

A Prospective Comparative Study on Clinical Estimation of Intraoperative Blood Loss with Postoperative Hemoglobin and Packed Cell Volume in Patients Undergoing Caesarean Section

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DOI: <https://doi.org/10.52403/ijhsr.20240133>

ABSTRACT

BACKGROUND: Obstetrical haemorrhage is a potentially preventable cause of mortality and morbidity. It's important to know the co-relation between intraoperative blood loss and post operative Hb and PCV in a patient undergoing LSCS for timely management of any obstetric haemorrhage.

AIM: The aim of the study is to compare clinically estimated intraoperative blood loss with postoperative Hb and PCV in patients undergoing caesarean section.

MATERIALS AND METHODS: Visual method of clinical estimation of blood loss assessment was adopted for assessing total intraoperative blood loss during the surgery. Total intraoperative blood loss was visually estimated and documented by counting the blood-soaked mop pads, blood in suction after deducting the saline for wash, weighing the blood clot and multiplied them with the estimated volume of blood it would hold. Sum of all these parameters will give total intraoperative blood loss. Then we assessed the correlation by getting the laboratory Hb and PCV.

RESULTS: The Pearson's value and 'p' value of postoperative laboratory Hb is -0.106 and 0.244. Pearson's value and 'p' value of postoperative laboratory PCV is -0.165 and 0.068.

CONCLUSION: we observed that there was no statistically significant correlation between total intraoperative blood loss with the postoperative laboratory Hb and PCV. There was no indication for intraoperative or postoperative transfusion of blood to the patients after the LSCS

Keywords: Hemoglobin, Intraoperative blood loss, Lower segment caesarean section, Packed cell volume, Postoperative, visual method.

INTRODUCTION

Obstetrical haemorrhage is a potentially preventable cause of mortality and morbidity. Controlling and management of haemorrhage or bleeding in caesarean section is the one of the important responsibility of Obstetricians and Anesthesiologist (3). The one major cause of the direct maternal death in Obstetric

practice is haemorrhage (3). The postpartum anemia is an important etiological factor that is associated with adverse maternal outcomes. However, it is important to know about the relationship between the overall blood loss and post caesarean section hemoglobin and packed cell volume level of the patient. Judicious estimation of intra operative blood loss during caesarean

section is important in terms of decreased perioperative morbidity and to avoid the risk associated with unnecessary blood transfusion. Accurate estimation of the blood loss is a paramount, as it may alter the timing of interventions to control the blood loss and alter the timing of blood transfusion. Over the years different types of methods have been used to estimate the intra operative blood loss which is important for perioperative management of these patients. Visual estimation is one of the commonly used methods because it is quick, convenient and easy (2). Clinical method of assessment of blood loss includes counting the blood-soaked mops, gauze pieces and multiplying them with the estimated volume of the blood they carry (2). We then measure the blood suctioned in bottles during the surgery. Estimating blood loss calculated by these parameters will give the total intraoperative blood loss. When determining whether a patient requires blood transfusions, the clinical estimation of intraoperative blood loss is frequently the only consideration. However, there are questions over the clinical estimation's accuracy. It is necessary to standardize this study. Consequently, a clinical approach of estimating blood loss is connected with the laboratory hemoglobin and packed cell volume value. Then compares postoperative hemoglobin and packed cell volume with clinically assessed intraoperative blood loss in individuals having Lower segment caesarean section.

MATERIALS & METHODS

This observational prospective study was approved by Yenepoya ethical committee after the approval from scientific review board and informed consent was obtained from all patients before participation in the study. The study was conducted from department of Obstetrics and Gynecology Operation theatre complex, preoperative ward, and post-operative ward of Yenepoya Medical College Hospital between December 2022 and June 2023. 123 was estimated based on G*power software

participants who met the following inclusion criteria were included in the study, they were between the age group between 20-45 years, Pregnant women undergoing lower segment caesarean section in Yenepoya Medical College Hospital and willing to participate in study, Pregnant women who are hemodynamically stable and fall under ASA II risk classification, Pregnant women with hemoglobin of 10gm/dl and above. The Pregnant women undergoing lower segment caesarean section in Yenepoya Medical College Hospital and not willing to participate, Patients undergoing normal delivery, Pregnant women who are hemodynamically unstable and fall more than ASA II risk classification, non-cooperative pregnant women, Pregnant women with hemoglobin of less than 10gm/dl were excluded from the study. By using convenient sampling method, 123 participants were selected. For statistical analysis the continuous variables are summarized using mean and standard deviation. The Pearson correlation between blood loss and hemoglobin level is computed and its significance is tested using correlation test.

After obtaining institutional review board approval and the Yenepoya Ethics Committee 2, performed a prospective comparative observational study on 123 pregnant patients who underwent caesarean section in order to assess the correlation between the intraoperative blood loss with postoperative laboratory hemoglobin and the PCV. The prospective observational study was performed in the women undergoing caesarean section under the neuraxial anaesthesia. The participants who had been enrolled in the study were on their voluntary basis after obtaining the written informed consent. The informed consent was obtained from the patient in the language that the patient understood. Before shifting the patient inside the operation theatre for the procedure of lower segment caesarean section the baseline preoperative hemoglobin was documented. Then the patient was shifted inside the

operation theatre for the procedure. Basic standard Anaesthesia monitors were connected that included 5 lead ECG, pulse oximetry, NIBP, temperature. 18G intravenous cannula was inserted and secured. These patients are preloaded with Ringer lactate solution. Subarachnoid block was administered following strict aseptic precautions in left lateral position at L2-L3 interspace using 23- or 25-gauge Quinke, Babcocks needle. 2ml of hyperbaric bupivacaine 0.5% injected intrathecally after confirming free flow of clear CSF. Patients were given wedge under the right side of abdomen for left uterine displacement. The patients were administered with intravenous fluids for the anticipated hypotension following spinal Anaesthesia along with intermittent 6mg ephedrine. The procedure was commenced after confirming the bilateral T5 sensory block.

Clinical estimation of the intraoperative blood loss had been performed as follows: here after the caesarean delivery the intraoperative blood loss was assessed by visual method of clinical estimation of blood loss. The normal range or volume of blood loss during the caesarean section is about 800 milliliters to 1000 milliliter of blood. Visual estimation of blood loss calculation is one of the methods which are used for the blind blood loss calculation.

The visual method of blood loss calculation was done by calculating the total amount of blood carried out by the mop pads, suction canister, and the number of blood clots from the patient during the lower segment caesarean section. We had assessed all the blood-soaked materials and fields in operating room. It includes mop pads, suction canister contents, blood clot from patient and the blood around the surgical fields. Then had counted the number of mop pads soaked with blood and multiplied it

with the estimated volume of the blood they would carry. The total number of the mop pads used in the operating theatre for the caesarean delivery was 10 mop pads with the size of 30*30 cm. A fully soaked mop pad carries around 100 ml of blood whereas a partially soaked mop pad carries around 50 ml of the blood. Count the number of the mop pads; diligently look for the fully and partially soaked mop pads. Then multiply it with the estimated blood it carries. Measure the total volume of the blood in the suction after deducting the saline for wash. The accurate measurement of the blood loss in the suction canister can be obtained. Look for the count of blood clots, afterwards calculate the weight of the blood clot and the milliliter of the blood it carries. The weight of the blood clot was measured using a weighing machine.

From sum of all these parameters the estimated intraoperative blood loss was obtained. Then once the procedure is finished safely shift the patient to the post anaesthetic care unit. Make sure that the patient is fully comfortable. Then ask the staff in charge to take the blood sample for looking the postoperative hemoglobin and PCV level using laboratory tests. The blood samples were taken according to the surgeon order. After obtaining the laboratory finding the correlation between the intraoperative blood loss and the postoperative laboratory hemoglobin and PCV were assessed. For statistical analysis the continuous variables are summarized using mean and standard deviation. The Pearson correlation between blood loss and hemoglobin level is computed and its significance was tested using correlation test. The sample size was calculated using G*power software.

INTRAOPERATIVE BLOOD LOSS

TABLE 1: shows materials to be assessed for measuring intraoperative blood loss during LSCS

Materials to be assessed	Count	Milliliter of blood it contains
Fully soaked mop		
Partially soaked mop		
Suction volume of blood excluding saline		
Weight of blood clot		

TABLE 2: shows the total ml of blood loss after LSCS compared with preoperative Hb and postoperative laboratory Hb and PCV

Preoperative Hemoglobin	Total milliliter (ml) of blood loss	Post-operative Laboratory Hemoglobin and Packed Cell Volume
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STATISTICAL ANALYSIS

For statistical analysis the continuous variables are summarized using mean and standard deviation. The Pearson correlation between blood loss and haemoglobin level is computed and its significance was tested using correlation test. The sample size was calculated using G*power software.

RESULT

A total of 123 pregnant women who were undergoing lower segment caesarean section were recruited for this study. The age of the women included in this study were between 20 and 45 years with a mean age of 28.50 ± 4.2 years. Their body weight ranged from 44 to 98 kilogram with a mean weight of 63.39 ± 8.6 kilogram and their height ranged from 142 to 172 centimeters with a mean height of 158.4 ± 7.5 centimeters. The study had included the women's undergoing both the elective and emergency Lower segment caesarean section. The ASA (American society of Anesthesiologist) grade of the women included in this study was ASAII. Spinal block was the choice of Anesthesia for lower segment caesarean section. Those women's who underwent caesarean section had the blood loss which ranges from 500ml to 1000ml. There were no women's who had major blood loss intraoperatively. There were no patients whose preoperative hemoglobin was recorded below 10 gm/dl. But there are 9

women among the 123 patients who had the postoperative Laboratory hemoglobin recorded below 10 gm/dl and their blood loss ranges from 700-1150ml. All the pregnant women who had participated in this study had the postoperative Laboratory packed cell volume more than or equal to 30%.

$p < 0.05$ is considered as significant. The result of the study shows that the Pearson value of the postoperative Laboratory hemoglobin is -0.106 and the 'P' value is 0.244 which shows that there was no statistically significant correlation between the total intraoperative blood loss (ml) and the postoperative laboratory hemoglobin (gm/dl). The Pearson value of the postoperative Laboratory packed cell volume is -0.165 and the 'P' value is 0.068 which shows that there was no statistically significant correlation between the total intraoperative blood loss (ml) and the postoperative laboratory packed cell volume (%).

The result of the study shows that there was no statistically significant correlation between the total intraoperative blood loss estimated using visual method of blood loss assessment with the postoperative laboratory hemoglobin and PCV. Figure 1 and Figure 2 shows the simple scatter plot diagram for the total intraoperative blood loss with postoperative laboratory hemoglobin and packed cell volume.

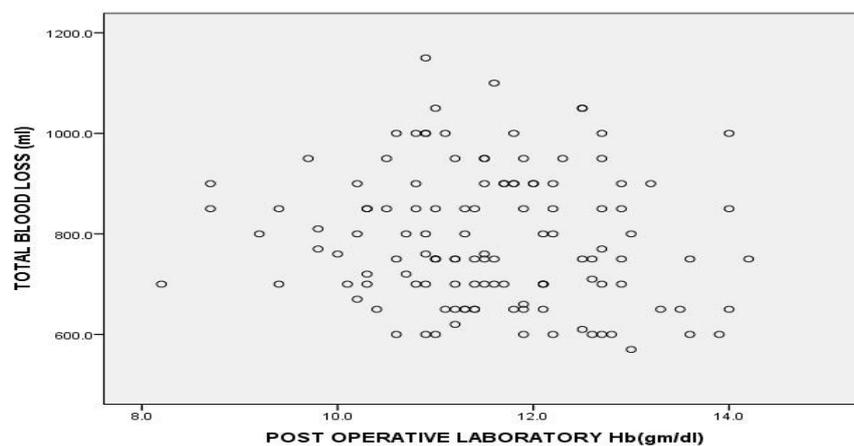


FIGURE 1: shows the scatter plot of total intraoperative blood loss with postoperative laboratory hemoglobin

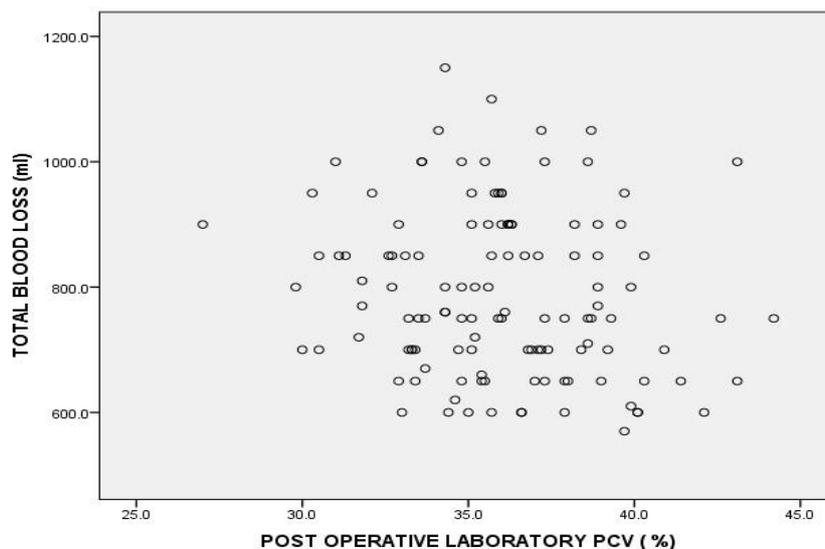


FIGURE 2: shows the scatter plot of total intraoperative blood loss with postoperative laboratory PCV

DISCUSSION

The estimation of the intraoperative blood loss, a crucial component of postoperative care for the surgical patient, has been estimated using a variety of techniques over the years. For measuring the intraoperative blood loss, visual estimation has traditionally been the most popular method and, in some cases, the only method available. This is because it is simple, rapid, and convenient. Anesthetists in developing nations do not have the luxury of point-of-care monitoring technologies for intraoperative blood loss measurement and might be forced to rely on visually estimated blood levels in making the decision regarding intraoperative blood loss. Since morbidity and mortality can come from both delayed diagnosis and denial of the presence of considerable bleeding, accurate blood loss estimation during caesarean delivery is essential as it may significantly influence the timing of blood transfusion and efforts to limit the haemorrhage. The hemoglobin level, blood volume, blood loss after birth, any accompanying coexisting diseases, all affect a pregnant women's capacity to resist blood loss.

A Study conducted by Kelly Fedoruk et al., found that they observed only a weak correlation between the modalities they had been used for intraoperative blood loss

measurement including the visual method of blood loss estimation with post caesarean delivery hemoglobin (1). These observations support the observation of our study. Here we came to the conclusion that there is no significant correlation between the total intraoperative blood loss which was estimated using visual method with the postoperative laboratory hemoglobin and PCV in patients who underwent the Lower segment caesarean section.

Sampson Uzo Anya et al., had performed a study on pregnant patients undergoing elective lower segment caesarean section. Their hemoglobin levels were obtained before and after the study using HemoCue201+ and they had used a modified gross formula to calculate the blood loss. They had estimated the blood loss visually and documented by counting the blood-soaked abdominal mops and gauze pieces then multiplied them with estimated volume of blood they would hold. Finally, the study concludes that visually estimated blood loss was closely related to the HemoCue estimated blood loss when the quantity of blood was less than 500ml (2). In this study also the baseline Hemoglobin was documented before and after the surgery and total intraoperative blood loss was measured using the visual method of clinical estimation of blood loss. But our study finalizes that there was no statistically

significant correlation between the visually estimated total intraoperative blood loss with postoperative laboratory hemoglobin and PCV.

We acknowledge that our study has various limitations. This study had compromised healthy pregnant women undergoing uncomplicated caesarean section; therefore, the total intraoperative blood loss values measured by visual estimation were moderate. No patient had Anemia preoperatively (Hemoglobin less than 8mg/dl). Thus, further more studies should be done using accurate method of blood loss assessment to examine the correlation between total intraoperative blood loss with postoperative laboratory Hb and PCV in pregnant women who are having Anemia preoperatively and who experiences Haemorrhage during caesarean section. The study recommends that more accurate methods can be adopted for clinical estimation of total intraoperative blood loss during the LSCS to obtain accurate blood loss and early detection of haemorrhage.

CONCLUSION

In conclusion, we observed that there was no statistically significant correlation between total intraoperative blood loss with the postoperative laboratory Hb and PCV in patients who had underwent caesarean section. There was no major blood loss observed intraoperatively during the lower segment caesarean section using the visual method, where there was no wide deflation in the postoperative laboratory haemoglobin and PCV after the surgery. Since it is a visual method of clinical estimation of intraoperative blood loss in patients undergoing caesarean section the accuracy in blood loss estimation may not be accurate. The study results show no significant correlation between the intraoperative blood loss and postoperative laboratory haemoglobin and PCV. There was no indication for intraoperative or postoperative transfusion of blood to the patients after the lower segment caesarean section.

Declaration by Authors

Ethical Approval: Approved

Acknowledgement: None

Source of Funding: None

Conflict of Interest: The authors declare no conflict of interest.

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How to cite this article: Rudra Mol R, Manjula Sudhakar Rao, Arya S Jith. A prospective comparative study on clinical estimation of intraoperative blood loss with postoperative hemoglobin and packed cell volume in patients undergoing caesarean section. *Int J Health Sci Res*. 2024; 14(1):255-261. DOI: <https://doi.org/10.52403/ijhsr.20240133>
