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ORIGINAL ARTICLE

Comparison of Estimated Blood Loss between Tranexamic Acid and Control in Women Undergoing Elective Cesarean Section

JAVERIA MASOOD[1], ZARTAJ HAYAT[2], NADIA AHMED[3], ROBINA JABEEN[4], NAZISH SHIFA[5], FAIZA MASUD[6]
[1,4-6]Senior Registrars, [2]Head of Unit-2, [3]Associate Professor, Gynae Unit-2, Fauji Foundation Hospital, Rawalpindi
Correspondence to: Javeria Masood, Email: drjaveriamasood@gmail.com

ABSTRACT

Background: Tranexamic acid is being utilized related to uterotonic agents to treat hemorrhage post-delivery. Evidence suggests that tranexamic acid may reduce bleeding and resultant chances of postpartum hemorrhage. However, limited data is available on the prophylactic utilization of tranexamic acid in local women undergoing elective lower segment cesarean section. This study aimed to compare reduction in mean blood loss between control and tranexamic acid group during and after elective lower segment cesarean section.

Methodology: This randomized controlled trial was done in a period of 6 months i.e. 17th December 2018 to 17th June 2019 in the Department of Gynecology and Obstetrics, FUI, Fauji Foundation Hospital, Rawalpindi. Sixty women were randomly equally allocated to Group A (tranexamic acid) and Group B (non-tranexamic acid). Patients were given tranexamic acid 1gm intravenous 15 minutes before skin incision. Hemoglobin and hematocrit levels were estimated on second post cesarean day (before discharge) as well to measure outcome i.e. estimated blood loss.

Results: In tranexamic acid group, mean estimated blood loss following elective lower segment cesarean section found to be 301.66±64.97 ml while in non-tranexamic acid group it was 433.33±137.29 ml. The significant (P<0.05) difference was noted.

Conclusion: The mean estimated blood loss reduced significantly in patients who were given tranexamic acid before elective lower segment cesarean section than those who were not given tranexamic acid.

Keywords: Postpartum hemorrhage, tranexamic acid, elective lower segment cesarean section (E:-LSCS)

INTRODUCTION

Maternal morbidity and mortality is still a huge challenge, especially in the healthcare setting of under developed regions.[1,2] Every year, primary postpartum hemorrhage (PPH) leads to more than one-third deaths of mothers. A blood loss of ≥500 mL in vaginal and ≥1000 mL in cesarean delivery is considered PPH.[3] The leading cause being uterine atony and genital tract tears, however, other conditions like amniotic fluid embolism, abruption in placenta, and placental accreta may also quicken bleeding related to obstetrics. Some of the risk factors of PPH are previous PPH, prolonged labor, obesity, augmented labor, twin or triplet pregnancies, h/o delivery through C-section, primiparous women, a case of polyhydramnios or macrosomic delivery. In the poor countries, PPH is one of the leading causes of maternal death. Globally around 830 mothers die every day from pregnancy related complications. In the year 2015 alone an estimated 303000 women died while or after delivery of child.[4]

In Pakistan maternal mortality is quite high with a rate of 178 per 100000 live births.[5] Pakistan is amongst the 10 countries that are responsible for approximately 59% of the global burden of maternal deaths.[4] Rate of PPH is more after cesarean section than vaginal delivery (4% vs. 0.6%) among these. Cesarean rates in Pakistan have increased from 2.7% in 1990–1991 to 15.8% in 2012–2013 and 25% in teaching hospitals of Pakistan which means there would be more risk of PPH than normal vaginal delivery.[6,7] As per WHO plan between 2016 to 2030, the target of sustainable development goals (SDGs) is to tailor down global maternal mortality ratio to <70 per 100000 live births.[5]

Previous evidence suggests that uterotonics like oxytocin therapy was the only option effective against PPH occurrence. An antifibrinolytic agent, i.e. tranexamic acid, has been evaluated for the prevention as well as treatment of PPH.[1] It has been found effective in other surgeries as well such like cardiac operation, elective surgery and trauma and also reduces menstrual bleeding.[8]

This study was conducted with aim to compare mean blood loss after tranexamic acid with non-tranexamic acid in elective lower segment cesarean section (EL-LSCS) so that a local protocol may be devised to prevent excessive blood loss and reduce mortality and morbidity.

MATERIALS AND METHODS

This randomized controlled trial was conducted at the Obstetric and Gynae Department, Foundation University, Fauji Foundation Hospital, Rawalpindi from 17thDecember 2018 to 17th June 2019. The study sample was 30 patients in each group i.e. tranexamic acid and the control group. Women undergoing elective caesarean section with the age group 18-40 years and gestational age of ≥ 37 weeks were included. Women with history of DVT, epilepsy or seizures, any known chronic diseases like cardiovascular, renal or liver were excluded. Similarly, those with autoimmune diseases, known coagulopathy or bleeding disorders, multiple pregnancies, placenta previa, morbidity adherence placenta, abruptio placenta, eclampsia, HELLP syndrome, and those cases who have been administered low molecular weight heparin, or anti platelets a week before delivery were all excluded.

The study was approved by hospital ethics and research board. All women planned for elective LSCS were screened for participation. The purpose and benefits of the study were explained to all women and if agreed upon, a written informed consent taken. Detailed history, and clinical examination and ultrasound examination was done. All cases were randomly assigned to the two groups by lottery method. Women in group A were given tranexamic acid (1 gm IV) 15 minutes before incision in skin while in group B tranexamic acid was not given. Body weight and vitals (pulse, blood pressure, temperature, respiratory rate) were documented for all patients. Pre-operative and post-operative hemoglobin and hematocrit was noted. Intravenous tranexamic acid 1 gm were given to study group 15 min prior to incision in skin plus 10 IU oxytocin post-delivery of the baby while the control group were given only 10 IU oxytocin after delivery. Patients in both groups were given 40 IU of oxytocin mixed in Ringer Lactate's Solution (1000 ml) at a rate of 125 ml/hr. Data was entered and analyzed in SPSS-23.0. For comparison of quantitative data i.e. estimated blood loss, student's t-test was used. A p-value of<0.05 was taken as significant difference.

RESULTS

The mean age was 35.40±10.57 years range between 18-40 years. The mean height was 158.46±8.83 cm, the mean weight79.71±10.44 kg, mean BMI level was 31.36±4.67 kg/m2 while the mean parity was 2.81±1.51 in study patients. The mean duration of surgery was 60.0±0.23 minutes. The mean pre-cesarean section hematocrit was 35.72±7.81%, mean post-cesarean section hematocrit was 31.37±4.13%. Similarly, the pre-cesarean section hemoglobin level was 11.66±2.99 g/dL while mean post-cesarean level was 10.58±1.25 g/dL. Mean age of patients was similar in both groups i.e. 36.41±13.89 in tranexamic acid group and 34.31±5.13 in non-tranexamic group. Similarly,

parity was similar in both study groups, however, mean height was slightly variable with 160.02±11.27 cm in tranexamic acid and 162.76±4.26 cm in non-tranexamic group, however, this difference wasn't significant statistically (p-value, 0.22). The mean BMI was slightly greater in tranexamic acid group 31.19±5.0 compared to 30.20±3.49 in non-tranexamic group. Similarly, the duration of surgery, hemoglobin levels and hematocrit levels were found comparable between the intervention and control groups (Table 1).

The indications for surgery were found comparable between the two study groups. The most frequent indication for surgery was previous cesarean section i.e. 18 (60.0%) in tranexamic acid group and 17 (56.7%) in non-tranexamic group and there was no statistical difference observed. Refusal to trial of labor after c-section was indication in 4 (13.3%) cases in tranexamicgroup compared to 2 (6.7%) in non-tranexamic acid group (p-value, 0.67). PIH was found more common in non-tranexamic group 3 (10.0%) cases versus 0 (0.0%) in the tranexamic acid group (p-value, 0.23). The other indications like BOH, breech presentation and oligohydramnios were found similar among the two groups (Table 2).

The estimated blood loss was compared between the two groups. In tranexamic acid group the mean estimated blood loss (ml) was 301.66±64.97 while in non-tranexamic acid group it was 433.33±137.29. The difference in means was found statistically significant between study groups (p-value, <0.001). This reveals that tranexamic acid reduces EBL significantly during and after cesarean section compared to the controls (Table 3).

Table 1: Baseline and Clinical Characteristics of Patients in Two Groups

Characteristics	Tranexamic acid group	Non-tranexamic acid group	p-value
Age (years)	36.41±13.89	34.31±5.13	0.43
Parity	2.81±1.30	2.83±1.71	1.0
Height (cm)	160.02±11.27	162.76±4.26	0.22
Weight (kg)	79.38±11.68	80.06±9.11	0.79
BMI (kg/m2)	31.19±5.00	30.20±3.49	0.37
Duration of surgery (min)	60.01±0.50	60.00±1.00	1.0
Preoperative hemoglobin (g/dL)	11.91±4.03	11.38±1.16	0.32
Postoperative hemoglobin (g/dL)	10.66±1.36	10.50±1.12	0.85
Preoperative hematocrit (%)	34.78±6.53	33.32±5.27	0.28
Postoperative hematocrit (%)	31.92±5.24	31.54±2.57	0.41

Table 2: Indications of Surgery in the Two Groups

Characteristics	Tranexamic acid group	Non-tranexamic acid group	p-value
Refusal to trial of labour after C-section	4 (13.3%)	2 (6.7%)	0.67
BOH	1 (3.3%)	1 (3.3%)	1.0
Breech presentation	4 (13.3%)	3 (10.0%)	0.95
Oligohydramnios	3 (10.0%)	4 (13.3%)	0.95
Previous Cesarean	18 (60.0%)	17 (56.7%)	0.79
PIH	-	3 (10.0%)	0.23

Table 2: Comparison of estimated blood loss between both study groups

	Tranexamic acid group	Non-tranexamic acid group	p-value
Estimated blood loss (ml)	301.66±64.97	433.33±137.29	<0.001

DISCUSSION

Postpartum hemorrhage, a life threatening problem of labor can cause severe maternal morbidity and mortality.[9,10] The incidence of PPH related mortality is estimated between 6% to 11% worldwide.[11,12] This study assessed effect of tranexamic acid in controlling and decreasing the blood loss during and in the post c-section period. As an additional drug the use of prophylactic tranexamic acid (TXA), although WHO guidelines does not recommend it as a preventive measure, together with uterotonic drugs, it has been investigated for the prevention of PPH in low risk patients.

The study was designed keeping in view the current situation of Pakistan where there are more women at risk of PPH because of prevalence of early marriages, multiparities, elderly gravidity, poor nutrition status with increased incidence of anemia, low socio-economic status with less access to tertiary care set ups. In the current study in tranexamic acid, the mean EBL following C-section was found significantly less than those patients in non-tranexamic acid group. These results are endorsed by many in the previously published literature.[13-15] It has been proven fact that bleeding following cesarean delivery vary with geo-ethnic variation of the population as well as coagulation profile, yet this study yielded almost similar results as previously conducted studies. Yehia and colleagues[16] also witnessed that blood loss from placental delivery to the climax of C-section was significantly lower in the tranexamic acid group compared to the controls, they also witnessed significantly lesser vaginal bleeding during the initial post-operative (6 hours)period in the intervention group. Another double-blind controlled trial by Movafegh et al[17] also reported lesser blood loss with tranexamic acid compared with the control group in both the intraoperative and postoperative periods. Another difference was less use of oxytocin administration in tranexamic group.

Xu and colleagues[18] reported that not only there was a lesser blood loss in tranexamic group during ending of CS to up to 2-hour postpartum but the overall total blood loss from the delivery of placenta to up to 2-hour postpartum was also significantly lessen with tranexamic administration. Recently, Milani et al[19] assessed effect of transexamic acid on bleeding while and post cesarean section period and found significantly lesser blood loss in the intervention group, however, no significant difference was observed regarding hemoglobin (Hb) concentration among two groups. This finding is similar to the current study results as well where we noticed similar hemoglobin levels in patients after cesarean section.

Sekhavat et al[20] assessed the efficacy and safety of tranexamic acid and concluded that it is significantly associated with reduction of blood loss from end of CS to after 2 hours postpartum, moreover, no side effects or complications were witnessed with its use. Gai et al[21] also noted similar findings in their study on evaluation of tranexamic acid as an adjuvant therapy for controlling bleeding after c-section.

A meta-analysis based on findings of randomized controlled trials (RCTs) also proved that tranexamic acid has significant advantages over no transexamic acid in controlling bleeding during and after c-section.[22] The above mentioned evidence is similar to the current study findings. As most of the previously published studies showed that prophylactic tranexamic acid significantly lessens bleeding post elective cesarean section, and its adjuvant use may be generalized. This study reflected that there was significant difference in blood loss among the patient who were given tranexamic and those who were not given.

The main strength of this study is that there was no previously available data on this topic in our local population. Thus, this gathered data would be beneficial and can be used as reference for future larger scale studies. There were few limitations as well like sample size was very small and many of the clinical effect modifiers like history of preeclampsia and diabetes were not studied. Also the hematologic profile was not assessed in detail in this study. In brief it can be argued that cesarean deliveries are becoming more common than before. As postpartum hemorrhage after cesarean section is a major threat to life of the mother, the use of tranexamic acid can significantly control the blood loss, thus, a decrease in the maternal morbidity and mortality rates in the country could be achieved.

CONCLUSION

The mean estimated blood loss in patients given tranexamic acid before EL-LSCS is significantly less than those who were not given tranexamic acid. Before generalization of these results further large scale studies on this topic must be conducted at multiple setups in future in order to devise a protocol in our hospitals to prevent excessive blood loss and reduce mortality and associated morbidities.

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