

Role of Prophylactic Transamine in Reducing Blood Loss during Elective Cesarean Delivery

Saima Irfan, Tehreem Yazdani, Salma Nisar, Maliha Khawar, Hira Shafqat

Department of Obstetrics and Gynecology, Pak Emirates Military Hospital/National University of Medical Sciences (NUMS), Rawalpindi Pakistan

ABSTRACT

Objective: The purpose of the current research was to see how effective Tranexamic Acid is for minimizing loss of blood after elective cesarean section.

Study Design: Interventional, randomized, parallel-group study.

Place and Duration of Study: Department of Obstetrics and Gynecology, Pak Emirates Military Hospital, Rawalpindi Pakistan, from August 2020 to August 2021.

Methodology: Computer-generated random number tables were used to assign 130 females who were scheduled for cesarean surgery to the Study or Control groups. The research group received TXA and regular treatment, while control group received just routine care. The gravimetric technique was used to determine blood loss in both groups. The percentage difference between hemoglobin levels before and after the operation was determined, the blood loss and percentage drop in hemoglobin were the primary outcome variables. The secondary outcomes of the study include the duration of operation, adverse effects, percentage of patients who lost more than 500ml blood and require for additional uterotonics. The outcome variables were compared using the unpaired t-test and the Chi-square test.

Results: Blood loss was significantly lower in the study group from placental delivery until the end of the operation. In the study group, 5(9.3%) of patients had a drop in hemoglobin of more than 10%, whereas 25(39%) of subjects had a drop of more than 10% loss of blood in the process of Lower Segment Caesarean Section.

Conclusion: TXA may be administered safely and successfully in Lower Segment Caesarean Section as its use was not linked to any adverse effects.

Keywords: Blood Loss, Hemoglobin, Transamine.

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INTRODUCTION

About 5 million women die all over the world every year due to the complications in pregnancy as well as childbirth.¹ Postpartum Hemorrhage is one of the major reason of morbidity and death, including severe anemia, the need for blood transfusions, hospitalization, and infection.² Goal 5 of the Millennium Development Goals calls for a 75 percent decrease in maternal mortality by 2015, translating to a 5.5 percent reduction each year.³ Individuals with high risk of Postpartum Hemorrhage cause just a little number of every maternal fatalities. The greater parts of death as well as morbidity occur in people with no risk factors and are unpredictable. A study was carried out in rural India with 1620 women, according to the study results it was predicted that more than 9 percent of them had postpartum hemorrhage. There were no differences in socio demographic or maternal variables in women with postpartum hemorrhage and without postpartum hemorrhage.⁴ Though cesarean section has

a lower rate of early PPH (within 24 hours after birth) than vaginal delivery, the former is a significant operation with more blood loss. As a result, it is critical to effectively and efficiently reduce blood loss, highlighting the significance of this research.

Pharmacologic treatment and obstetric, surgical, and radiological therapies play a significant role in this aspect. The most frequent cause of PPH is uterine atony. The use of oxytocin as a first-line treatment for PPH is recommended.⁵ Intravenous ergometrine, intramuscular carboprost, and misoprostol are some of the other options. TXA and other prohaemostatic medicines offer a biochemical hemostatic action in addition to the well-known uterotonics, particularly oxytocin. In surgery, systemic antifibrinolytic drugs are often utilized.⁶ According to a systematic review, there were 211 randomized controlled trials of antifibrinolytic agents in elective surgical patients.⁷ According to the research results of study, tranexamic acid decreased the risk of blood transfusion by thirty nine percent and aprotinin by thirty four percent.⁸

Tranexamic acid is a type of lysine analog and its function is to hinder fibrinolysis via requisite to

Correspondence: Dr Saima Irfan, Department of Obstetrics and Gynecology, Pak Emirates Military Hospital, Rawalpindi Pakistan
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plasminogen competitively. By inhibiting the activation of plasminogen and plasmin, it prevents the lysis of formed clots. It has a tenfold higher potency than amino-caproic acid.⁹ In a non-surgical setting, TXA has been proven to decrease uterine blood loss. TXA treatment reduced mean menstrual blood loss significantly in women with menorrhagia, according to a study. TXA was evaluated for the treatment of PPH in a randomized controlled trial, it was confirmed from the study that increase amount of tranexamic acid decreases the loss of blood among women with who have PPH.¹⁰ Number of RCTs has looked at preventive function of tranexamic acid as well as it reduces the blood loss significantly. TXA may decrease the need for hysterectomy, lower the risk of severe anemia, and eliminate the requirement for blood transfusions, all of which would help to achieve the objective of reducing maternal mortality.¹⁰

METHODOLOGY

This interventional, randomized, parallel-group study was performed from August 2020 to August 2021 among participants at Pak Emirates Military Hospital, Rawalpindi who were scheduled to have an elective cesarean section. The sample size was determined using the WHO sample size calculator by using population prevalence proportion of post-partum hemorrhage after elective cesarean as 9.2% and keeping margin of error as 10%.¹¹

Ethical approval was obtained from the Internal Review Board of Pak Emirates Military Hospital (IREB Letter no: A/28/33/EC/188/2020). The study included one hundred and thirty women with singleton pregnancies scheduled for elective LSCS delivery. After informed consent they were split into two groups using the random number table technique: control and study (computer-generated). Each group had 65 people in it. It was an open research project.

Inclusion criteria: Subjects ranged from 19 - 34 years old, with gestational ages ranging from 37 - 42 weeks.

Exclusion criteria: The research excluded participants with medical conditions such as pregnant women with problem of high blood pressure, renal diseases, chronic hypertension, severe pre eclampsia, coagulation abnormalities and heart problem cause difficulties in pregnancy. Subjects who had allergies to TXA, had a history of thromboembolic disorders, for higher amount of blood loss such as several pregnancies, polyhydramnios, unusual placentation, or had had more than 2 C-sections were also excluded from the research.

The blood loss was monitored using a gravimetric technique from when the placenta was delivered until the operation was completed. Blood was discovered in the suction container. Before and after the procedure, wet mops and the perineal linen on the operating table were weighed on an electronic scale. The total amount of blood loss (ml) was calculated by adding together: 1) blood absorbed by soaked mops (wet weight of used mop - dry weight +); 2) blood absorbed by a perineal sheet during vaginal toileting (wet weight - dry weight +); and 3) blood collected in a suction container (wet weight - dry weight +). The amount of blood loss before placental delivery and amniotic fluid were not included in the research. One milligram of weight was equated to one milliliter of blood. Presently intra-operative loss of blood was estimated, on the other side loss of blood during postoperative process was not taken into account. Hemoglobin before and after surgery was also compared.

SPSS 16.0 was used to conduct the statistical analysis. Age, weight, blood loss, and surgery duration were all given a mean and standard deviation. The significance between the two groups was determined using an unpaired t-test for blood loss and surgery duration continuous variables. The Chi-square test was used to see if there was a difference between the two groups in the incidence of increased blood loss (>500ml) and the incidence of a >10% drop in hemoglobin. The level of significance was set at a probability value of $p=0.05$.

RESULTS

A total 130 participants were included in the study. Mean age of the study group was 24.77 ± 2.907 years while mean age of the control group was 25.82 ± 2.801 years. Table-I summarized the general characteristics of study participants. There was no statistical difference in age, weight, body mass index and parity of both the groups. Table-II summarized the mean blood loss during the surgery. Mean blood loss in study group was 387.07 ± 106.9 ml while in control group it was 517.72 ± 155 ml (p -value<0.001).

Table-III summarized the statistics of patients with more than 500ml blood loss and more than 10% fall in hemoglobin. Blood loss was significantly lower in the study group from placental delivery until the end of the operation. In the study group, 5(9.3%) of patients had a drop in hemoglobin of more than 10%, whereas 25(39%) of subjects had a drop of more than 10% loss of blood in the process of Lower Segment Caesarean Section (p -value<0.001)

Table-I: Baseline Characteristics of Participants and Correlation (p-value)

Parameters	Study Groups		p-value
	Study group (n=65)	Control group (n=65)	
Age (years)*	24.77±2.907	25.82±2.801	0.98
Weight (kg)*	70.41±5.04	70.46±5.71	0.86
Height (m)*	1.863±0.08	1.582±0.096	0.53
BMI (kg/m ²)*	29.38±1.5	26.12±2.9	0.61
Parity	Primiparous: 9/65(13.84%) Multiparous: 56/65(86.15%)	Primiparous: 9/65(13.84%) Multiparous: 56/65(86.15%)	

Table-II: Comparison of Blood Loss and Duration of Surgery

Parameters	Study Groups		p-value
	Study group (n=65)	Control group (n=65)	
Blood loss (ml)*	387.07±106.9	517.72±155	<0.001
Blood loss (per minute)*	55±10.26	72.43±11.83	0.002

Table-III: Percentage of Patients with more than 500ml Blood Loss and more than 10% Fall in Hemoglobin

Parameters	Study Groups		p-value
	Study group (n=65)	Control group (n=65)	
>500ml Blood loss	3(4.6%)	38(58.46%)	<0.001
>10% fall in hemoglobin	5(11.1%)	25(38.46%)	<0.001

DISCUSSION

Postpartum hemorrhage is one of the major source of maternal death in developing world. Every 6 to 8 mins, a woman dies after child birth. The largest trial of tranexamic acid for the treatment of postpartum haemorrhage to date, the World Maternal Antifibrinolytic (WOMAN) trial in 2017 established that timely use of tranexamic acid within 3hrs of birth in case of postpartum hemorrhage, has significantly reduced maternal morbidity and mortality. TXA inhibits the lysis of produced lump via blocking the binding site of lysine plasminogen.^{12,13} It has a 5–15 minute onset of effect and a 3-hour duration of action.¹⁴ It binds to the plasminogen molecule more strongly than aminocaproic acid. PPH is a significant cause of maternal morbidity and death.¹⁵ Furthermore, danger of infection raises, the requirement for blood products, the length of wait in hospital as well as the expense. As a result, measures to reduce blood loss are significant, particularly in developing nations lacking knowledge and resources. As a response to the immediate blood vessel trauma, there is an increase in fibrinolytic activity after birth. As a result, TXA may effectively stop bleeding by stopping fibrinolysis.¹⁶

The efficiency of Tranexamic Acid in decreasing loss of blood after the cesarean delivery was compared between the Research and Control arms in this randomized, prospective, interventional study. The gravimetric technique was used to calculate intra-operative blood loss. Visual, direct, and photometric techniques are also employed to estimate blood loss. The visual approach is the most ineffective, yet it is also the most often utilized. Photometric analysis is the most accurate, but it is also the most complicated and expensive. According to the WHO, no technique is better than another. Vital indicators were collected after surgery, and patients were closely followed for any adverse consequences. In Sweden, the mainly repeatedly reported post marketing negative response to Tranexamic Acid is visual problems, which are typically inadequately described¹⁷ (if the drug was continued for several days).¹⁸ One of the side effects of getting Tranexamic Acid in the process of cardiovascular surgery and accidental delivery into the neuraxial system is convulsions.^{19,20}

However, none of the research included here has shown evidence of TXA's thrombogenic impact on pregnant women. Nausea, vomiting, and diarrhea are common gastrointestinal symptoms. There was no significant difference between the two groups in terms of operation length or reason for surgery in this research. In the same study twenty milliliter of Tranexamic Acid was diluted with twenty milliliter of 5 percent of dextrose.³ In the trial arm, there was a substantial decrease in blood loss. Research by Yehia and colleagues looked at the need for iron replenishment after surgery.²¹ Vaginal bleeding was measured during the first 6 hours following surgery, and it was shown to be lower in the study arm. According to the guidelines of World Health Organization, use of TXA should be measured as part of usual cure packages for PPH.

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LIMITATION OF STUDY

In this research gravimetric technique of estimating blood loss was used, so the amount of blood taken was just an estimate. The second issue is that the drug's long-term consequences were not considered.

CONCLUSION

Tranexamic acid decreased the quantity of blood lost during lower segment caesarean section by a considerable amount. As pregnancy is a hypercoagulable condition, the risk of thrombotic events is higher during this time. Nonetheless, there were no adverse effects or problems related to

using this antifibrinolytic in the early postpartum period. As a result, tranexamic acid may be administered safely and successfully in lower segment caesarean section patients.

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Authors' Contribution

Following authors have made substantial contributions to the manuscript as under:

SI & TY: Data acquisition, data analysis, critical review, approval of the final version to be published.

SN & MK: Study design, data interpretation, drafting the manuscript, critical review, approval of the final version to be published.

HS: Conception, data acquisition, drafting the manuscript, approval of the final version to be published.

Authors agree to be accountable for all aspects of the work in ensuring that questions related to the accuracy or integrity of any part of the work are appropriately investigated and resolved.

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