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Original Research Article

Postpartum Blood Loss in Induced Verses Spontaneous Vaginal Delivery: A Descriptive Observational Study

Minakshi Bajpayee[1], Priyanka[2], Abha Rani Sinha[3]

[1]Senior Resident, Department of Obstetrics and Gynaecology, Sri Krishna Medical College and Hospital, Muzaffarpur, Bihar.

[2]Senior Resident, Department of Obstetrics and Gynaecology, Sri Krishna Medical College and Hospital, Muzaffarpur, Bihar.

[3]Professor and Head of Department, Department of Obstetrics and Gynaecology, Sri Krishna Medical College and Hospital, Muzaffarpur, Bihar.

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Corresponding author: Dr Priyanka

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Abstract

Background: The most severe and potentially fatal complication of vaginal birth is postpartum haemorrhage (PPH). Blood loss of more than 500ml during vaginal birth is referred to as PPH. Primary PPH is what it is called if it happens within 24 hours of delivery. Secondary PPH is the term used when it arises after 24 hours and within 6 weeks following delivery. The aim of this study is to compare third stage blood loss during induced vs. spontaneous vaginal deliveries and to determine whether the volume of blood loss correlates with the subsequent drop in hemoglobin.

Methods: From January 2022 to December 2022, the current descriptive observational study was carried out in the Obstetrics and Gynecology Department at SKMCH in Muzaffarpur, Bihar. When 300 pregnant women underwent vaginal deliveries through labour induction, blood loss after placental deliveries was assessed using special collection bags, and it was compared to blood loss in another 100 women who underwent spontaneous vaginal deliveries. Each patient's haemoglobin levels were noted both before and after the child was delivered.

Results: The difference in mean blood loss between the induced and spontaneous groups was 30 mL (202±117 vs. 172±114 mL), although this difference was not statistically significant (p=0.12). However, when various induction techniques were evaluated, it was discovered that the oxytocin group had much more blood loss (327±140 mL) than both other labour induction techniques and spontaneous deliveries. When compared to spontaneous deliveries, the blood loss caused by prostaglandin-assisted labour induction was not greater. Post-delivery haemoglobin values in both the induced and spontaneous delivery groups showed statistically significant drops, but the induced group's drop was relatively greater than that of the spontaneous vaginal delivery group (0.96gm/dL vs. 0.56gm/dL), which appeared to be statistically significant (p=0.001).

Conclusion: Using prostaglandins to induce labour is safer than using oxytocin. All deliveries require an accurate calculation of blood loss in order to identify postpartum haemorrhage early and take the necessary precautions.

Keywords: Third Stage Blood Loss, Postpartum Haemorrhage, Labour Induction, Oxytocin, Prostaglandins.

Introduction

A 500 mL or more amount of genital bleeding within the first 24 hours of the baby's birth is considered a primary postpartum haemorrhage (PPH) [1]. In poorer nations, it is one of the main causes of maternal mortality [2]. Over the years, a number of risk factors have been found to contribute to its prevalence. According to recent estimates, haemorrhage accounts for at least 18,000 maternal deaths annually around the world, or at least 25% of all maternal deaths [3]. The majority of these deaths take place four hours or less after delivery and are caused by issues that arise in the third stage of labour [4].

Postpartum haemorrhage has been linked to a number of risk factors, including Asian racial background, anaemia, hypertension, prior PPH, history of retained placenta, multiple pregnancies, antepartum haemorrhage, macrosomia (>4 kg), chorioamnionitis, uterine over distension, epidural anaesthesia, prolonged first/second stage of labour, induction labour, etc. [5]. Oxytocin-induced labour induction or augmentation has been shown to increase the incidence of postpartum haemorrhage in numerous studies[6,7]. Nevertheless, the use of prostaglandin analogues for labour induction in modern medicine has claimed that there is no difference [8] in the amount of bleeding that follows deliveries compared to what happens following spontaneous vaginal deliveries, however the evidence for this assertion is relatively thin.

It is crucial to recognise third stage blood loss as soon as possible in order to start therapy right away and lower PPH-related morbidity and mortality. Yet, practitioners almost always rely on observer-based, inaccurate visual assessment of blood loss at delivery. Blood loss is frequently underestimated, which causes intervention to be delayed. In this context, a specially made bag measurement of blood loss is more precise than a visual guess and may be especially useful in underdeveloped countries [9]. This study uses quantitative analysis of blood loss during vaginal and induced births to identify which population is more susceptible to postpartum haemorrhage.

Materials and Methods

From January 2022 to December 2022, this descriptive observational study was carried out in the Department of Obstetrics and Gynecology, Sri Krishna Medical College and Hospital, Muzaffarpur, Bihar. 400 pregnant women made up the study's sample; of these, 300 delivered vaginally after having their induction of labour, while the remaining 100 served as controls. The study excluded participants with a history of bleeding issues or those who were receiving heparin medication.

Each woman gave a thorough history, and on each general physical examination were conducted. Preeclampsia, gestational hypertension, gestational hyperglycemia, and a prior history of postpartum haemorrhage were properly noted as risk factors. Before the induction, the patients' written informed consents were obtained. The doctors who were in charge of the patient selected the method of induction.

Using a blood collection bag that was specifically created for the purpose, the blood lost throughout the third stage of labour was tracked. Each patient's haemoglobin levels were noted before labour began and on the first postpartum day. The mother's age, parity index, gestational age, duration of labour, induction method, and indication for induction were all noted. After placental discharge, Methergine 0.2 mg IM was given to all patients, whether or not they had been induced, and those who had hypertension got inj. Prostodin 250 mcg intramuscularly. Furthermore, noted were the infant's weight, any accompanying problems, and the APGAR scores at 5 and 10 minutes were noted.

The SPSS statistics software was used to conduct the statistical analysis (version 14 for windows). Chi-square (χ^2) test for cross tab data, independent t-tests for comparison of blood loss between induced and spontaneous delivery groups, ANOVA for variations within induced groups, and paired t-test for paired observations were used to compare cases and controls (haemoglobin changes before and after delivery). At a p-value of 0.05, the difference was deemed statistically significant.

Results

400 patients in all were investigated over the course of a year; 300 of them gave birth vaginally when labour was induced, and the other 100 spontaneously. Age, height, weight before birth, and parity index were all closely matched between the two groups [Table -1].

Table 1: Demographic characteristics of study and control groups a. independent t-test, b. chi sq. tests

Variables	Induced (n=300)	Spontaneous (n=100)	p-value
Maternal Age (yrs.)	26.4±3.87	27.2±3.80	0.22a
Height (mtr.)	1.543±0.04	1.548±0.05	0.54a
Weight before delivery(kg)	62.23±8.06	64.29±10.04	0.61a
BMI	27.4±3.24	26.8±4.15	0.45a
Parity			
• Nullipara	178(59%)	50(50%)	
• Primipara	104(35%)	46(46%)	
• Multipara	18(6%)	4(4%)	0.34b
Antenatal Complications			
• Preeclampsia	72(24%)	6(6%)	0.001b
• Gestational Hypertension	24(8%)	2(2%)	0.13b
- Essential Hypertension	18(6%)	Nil	0.07b
- Gestational Hypertension	48(16%)	8(8%)	0.15b
• IUGR	36(12%)	4(4%)	0.10b
• Oligoamnios	30(10%)	4(4%)	0.18b
• PROM	54(18%)	6(6%)	0.03b
• Past Dates	18(6%)	Nil	0.07b
Gestational age at labour (wks)	37.1±1.75	38.2±1.91	<0.01a
Duration of labour (hrs)	6hr56min±2hr34min	5hr28min±2hr24min	0.002a
Hb before delivery (gm/dL)	12.01±0.86	12.19±1.27	0.39a
Birth Weight (kg)	2.853±0.386	2.901±0.430	0.55a

The policy of routinely inducing labour in them by 38 weeks of gestation may be to blame for the statistically higher incidence of preeclampsia in the induced group. Prelabor membrane rupture also occurred more frequently in the induced group, as delivery was required if the patient did not enter spontaneous labour. In this group patients who had completed 37 weeks of gestational age after induction was very much low in number. Moreover, the length of labour was considerably longer in the induced group (6 hrs 56 min vs. 5 hrs 28 min). Between the two groups, there were no discernible variations in the haemoglobin levels and birth weights.

The techniques and medications utilised in labour induction are shown in Table -2. In 31 patients, we used two surgical induction techniques, artificial rupture of membranes (ARM) whenever the cervix was favourable and 3 cm dilated, followed by continuous oxytocin infusion. In 59 cases, and in some cases, it was repeated every eighth hour, intracervical dinoprostone E2 gel was used to ripen the cervix when the Bishop score was low. Preinduction cervical preparation was performed on 40 participants using oral mifepristone 200 mg, followed by intracervical cerviprime 24 hours later. When there was a frank leak, oral primiprost (PGE2 - dinoprostone) was utilised because intracervical cerviprime was likely to be discharged by spilling out of the vagina.

Table 2: Methods of induction

Artificial Rupture of membranes (ARM) followed by Oxytocin intravenous infusion	**62**
Intracervicaldinoprosione E2 gel (Cerviprime)	118
Oral Mifepristone followed by intracervicaldinoprostone gel	80
Oral dinoprostone (PGE2) tablets (Primiprost)	40
Total	300

Table -3 displays the analysis of third stage blood loss in two major groups and subgroups of induced groups (means and standard deviations). About 30 mL more blood was lost on average in the induced group than in the spontaneous group. Yet, this variation was not statistically significant (independent t-test statistics revealed p value of 0.12). Compared to other techniques of induction, artificial rupture of the membranes (ARM) followed by oxytocin caused the most blood loss in the group that had been induced. ANOVA (one way analysis of variance) was carried out to ascertain the variance within the induction group. Significant differences in blood loss were found in the test's [Table -4] across and among various induction groups (f-value: 20.8, p-value <0.001).

Table 3: Third stage blood loss in various groups in mL

Numbers	**Mean**	**Std. Dev.**
According to the type of delivery		
Induced delivery	202	117
Spontaneous delivery	172	114
According to the method of induction		
ARM and oxytocin	327	140
Cerviprime	173	99
Mifeprostone and Cerviprime	165	64
Primiprost	166	70

Table 4: One way analysis of variance (ANOVA) of blood loss variation

	Sum of Squares	**Df**	**Mean square**	**f**	**Sig.**
Between groups	611930.175	3	203976.725	20.829	0.0001
Within groups	1429740.659	146	9792.744		
Total	2041670.833	149			

Using Tukey's post hoc testing, different induction techniques were compared pairwise. When compared to the other groups, it was discovered that the ARM and

oxytocin group had significantly increased blood loss. Blood loss was equivalent and smaller in different prostaglandin types, and it did not differ statistically. The statistical findings are displayed in [Table -5].

Table 5: ANOVA Post-hoc Statistics (Tukey's test)

Induction of protocols	Number	Different (p<0.05) from
ARM and Oxytocin	62	Cerviprime Mifeprostone with Cerviprime Primiprost
Cerviprime	108	ARM & Oxytocin
Mifeprostone & Cerviprime	80	ARM & Oxytocin
Primiprost	40	ARM & Oxytocin

To find out which induction protocol was linked to more blood loss than spontaneous deliveries, additional analysis was performed to compare the blood loss in different induction protocol groups with that in the spontaneous delivery group. In [Table -6], the findings of independent t-tests are presented. Moreover, the oxytocin group lost blood more frequently than the spontaneous group. When compared to women who gave birth naturally, blood loss following prostaglandin-induced labour did not increase.

Table 6: Third stage blood loss in various induction protocols compared to spontaneous deliveries

Type of induction (n)	Control (n)	p-value
ARM & Oxytocin (62)	Spontaneous (75)	<0.0001
Cerviprime (108)	Spontaneous (75)	0.94
Mifeprostone & Cerviprime (80)	Spontaneous (75)	0.74
Primiprost (40)	Spontaneous (75)	0.83

The haemoglobin readings before labour and the first postpartum day have changed, as shown in Table -7. Haemoglobin levels dropped in both the induced and spontaneous delivery groups, although the drop in the induced group was comparatively greater than the drop in the spontaneous vaginal delivery group (0.96 gm/dL vs. 0.56 gm/dL), which appeared statistically significant (p=0.001). Five women in the induced group experienced postpartum haemorrhage, which is defined as blood loss of more over 500 mL. Four of the five cases occurred in the oxytocin group, one in the cerviprime group, and all five cases were successfully treated without the need for surgery. In the group of spontaneous vaginal deliveries, there were no such cases.

Table 7: Changes in the hemoglobin after delivery

	Hemoglobin before delivery		Hemoglobin after delivery		Significance
	Mean	Std. Dev.	Mean	Std. Dev.	p-value*
Induced Delivery (n=300)	12.01	0.86	11.05	1.19	0.001
Spontaneous Delivery (n=100)	12.19	1.27	11.63	1.21	0.001

Discussion

According to recent studies, labour induction occurs in between 9.5 and 33.7% of all pregnancies each year. It is commonly accepted that patients whose labour is stimulated with oxytocin induction or augmentation experience more third stage blood loss than those who deliver naturally. This is due to the fact that the uterus, which contracts under the influence of the oxytocin hormone during the initial stage of labour, occasionally fails to do so after the baby has been delivered and the placenta has been expelled. Another factor that is frequently cited is the increased risk of premature labour in these women due to the inappropriate usage of oxytocin (however it was not seen in this study, as we were very cautious with oxytocin). However, prostaglandins outperform oxytocin induction because they can modify the structure of the immature cervix, making it easier to dilate during the early stages of labor [10]. As a result, they are used more frequently now. Another benefit is that there are numerous analogues that are available and can be employed through various ways [11]. Prostaglandins were used to induce labour in numerous studies, and this method was linked to less third stage blood loss [12].

The incidence of primary postpartum haemorrhage in various labour induction techniques has been the subject of numerous research, but there is little information available in the literature about the precise amount of blood loss that happens during the third stage of labour. In a prior trial conducted in the United States, more blood was lost in the group that received oxytocin (333±298 mL) than in the control group (345±285 mL) [13]. The average blood loss in the induced group was 235 mL, while the average blood loss in spontaneous vaginal deliveries was 205 mL, according to Brinsden and Clark from St Mary's Hospital in Portsmouth, Hampshire [14].

In our study, blood loss in the oxytocin group was comparable (334±147 mL), but less so (172±114 mL) in the control group. The current approach of actively managing third stage labour to limit blood loss may be to blame for this.

Induction with misoprostol led to blood loss, according to a study conducted in Jamaica [15]. The mean amount of blood lost at birth was significantly higher in all cases of induced labour than it was in situations when it wasn't. The lowest mean blood loss for controls (100±130 mL) occurred in cases where predelivery oxytocin was not required, whereas the highest mean blood loss occurred for misoprostol (162.5±190 mL), oxytocin (150±100 mL), and oxytocin with misoprostol (150±150 mL). We do not support the use of misoprostol in third trimester labour induction due to various side effects that are connected with it.

Many studies that have been conducted on the use of dinoprostone (PGE2) for labour induction by different ways have mostly focused on the incidence of postpartum haemorrhage, which was defined as a blood loss greater than 500 mL, but not on the amount of third stage blood loss. Prostaglandin induction was not linked to a higher incidence of postpartum haemorrhage compared to controls, according to Howarth GR and Botha DJ's Cochrane meta-analysis review [16]. The current study also showed that, as compared to women who gave birth spontaneously, prostaglandin induction (either by oral or vaginal route) was not linked to greater blood loss.

The haemoglobin levels in the induced and spontaneous delivery groups after deliveries (12.01±0.86 gm/dL to 11.05±1.19 gm/dL, 12.19± 1.27 to 11.63±1.21 gm/dL respectively) were not significantly different in the current study. This could be because neither group's third-stage blood loss showed

a significantly different amount in the current investigation. A significant decline in haemoglobin levels did not occur after delivery unless it was preceded by postpartum haemorrhage, according to Bhullar A *et al* study of haemoglobin alterations in the normal population as opposed to those in the buccal misoprostol group [17].

Most studies on the calculation of third stage blood loss were based on ocular estimates of the blood loss that happened at the time of placental delivery, which were occasionally 25 to 50% off[18].

A prospective study was carried out at the National University Hospital in Singapore by Razvi K *et al*. They contrasted laboratory measurements of measured blood loss with ocular estimation of blood loss (EBL) upon delivery (MBL). When MBL was between 301 and 500 mL, there was a propensity to underestimate blood loss [19].

Another randomised controlled trial by Patel *et al*. found that the visual estimate of blood loss was 33% lower than the drape estimate. This study involved 123 women who gave birth at the District Hospital in Belgaum, Karnataka, India. The measurement of blood loss using a drape was said to be more accurate than visual estimation and may be especially useful in underdeveloped countries [9]. We used a blood collection bag with a calibrated collection pouch that was identical to the BRASS-V drape used in the Belgaum trial [9] for our study.

In our investigation, we discovered that this method was very helpful for providing an accurate evaluation of blood loss. This method of blood loss estimation may be useful for identifying acute postpartum haemorrhage, which can happen in cases of anaemia and preeclampsia, and for prompting the implementation of effective intervention strategies [20].

Conclusion

The process of giving birth has become somewhat safer thanks to modern labour induction techniques that use prostaglandins, although oxytocin must occasionally be administered, particularly when labour augmentation is necessary. Nevertheless, postpartum haemorrhages can happen with any delivery method, including oxytocin or prostaglandin inductions. It is crucial to recognise them as soon as possible in order to reduce maternal death and the accompanying morbidity. The blood collection method described in this study is precise, simple to use, and somewhat pricey (about Rs. <100 per sterilised bag). Also, it enables early postpartum haemorrhage identification, particularly in conditions like anaemia and preeclampsia when even modest amounts of blood loss can have disastrous effects.

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