Research Article

# Trends of blood loss and blood transfusion during cesarean section - A retrospective study over 10 years

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## ABSTRACT

**Background:** In Obstetrics and Gynecology, knowing the reasons of blood loss and blood transfusion (BT) becomes very important for proper patient management. Periodic assessment of BT practices provides knowledge of areas of improvement. **Objective:** To study the trends in blood loss and transfusion rates during or after cesarean section (CS) over 10 years between 2005 and 2014. **Materials and Methods:** A retrospective observational study was done including all women who underwent CS irrespective of indication in the Department of Obstetrics and Gynecology, Kamla Raja Hospital, Gajra Raja Medical College, Gwalior, during the last 10 years between 2005 and 2014. The data were collected for 12-month period every 2 years from 2005 to 2014, i.e., 2005, 2008, 2011, and 2014. **Results:** Out of 21192 deliveries during this period, 7891 (37.23%) were CS and were more common in women in age group of 20-29 years (68%). During this study period, 8.89% women received BT. The most common indication of BT was anemia with antepartum eclampsia (49%) followed by antepartum hemorrhage (18.09%) and severe anemia (15.24%). There was no significant change in rate of BT during 2005-2014 ($P > 0.05$). **Conclusion:** The marginal fall in the rate of transfusion in 2014 compared to 2011 suggest improvement in antenatal care services and advancement in obstetrics, anesthesia, surgical techniques, and BT medicine. And if this continues, there will be a significant decrease in maternal morbidity and mortality.

**KEY WORDS:** Retrospective Study; Maternal Morbidity and Mortality; Blood Transfusion; Cesarean Sections

## INTRODUCTION

Reports have shown that each year a total 20 million cesarean sections (CS) are carried out worldwide, and over the last decades, rates of CS have increased speedily.[1]

In obstetric practice, CS is reported to be the most common indication of blood transfusion (BT) as it may lead to severe intraoperative loss of blood. Varying figures from <500 ml to >1000 ml blood loss have been reported by different authors in women undergoing CS.[2]

Among all pregnant women, 20% endure anemia, of that iron deficiency, folic acid deficiency, or both is the most common.[3] It is because of the fact that in pregnancy plasma volume is increased by 50%, red blood cells by 33%, and hemoglobin (Hb) by 18-20% mass. Furthermore, there is an increased demand of iron in the second half of pregnancy. All these physiological factors when combined leads to physiological anemia.[3]

During pregnancy, blood loss mainly occurs due to antepartum hemorrhage such as placenta previa, placental abruption, and vasa previa which may be the result of chronic hypertension, multiparity, multiple gestations, older age, and previous CS.[4]

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Deliveries with CS are linked with life-threatening antenatal morbidity such as anemia, hysterectomy, obstetric hemorrhage and BT. Among all aforementioned morbidity, obstetric hemorrhage is reported to be the leading cause of maternal mortality.[1]

Hence, in this study, retrospective analysis was done to observe the trend in blood loss and transfusion rates during or after CS over 10 years between 2005 and 2014.

## MATERIALS AND METHODS

The present hospital-based retrospective observational study was done including all women who underwent CS irrespective of indication in the Department of Obstetrics and Gyanecology, Kamla Raja Hospital, Gajra Raja Medical College, Gwalior from January 2005 to December 2014. Women who were referred in post-operative period from outside were excluded from this study.

The data were collected for 12-month period every 2 years from 2005 to 2014. Details including demography, previous pregnancy, delivery, blood loss, transfusion, and puerperal observations were recorded. The clinical records of all women delivered by CS during 2005, 2008, 2011, and 2014 were reviewed for various parameters such as age, parity, previous CS, gestation period, plurality, associated morbidity, nature of CS, and baby weight. Authorization for access to medical records had been obtained for this study.

Recorded blood loss which was estimated by the surgeon, the surgical assistant, the scrub nurse and the anesthetist in consultation and defined as low (≤500 ml), average (501-1000 ml) and excess (>1000 ml) as recommended by the Healthcare Commission.[5] The indication for BT was noted and no of BT required.

All the data were analyzed using IBM SPSS ver. 20. $P < 0.05$ was considered significant.

## RESULTS

During the study period, 21192 women were delivered, out of that 7891 (37.23%) were CS delivery. There was an increase in CS rate till 2011 after which the increase in cesarean was not proportional to increase in normal deliveries.

During this period, it was noted that there were more CS deliveries in nulliparous women. CS was most common in women with age group between 20 and 29 years (1027 [68%], 1522 [80%], 1674 [82%] and 1904 [78%] in 2005, 2008, 2011 and 2014, respectively) and in women with single plurality (1479 [98%], 1845 [97%], 1960 [96%] and 2391 [98%] in 2005, 2008, 2011 and 2014, respectively). The distribution of various obstetric parameters and the blood loss is given in Table 1.

In this study, a total 8%, 7.7%, 10.4% and 9% BT was taken place in 2005, 2008, 2011 and 2014, respectively, whereas a total 368, 475, 620 and 616 units of blood was transfused during the study period, respectively. The most common indication for BT was APE (52%) followed by APH (19%), severe anemia (16%) and previous CS (13%) (Table 2).

## DISCUSSION

This study has captured data of the women who underwent LSCS from 2005 to 2014, i.e., 2005, 2008, 2011 and 2014, which was the major strength of the present study.

In the present study, blood loss was significantly more common in patients with APH, non-longitudinal fetal lie and with those women who delivered baby with baby

**Table 1:** Comparison of demographic factor, obstetrics parameters and operative blood loss

| Demographic factor | Blood loss<1000 ml (*N*=7178) | Blood loss>1000 ml (*N*=713) | *N* | *P* value |
|---|---|---|---|---|
| Age (years) | | | | |
| <20 | 466 (90) | 52 (10) | 518 | 0.046 |
| 20-29 | 5575 (91) | 551 (10) | 518 | |
| 30-39 | 1096 (88) | 149 (12) | 1246 | |
| Parity | | | | |
| Nulli | 3019 (88) | 511 (12) | 3531 | <0.001 |
| Multi | 3139 (72) | 1221 (28) | 4360 | |
| Previous CS | | | | |
| Nil | 4638 (91) | 458 (9) | 5097 | <0.001 |
| 1 | 1386 (80) | 346 (20) | 1733 | |
| 2 | 645 (77) | 192 (23) | 838 | |
| 3 | 153 (68) | 68 (32) | 223 | |
| Gestation (weeks) | | | | |
| 29-34 | 506 (94) | 33 (6) | 539 | 0.006 |
| 35-37 | 705 (91) | 69 (9) | 774 | |
| >37 | 5854 (89) | 724 (11) | 6578 | |
| Plurality | | | | |
| Single | 7291 (95) | 383 (5) | 7619 | 0.0273 |
| Multiple | 198 (92) | 18 (8) | 272 | |
| Fetal lie | | | | |
| Longitudinal | 5846 (72) | 2133 (28) | 7619 | <0.001 |
| Non-longitudinal | 109 (40) | 163 (60) | 273 | |
| Morbidity | | | | |
| Mild anemia | 4800 (88) | 663 (12 ) | 5523 | 0.005 |
| Moderate anemia | 860 (91) | 80 (9) | 946 | |
| Severe anemia | 562 (89) | 69 (11) | 631 | |
| Eclampsia | 214 (62) | 130 (38) | 344 | <0.001 |
| Antepartum hemorrhage | 101 (44) | 127 (56) | 228 | |

Data were expressed as no of patients (%). CS: Cesarean section

**Table 2:** Comparison of factors associated with surgery and operative blood loss

| Factors | Blood loss<1000 (ml) | Blood loss>1000 (ml) | *N* | *P* value |
|---|---|---|---|---|
| Anesthesia | | | | |
| Spinal | 6839 (91) | 671 (9) | 7510 | NS |
| General | 339 (87) | 42 (13) | 387 | |
| Stage of labor | | | | |
| Before | 2225 (94) | 142 (6) | 2368 | <0.001 |
| I | 3374 (91) | 333 (9) | 3708 | |
| II | 1615 (89) | 199 (11) | 1815 | |
| CS | | | | |
| Elective | 2201 (93) | 165 (7) | 2367 | <0.001 |
| Emergency | 4916 (89) | 607 (11) | 5524 | |
| Baby weight (g) | | | | |
| 1000-1999 | 2871 (40) | 34 (5) | 2905 | <0.001 |
| 2000-3000 | 3680 (52) | 293 (41) | 3973 | |
| >3000 | 677 (8) | 386 (54) | 1013 | |

Data are expressed as number of patients (%). CS: Cesarean section, NS: Not significant

weight >3000 g. Subramanyam and Murthy in their study of 303 patients who were posted for emergency CS reported that 80% of the patients who had Hb <7% required BT.[6] another study done by Bao et al. reported placenta previa as one of the major risk factors for the BT for the women undergoing CS.[7]

Eyelade et al. also did a similar study to find out the risk factors associated with BT in women undergoing CS, they reported that increasing parity, pre-operative anemia, and severe blood loss during surgery as the main risk factors for BT.[8] Almost similar risk factors were observed in the present study.

It was observed that the lower rates of excess blood loss observed for all cases in 2014, suggesting a declining trend since 2005. General anesthesia for CS has been associated with greater blood loss compared with neuraxial anesthesia in many studies, and this was confirmed by our data.[9]

Nevertheless, the decreased rates of average and excess blood loss in 2014 compared with the two earlier study years observed suggesting better PPH management, advanced anesthetics, and surgical techniques.

There is no specific trend observed in the study in the use of BT over 10 years period for all blood loss categories from "low" to excess." The specific indications for giving transfusion for individual patients was not recorded, nor the volume of transfusion; it is possible some women were transfused even though they had blood loss of 500 ml or less, and the reason for this would be pre-existing anemia.

All the factors such as parity, age, plurality, gestation period at the time of CS, no of the previous cesarean, pre-operative comorbidities were found statistically significant like in a retrospective study done by Patterson et al.[10]

Transfusion rates reported in other studies during this period have varied. In the United States of America, transfusion across medical specialties showed a gradual increase until 1986 followed by a decline to 1994 after which there was a gradual increase to 2001.[11,12] It is not clear yet from our data whether the marginal increase in transfusion rates between 2011 and 2014 represents a relaxing of anxiety and a genuinely increased willingness to transfuse, or the result if clinical variation. In contrast to a study by Patterson et al. where the transfusion rates at any stage during pregnancy, birth or the postnatal period increased steadily from 1.2% to 1.6% in 2010 ($P < 0.001$).[10]

This study had some limitations such as an unequal number of patients in the comparison groups, lack for proper sample size calculations, and lack of allocation concealment.

## CONCLUSION

A progressive increase in total number of deliveries was observed over 10 years. Increase in CS rates was also observed till 2011, after which normal deliveries were increased. No significant change was observed in BT rate.

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