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Comparison of Management Modalities in Cases of Primary Postpartum Hemorrhage

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Abstract: ***Introduction**: Primary postpartum hemorrhage (PPH) remains one of the leading causes of maternal morbidity and mortality worldwide. Despite improvements in obstetric care, it continues to pose a major clinical challenge, particularly in tertiary care referral centers. Early recognition and timely management are critical in preventing adverse maternal outcomes. **Aim and Objective**: To analyze the causative factors and management modalities in cases of primary postpartum hemorrhage. **Material and Methods**: This hospital-based observational study was conducted in the Department of Obstetrics and Gynaecology at a tertiary care center. A total of 152 women who developed primary PPH within 24 hours of delivery were included. PPH was defined as blood loss >500 ml following vaginal delivery or >1000 ml following cesarean section, or bleeding associated with signs of hypovolemia. Data regarding, obstetric risk factors, mode of delivery, severity, management interventions, and maternal outcomes were recorded. Patients were managed using a stepwise approach including medical, mechanical, and surgical modalities. Statistical analysis was performed using appropriate descriptive and inferential methods. **Results**: The majority of women were aged 20–29 years and multiparous. Cesarean section accounted for 58.6% of cases. Uterine atony was the most common cause (61.2%), followed by trauma (17.1%) and retained placental tissue (15.1%). Most cases were moderate in severity (66.4%). Medical management alone was effective in 68.4% of patients, while escalation to mechanical and surgical interventions was required in refractory cases. Blood transfusion was required in 55.9% of women, ICU admission in 5.3%, and maternal mortality was 0.7%. **Conclusion**: Primary PPH remains a significant obstetric emergency, with uterine atony as the predominant cause and medical managent remains the main stay for the management. Early diagnosis and protocol-based stepwise management are essential to reduce maternal morbidity and mortality.*

Keywords: Primary PostPartum Hemorrhage, uterine atony, obstetric hemorrhage, cesarean section. Maternal morbidity, blood transfusion, management modalities, maternal outcomes.

1. Introduction

Postpartum hemorrhage (PPH) is a leading cause of maternal morbidity and mortality worldwide. It is a serious obstetric emergency characterized by excessive bleeding after childbirth and requires prompt diagnosis and timely management. The burden is particularly high in resource-limited settings where access to emergency obstetric care is limited.[1] Improving maternal outcomes requires a clear understanding of its underlying causes and the implementation of evidence-based management strategies.

The prevalence of PostPartum Hemorrhage varies significantly by region, according to population - based studies, and is impacted by a number of factors, including access to skilled birth attendance, healthcare infrastructure, blood products, and surgical procedures [2]

Comprehensive maternal hemorrhage protocols have demonstrated promise in developed nations in lowering the use of blood products while also improving patient safety outcomes, underscoring the significance of methodical approaches to PPH management [3]

Recent hospital data analyses show evolving trends in the causes and management of primary postpartum hemorrhage, indicating that its incidence and associated factors continue to change.[4]

Numerous maternal and obstetric factors can interfere with the intricate hemostatic mechanisms that are part of the pathophysiology of Postpartum Hemorrhage. Recent studies have shown links between maternal anemia, fibrinogen levels, and the severity of postpartum hemorrhage, underscoring the important role of coagulation parameters during pregnancy and their relationship to postpartum bleeding[5]

2. Material and Methods

This hospital-based observational study was conducted in the Department of Obstetrics and Gynaecology at a tertiary care center. A total of 152 women who developed primary PPH within 24 hours of delivery were included. PPH was defined as blood loss >500 ml following vaginal delivery or >1000 ml following cesarean section, or bleeding associated with signs of hypovolemia. Data regarding demographic characteristics, obstetric risk factors, mode of delivery, etiology, severity, management interventions, and maternal outcomes were recorded. Patients were managed using a stepwise approach including medical, mechanical, and surgical modalities. Statistical analysis was performed using appropriate descriptive and inferential methods.

3. Results

A total of 152 subjects with Primary PPH during the study period were included in the study. The mean period of gestation was 38 ± 4 wks of gestation. Most of them were in

the age group of 20-29 yrs(mean age 26± 4.5 years) and multiparous (P2) -28.3% with P value of 0.0001. Most of the cases were illiterate (30.9%) and belong to lower socioeconomic status (modified kuppuswamy classification) -(59%) Most of the cases presented with prolonged leaking per vaginum >24 hours- (59.2%). The mode of delivery was mostly by LSCS and is associated with higher PPH. In this study various risk factors were studied and atonic PPH (Prolonged labor) was found to be most common causative factor for PPH followed by traaumatic PPH (cervical tear); retained placenta (fibroid); coagulopathy (liver disorders)

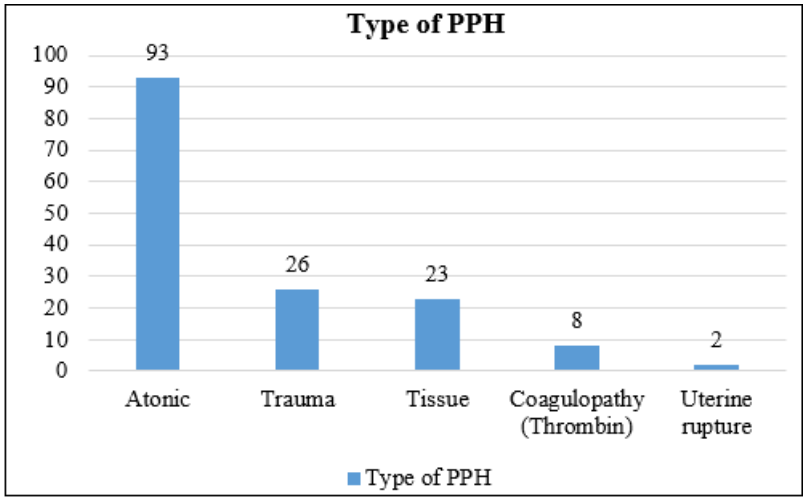

Figure 1: Bar diagram showing type of PPH

The above graph depicts the distribution of cases according to the type of PPH. Uterine atony was the most common cause, accounting for 61.2 % of cases, followed by traumatic causes (17.1 %) and retained placental tissue (15.1 %). Coagulopathy constituted 5.3 % of cases, while uterine rupture was observed in a small proportion (1.3%). The prevalence of atonic PPH emphasizes how crucial it is to actively manage the third stage of labor and detect uterine atony early in order to avoid serious maternal morbidity. The chi square goodness-of-fit test produced a statistically significant p value of 0.001.

Table 2: Distribution of cases based on severity of PPH (n = 152)

Parameter		Frequency	P value
Based on VABL (visual assessment of Blood loss)	Mild	49	< 0.0001
	Moderate	101	
	Severe	2	
Need For Blood Transfusion	Yes	85	< 0.03
	No	67	
Hb drop (g/dL)	<2	85	0.001
	2-4	64	
	>4	3	
ICU Admission	Yes	8	< 0.0001
	No	144	
Mortality	Yes	1	< 0.0001
	No	151	

The above table depicts that based on VABL most of the cases of PPH are of moderate intensity and its p value is significant. Based on need for blood transfusion most of the cases required for BT and fall of Hb <4 g/dl. Very few cases required ICU admission which is significant and only one case got mortality in which p value is highly significant statistically.

Table 3: Management interventions for PPH (n = 152)

Type of intervention	Frequency	Percentage (%)
Only medical	104	68.4
Only surgical	3	1.97
Medical + mechanical	19	12.5
Medical + surgical	16	10.5
Medical + mechanical + surgical	10	6.6
Total	152	100

The above table depicts the various management interventions employed in the treatment of Primary PPH. The majority of women (68.4 %) were managed with medical treatment alone, highlighting the effectiveness of first - line uterotonic therapy in controlling hemorrhage. Combined medical and mechanical interventions were required in 12.5 % of cases, while medical plus surgical management was needed in 10.5 % of women. Only a small proportion required surgical intervention alone (2.0 %) or a combination of medical, mechanical, and surgical measures (6.6 %). These findings emphasize that timely medical management can successfully control most cases of PPH, while stepwise escalation to mechanical and surgical interventions is crucial in refractory cases to prevent severe maternal morbidity and mortality.

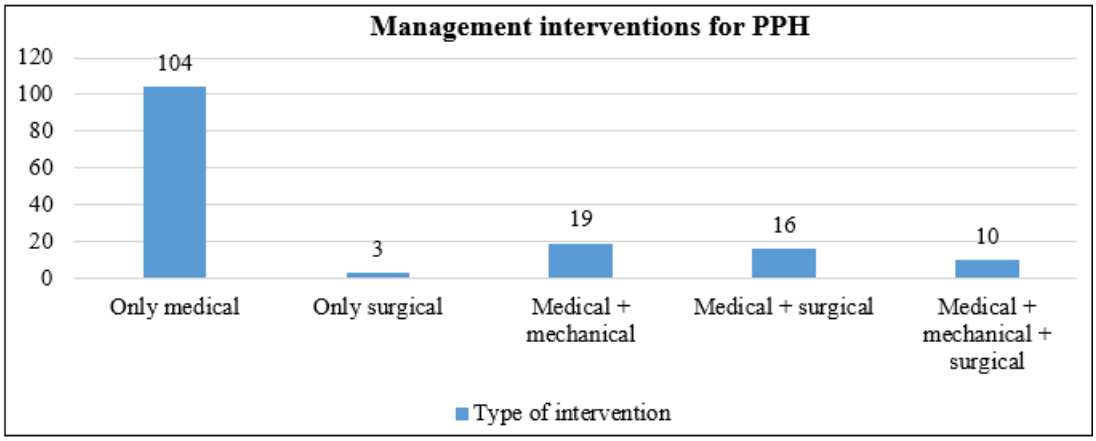

Figure 2: Bar diagram showing management interventions

Table 4: Association of Type of PPH with Risk Factors

Type of PPH	Risk factor	N value	p value
Atonic PPH	Multiparity	24	0.00003*
	Prolonged labour	22	<0.001*
	Obstructed labour	16	<0.001*
	Pre-eclampsia	12	0.003*
	Advanced maternal age	7	0.043*
	Second stage arrest	3	0.023*
	Fibroid uterus	2	0.003*
Traumatic PPH	Cervical tear	9	<0.001*
	Second stage arrest	8	<0.001*
	Vaginal tear	4	0.001*
	Perineal tear	4	0.001*
Tissue PPH (Retained placenta)	Fibroid uterus	9	<0.001*
	Incomplete placental separation	6	<0.001*
	Placenta accreta	4	<0.001*
	Arcuate uterus	3	0.003*
Coagulopathy	Liver disease	4	<0.001*
	Febrile illness	2	0.002*
Uterine rupture	Broad ligament hematoma	2	<0.001*

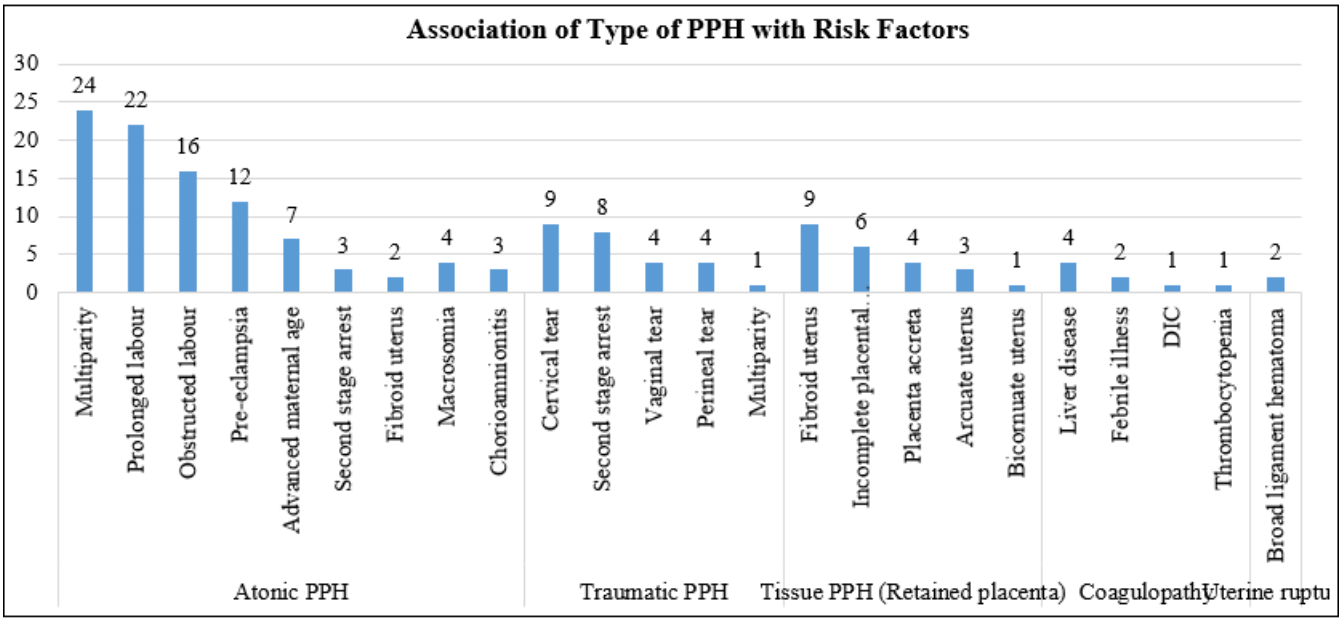

Figure 3: Association of Type of PPH with Risk Factors

4. Discussion

In the present hospital-based observational study of 152 cases of primary postpartum hemorrhage (PPH), most women were aged 20–29 years (62.5%) and were multiparous, suggesting that PPH remains common in peak reproductive age and increases with parity.

Similar age predominance has been reported by Marabasannanavar et al.[6], where most cases occurred in

women aged 20–30 years. However, their study had a higher proportion of primiparas, whereas our study showed higher occurrence among multiparas, possibly reflecting referral bias and differing obstetric profiles in tertiary-care settings. A significant proportion of PPH followed cesarean section (58.6%) in our study, indicating the strong association of operative delivery with PPH risk. In contrast, Marabasannanavar et al[6]. reported a near-equal distribution between vaginal and cesarean deliveries. The higher cesarean proportion in our series may be due to referral of complicated labor, prolonged labor, and intraoperative blood loss factors typical of tertiary referral centers.

Uterine atony was the leading cause of primary PPH in our cohort (61.2%), followed by trauma (17.1%) and retained placental tissue (15.1%).

Marabasannanavar et al[6]., where uterine atony was also the most common cause (68.6%).

The strong association between prolonged labor (>24 hours) and atonic PPH in our study supports the concept of uterine exhaustion as a key contributor to atony, reinforcing the importance of vigilant labor monitoring and timely intervention.

Regarding management outcomes, medical therapy alone controlled hemorrhage in 68.4% of cases, showing the effectiveness of early uterotonic-based treatment with stepwise escalation when needed. Evidence-based guidance supports intravenous oxytocin as first-line therapy for primary PPH due to atony, with misoprostol reserved where oxytocin is unavailable.

Similarly, a systematic review found secondary outcomes favored oxytocin over misoprostol in controlling severe bleeding and reducing need for additional uterotonics.

Blood transfusion requirement (55.9%) highlights the substantial morbidity burden of PPH, although ICU admission (5.3%) and maternal mortality (0.7%) were low, reflecting timely institutional response, availability of blood products, and protocol-based escalation.

Overall, our findings emphasize that uterine atony remains the predominant cause of primary PPH and that outcomes can be improved through risk stratification (including prolonged labor and operative delivery), early uterotonic therapy, and rapid stepwise escalation to mechanical or surgical measures where required.

5. Conclusion

Primary postpartum hemorrhage remains a significant obstetric emergency and an important cause of maternal morbidity. Uterine atony was the predominant cause, with multiparity, prolonged labour, cesarean delivery, and higher birth weight identified as key associated factors. The association between prolonged labour and atonic PPH highlights the importance of vigilant intrapartum monitoring.

Most cases were successfully managed with medical therapy; however, timely escalation to mechanical and surgical interventions was essential in refractory cases. Although maternal mortality was low, PPH continues to carry potential life-threatening risks. Early risk identification, active management of the third stage of labour, and adherence to standardized protocols are crucial to improving maternal outcomes.

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