



## ESTIMATION OF FALL IN HEMOGLOBIN AND HEMATOCRIT IN UNEVENTFUL CESAREAN SECTION

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### ABSTRACT

**Objective:** Hemorrhage still continues to be reported as one of the leading causes of maternal mortality and morbidity. Intraoperative estimation of the blood loss seems to be complex and misleading as it is impaired by the amount of amniotic fluid and blood from the placenta. However intraoperative visual assessment of blood loss is widely practiced by operating surgeon and anesthetist. The present study was aimed to find decline in Hemoglobin (Hb), hematocrit (Hct) and loss of percent blood volume in an uneventful cesarean section in a low risk patient population.

**Material and methods:** A retrospective study was carried out in the Deptt. Of Obs& Gynae from Nov 18 to January 19 in NDMC Medical College and Hindu Rao Hospital. Out of 140 cases of cesarean, 104 patients who were free from hemorrhage risks and experienced an uneventful elective cesarean section were included in the study. Cases with antepartum hemorrhage, blood transfusion, rupture uterus or surgical complications were excluded. The preoperative and post op Hb and Hct values were noted from case records. The post-operative decline in hemoglobin and hematocrit values were calculated and loss of percentage blood volume was calculated from the pre and postop values of hematocrit.

**Results:** The average preoperative and postoperative hemoglobin values were found to be 11.4 and 10.1±1.37 g/dl, respectively. The average decrease in Hb was 1.3± 0.67 g/dl. Mean pre and post- op haematocrit was 33.7 ± 3.34 and 30.16 ±3.56 respectively. The average fall in Hct was 3.5 ± 1.66. The average percentage of blood volume lost was calculated to be 10.5 ± 5 % in an uneventful cesarean.

**Conclusion:** Visual estimate of blood loss is a reliable method to assess intra-operative blood loss in uneventful cesarean section. After a routine uneventful cesarean, one should expect a fall in Hb by 1.3 g% ±.67 and fall in Hct by 3.5 ±1.66. This amounts to a loss of 10.5% ± 4.98 percentage of blood volume. Routine postoperative hemoglobin measurement after an uncomplicated cesarean section in low-risk women is only reassuring but not necessary and may be eliminated.

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### INTRODUCTION

Cesarean section remains one of the most common major operation performed in women worldwide.<sup>1</sup> Physiologically, in near term pregnancy, the uterus is perfused at a rate of 500-750 ml/min.<sup>2</sup> Due to this hyper-perfusion, the average blood loss during cesarean amounts to approximately 1000 ml.<sup>3</sup> Different figures varying from less than 500 ml to more than 1000 ml have been quoted as estimated blood loss associated with caesarean section.

Duthie *et al* found that mean measured blood loss was around 400-500 ml in uneventful cesarean. Higher observer error in estimating blood loss was seen when measured blood loss was greater than 600 ml.<sup>4</sup>

Various studies have been undertaken to estimate intra-operative blood loss during cesareans.<sup>5</sup> As compared to vaginal delivery, it is easier to estimate blood loss in cesarean sections because we can measure the amount suctioned and the weight the surgical swabs. However, there may be overestimation of intraoperative blood loss due to inclusion of amniotic fluid before rupture of membranes and blood from the placenta. Thereby, estimation of blood loss during cesarean is complex and misleading.<sup>6</sup> Other studies have found that intra-operative estimation of blood loss during cesarean is usually underestimated and poorly reproducible.<sup>7</sup> Studies have also shown uncertainty about visual estimates of blood loss.<sup>8</sup> In comparing the various methods of assessment of intraoperative blood loss, visual estimation of blood loss gave the lowest estimated value as compared to measured estimate of blood loss.<sup>9</sup>

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Therefore, it is difficult to compare surgical blood loss among different institutes or obstetricians. Despite these uncertainties, visual estimation of blood loss by the operative staff is the prevalent method and is practiced by both anesthesiologists and obstetricians.<sup>4, 10</sup>

One of the measurements of blood loss during cesarean section is calculation based on postoperative decrement of hemoglobin (Hb) and hematocrit (Hct) level. Routine hematocrit (Hct) and hemoglobin (Hb) testing before and after CS is a common feature of pre and postoperative care. Traditionally, routine post-cesarean section hematocrit testing is carried out mainly to diagnose and treat anemia early and to identify patients that may need blood transfusion.<sup>11</sup> Therefore, the purpose of our retrospective study was to estimate fall in Hemoglobin and Hematocrit in an uneventful cesarean when visual estimation of blood loss was average.

## MATERIALS AND METHODS

This retrospective study of 140 cases of cesarean sections was carried out in the Deptt of Obs. and Gynae in NDMC Medical College and Hindu Rao Hospital from November 2018 to January 2019. Hematological parameters were evaluated, especially hemoglobin and hematocrit levels before and within 72 hours after emergency or elective uneventful cesarean sections.

Uneventful cesarean delivery is defined using the following criteria: pregnancy more than 37 weeks of gestation, an estimated blood loss less than 1500 ml, no uterine atony, no use of prostaglandins and no other associated surgical procedures during or following the cesarean section. Hemorrhage was defined as a decrease in hemoglobin concentration of 30% or greater, decrease in Hematocrit levels of 10% or calculated blood loss greater than 1500 ml, or any need of packed red cell transfusion.<sup>12,13</sup>

A detailed chart reviewing cesareans was made. The patients with antenatal or any history of severe bleeding, history of antepartum hemorrhage, preoperative signs of hemodynamic instability or those transfused blood for any indication or eventful cesarean sections like any bladder, ureteral or intestinal injury, uterine artery injury and uterine atony were excluded. Cases in which the operating surgeon had estimated blood loss to be average during cesarean were included in the study. We documented gestational age, type of cesarean section, anesthetic method, indications for cesarean section, surgeon's visual estimated blood loss, pre- and postoperative Hemoglobin and Hct levels within 72 hours after cesarean, the number of blood units cross matched and transfused. All women had between 1500 and 2000 mL intravenous fluids during surgery and 2500 mL postoperatively over 24 h period as well as prophylactic antibiotics and analgesics.

The preop and postop Hb and Hct were tabulated. Percent loss of blood volume was calculated by the formula

$$\% \text{ blood volume lost} = \frac{\text{Initial hematocrit} - \text{final hematocrit}}{\text{Initial hematocrit}}$$

The data was analyzed using SPSS statistical package. Comparison in hemoglobin and hematocrit changes and other parameters between different groups were done by using Paired and unpaired 't' test. A P value of < 0.05 was considered statistically significant.

## RESULTS

Out of Total 140 cases of cesarean section, 104 patients fulfilled the criteria of average intraoperative blood loss during cesarean and whose pre-op and post op Hb and hematocrit values were available and the cesarean was uneventful. All cases were done under spinal anesthesia.

The average age of patients was 27 years and average gestational age was 39 weeks (37- 41.5 weeks) with SD of 1.08 weeks.

Out of 104 cases, 88 were done in emergency, 11 were elective and 5 cases were those which were planned for elective but were done in emergency due to various reasons.

The mean preoperative hemoglobin was 11.4g /dl (SD 1.27), whereas the mean Hb was 10.1 g/dl (SD 1.37), postoperatively ( $p < 0.001$ ).

Mean preoperative hematocrit was 33.7 (SD 3.34) and mean post-operative Hct was 30.16 (SD 3.56) ( $p < 0.05$ ).

The mean fall in Hb was 1.3 g% (0.2-4.3g%) with SD of .67 and average fall in Hct was 3.5 (0.8-9) with SD of 1.66 postoperatively.

According to the formula, the average percent of blood volume loss was 10.5% (2.3-24.9) with SD of 4.98.

Maternal age, number of gestation, previous delivery, abortion and type of blood groups showed no statistically significant difference ( $P > 0.05$ ).

On correlating the visual blood loss with fall in Hb and Hct, following observations were made

- The blood loss was not found to be different when lower segment was poorly formed or well-formed or stretched.
- There was no statistically significant difference in fall in Hb and Hct with maternal age, gravidity, previous delivery, abortion, previous cesarean ( $P > 0.05$ ).
- In cases which had more than average intraoperative blood loss, the mean fall in Hb was 1.5 g/dl and fall in Hct was 4.9 and an average 14.6 percent volume of blood loss. Fall in Hb and Hct in these cases appeared similar to the ones with average blood lost on visual assessment because most of the patients with excessive blood loss had received blood transfusion during or immediately after cesarean based on visual assessment and intra op vitals and hence the post-operative Hb and Hct were not very low.

## DISCUSSION

In a study of 421 cases of emergency uneventful cesarean in low-risk women with no postoperative signs or symptoms for anemia, the mean pre and post-operative Hb levels were  $11.7 \pm 1.99$  g/dl and  $11.24 \pm 1.99$  g/dl, respectively ( $P < 0.001$ ). Hb concentrations fell in 72% of the patients, 24.5% experienced an increase and 3.5% showed no change, postoperatively. They suggested that routine Hb testing following uneventful, unplanned cesarean section neither changes postoperative management nor determines the patients requiring blood transfusion.<sup>14</sup>

In another study of 383 patients with no significant risk factor, mean hemoglobin level was  $12.24 \pm 1.09$  g/dl and  $10.87 \pm 1.2$

g/dl in the pre-op and post op period respectively in women undergoing cesarean delivery with a mean fall in Hb being  $1.37 \pm 0.87$  g/dl ( $p < 0.001$ ).<sup>11</sup> Intraoperative blood loss was not affected by indication for surgery. None of the patients needed blood transfusion during or after cesarean. They also concluded that routine postoperative Hb measurement after an uncomplicated cesarean section in asymptomatic low-risk women is not necessary and should be eliminated.

Md Taher *et al* also suggested that routine Hb testing following uneventful, unplanned cesarean section neither changes postoperative management nor determines the patients requiring blood transfusion.<sup>15</sup>

Average drop of Hct of 4.0-4.2 was observed by Combs *et al* whereas 17% cases had no decline.<sup>16</sup>

In a study of 121 cases of cesarean, average post-cesarean drop in hemoglobin was  $1.52 \pm 1.27$  gm/dl and drop in Hct was  $5.49 \pm 4.1\%$ .<sup>17</sup>

In a multivariable analysis, Ashwal *et al* found that emergency cesareans were associated with higher decline in Hemoglobin decline as compared to elective cesareans, (8.9% versus 3.1%,  $p < 0.001$  and 2.3% versus 0.4%,  $p = 0.001$ , respectively). Emergency CS was found to be significantly associated with Hb decline of  $\geq 3$  g/dl after surgery (aOR = 2.10, 95% CI 1.36-3.23,  $p = 0.001$ ) and need for blood products transfusion (aOR = 2.24, 95% CI 1.04-4.83,  $p = 0.03$ ).<sup>18</sup>

In our study, the mean preoperative hemoglobin was  $11.4 \pm 1.2$  g/dl, whereas it was  $10.1 \pm 1.3$  g/dl, postoperatively with an average fall of 1.3g/dl. The mean fall in hematocrit was  $33.7 \pm 3.34$ , and mean fall in percent blood volume lost was  $10.5\% \pm 5\%$ . This was in accordance with others work by Combs *et al*, Singh *et al* and Api *et al*.

Our study was in accordance with Md Taher *et al* as there was no relationship between maternal age, number of gestation, previous delivery, abortion or previous cesarean with decline in Hb.

## CONCLUSION

Visual estimate of blood loss is a reliable method to assess intra-operative blood loss in uneventful cesarean section. After a routine uneventful cesarean, one should expect a fall in Hemoglobin by  $1.3 \text{ g} \pm 0.67$  and fall in Hematocrit by  $3.5 \pm 1.66$ . This amounts to a loss of  $10.5\% \pm 4.98$  percentage of blood volume. Routine postoperative hemoglobin measurement after an uncomplicated cesarean section in low-risk women is only reassuring but not necessary and may be eliminated.

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