric blood loss, the effectiveness of quantitative blood loss measurement on clinical outcomes has not been demonstrated. A recent Cochrane Review of three international trials found no difference between subjective and objective methods of assessing obstetric blood loss when comparing outcomes of serious morbidity such as need for blood transfusion (adjusted relative risk, 0.82; 95% CI, 0.46–1.46), plasma expanders (adjusted RR, 0.77; 95% CI, 0.42–1.42), or uterotonics (RR 0.87; 95% CI, 0.42–1.76)[10].

Finally another important contributing factor to the lower incidence of PPH in the present study could be the ***level of healthcare*** provided to the labouring mothers. In the present study the patients delivered in a

tertiary healthcare center, the deliveries were conducted by trained gynaecologists. This in contrast to the study conducted by Ghosh et al[7] and Shirin et al[8] where the deliveries were conducted by midwifes.

A large number of cases in the study did not have any ***risk factor*** for PPH (29 cases). This is in accordance with studies published in literature[11]. This fact emphasises the need for high level of anticipation for PPH to be maintained whenever any patient delivers. A significant risk factor for PPH was found to ***placenta praevia and its invasive forms***. The results of this study assume particular significance for Goa given the findings of national family health survey 2019 -2020 , which found the percentage of mothers who delivered by caesarean section in Goa to be as high at 39.5% [12]when compared with the WHO recommended figure of 10% [13]

In the present study the highest percentage of PPH cases were observed in the ***age group*** of 30- 35 years (32.5%). This may be due to a bias in the study as most of the deliveries in the study period also took place in that age group. Contrary to most studies in literature[10], advanced age was not a risk factor for PPH, however similar findings were reported by Terence et al who concluded that advanced maternal age only served as a surrogate factor for PPH due to the associated increased risk factors, obstetric complications and interventions[14].

PPH was found to be more common among ***nulliparous (52.7%) as compared to multiparous patients*** (47.3%). None of the patients who had PPH were grand multiparous (parity of 4 or more). While this contradicts traditional teaching, recent studies have found no association between grand multiparity and severe haemorrhage[15].Morover it should be remembered that we live in an era of family planning with easy access to contraceptive and sterilization methods. With increasing number of couples being successfully counselled for ligation postnatally, grand multiparity as a risk factor for PPH is likely to lose its significance.

PPH was found to be more common among ***unbooked patients(53.5%) as compared to booked patients(46.5%).*** This calls for innovative measures to increase the antenatal coverage. The National Health Family survey (2015-2016) found the prevalence of pregnant women who had full antenatal care to be as low as 21%[16]. Possible reasons for such poor coverage are lack of awareness, inability to access health care facilities or inability to afford them.The Janani Suraksha Yojna (JSY) scheme, the Janani- Shishu Suraksha Katyakram (JSSK) scheme and more recently the Ayushman Bharat Yojna are aimed at improving antenatal coverage apart from ensuring free, institutional deliveries for all.

The Indian diet being primarily vegetarian, anemia is widely prevelant. The **National** Health Family survey (2015-2016) found the prevalence of pregnant women who were anaemic to be as high as 50.3%[16]. A comprehensive antenatal coverage will lead to earlier detection and correction of anaemia, thus translating to a reduction in the incidence of PPH

Contrary to previous studies published in literature[11], in the present study PPH ***was more common in mothers who delivered babies <3kg***(61.3%).This could be due to a bias in the study, as the average weight of the Indian newborn is 2.7kg[17] the total number of patients who delivered babies less than 3 kg was probably higher. Never the less, it is significant to note that despite the high prevalence of diabetes, just two of the patients in the study had macrosomic babies. Early detection and control of diabetes in pregnancy followed by elective caesarean section of patients suspected to have foetal macrosomia definitely contributed to reduce the significance of this risk factor in the present study.

Contrary to studies found in literature[11], in the present study ***induction of labour*** did not appear to a risk factor for PPH. This may be explained by the findings of Elsedeek et al in a study on evaluation of blood loss after misoprostol induced labour, which concluded that the postpartum blood loss with misoprostol induction was highest in women with already ripe cervices where misoprostol caused some form of iatrogenic precipitate labour[18]. Similarly Mary-Ann Davey in a retrospective cohort study on risk factors for PPH concluded that limiting the use of oxytocin infusions in labour to cases in which they are clearly indicated would likely reduce the number of severe PPHs[11]. In the present study induction of labour was done as per departmental protocol, after careful assessment of Bishops score by consultant gynaecologists. This could explain the apparent absence of association between induction and PPH in the present study.

In the present study it was found that packed cells were the most commonly ***transfused blood component***, with 54% of cases which required transfusion receiving only packed cells. The departmental protocol was thus found to be out of sync with current guidelines which recommend the initial transfusion ratio for packed red blood cells:fresh frozen plasma:platelets to be in the range of 1:1:1[9].

The incidence of ***obstetric hysterectomy*** in the present study was 0.14 /1000 deliveries.

This was lower as compared to the findings of Sharma et al who conducted a one year study on peripartum hysterecetomy at the Postgraduate Institute of Medical Education and Research, Chandigarh and found the incidence of PPH to be 6.9/1000 deliveries[19]. The study by Sharma et al concluded that the incidence of peripartum hysterectomy is increasing in this era not because of improperly managed third stage of labor or obstructed labor but most likely because of increasing incidence of cesarean sections[18]. 50% of obstetric hysterectomies in the present study were done for adherent/invasive placenta, all of them adherent/ invading a scar of previous caesarean section. This reinforces the urgent need to rein in the rising caesarean section rate.

The most mournful result of PPH is maternal mortality that adversely impacts every family member, especially the child that is left behind. Two ***maternal deaths*** secondary to PPH were noted in the present study, contributing to 13% of all maternal deaths during the study period at this tertiary care center. This compares favourably with the findings of Kodla et al which found the maternal mortality due to severe PPH to be 21%[6]. While PPH was certainly the precipitating factor in both cases encountered, the patients succumbed to complications (acute kidney injury, ventilator associated pneumonia) of the same. This emphasises the fact that the management of PPH requires a team interdepartmental effort involving physicians, haematologists and intensivists.

V. Conclusion

The problem of PPH was found to be a ***catastrophic experience*** for the mother and obstetrician even in this era of advanced obstetrics.The incidence of PPH in Goa Medical College in term patients was found to be 1.62%. It was found that ***accurate estimation of blood loss***, resulted in earlier recognition of the severity of the PPH apart from serving as a guide for replacement of blood and thus translating into better outcomes.

In the present study a significant number of cases had no risk factor for PPH. This calls for ***vigilant monitoring*** of all patients in labour and more importantly in the immediate postnatal period. In this study placenta praevia and its adherent forms, previous caesarean section were found to be the commonest risk factors associated with PPH thus highlighting the need to rein in the rising caesarean section rate. Other risk factors found were gestational diabetes mellitus, pregnancy induced hypertension, abruption placenta.

In conclusion ***good antenatal care, diligent monitoring of labour and prompt response*** can greatly reduce the morbidity and mortality associated with PPH.

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