European Journal of Molecular & Clinical Medicine

ISSN 2515-8260 Volume 10, Issue 02, 2023

ORIGINAL RESEARCH

Role of prophylactic use of tranexamic acid in reducing blood loss in cesarean sections

Kandru Madhuri[1], Sneha Yadav[2], Sanjivani Ashok Deshpande[3]

[1]Junior Resident, Department of Obgy, Bvdumch, Sangli, India.
[2]Junior Resident, Department of Obgy, Bvdumch, Sangli, India.
[3]Hou and Professor, Department of Obgy, Bvdumch, Sangli, India.

Received Date: 13/11/2022 Accepted Date: 14/01/2023

ABSTRACT

Aims: To study the efficacy and safety of intravenous administration of tranexamic acid in reducing blood loss in caesarean sections. Objectives: To compare the volume of blood loss (intraoperative and postoperative) in both study and control group. To assess the difference between preoperative and postoperative hemoglobin and hematocrit levels in both study and control group. To assess the need for additional uterotonics in both groups and to assess the side effects of this drug in study group. Materials And Methods: Material: Pregnant women aged 19years and above, primiparous or multiparous with gestational age between 34 to 40weeks who were to undergo elective or emergency caesarean sections at Bharati Vidyapeeth Medical College and Hospital , Sangli were selected for this study. Informed written consent was taken from all consenting patients.

Patient with history of thromboembolic disorders, any medical disorders (renal, liver or cardiovascular diseases), severe hemorrhagic disease, anemia (Hb< 9g/dl), anticoagulant therapy, allergy to tranexamic acid, morbid adherent placenta were excluded from this study. Method: A retrospective observational study was conducted for a duration of 6 months in 50 ANC patients who fulfilled the inclusion criteria. After taking informed consent, they were divided into two equal groups as study and control group. In study group, a bolus injection of 1 gram tranexamic acid diluted in 100ml normal saline was administered slowly 5-10mins before skin incision. No drug was given to control group. After delivery of neonate, routine care was given to both groups, that is 10 units oxytocin was added to ringer lactate and allowed to flow at rate of 75 to 100ml /hr for 3hours after surgery. Blood loss was measured in both the groups by gravimetric method. Hemoglobin and hematocrit values before and after the surgery was estimated and the percentage of difference was compared. Results: Hemoglobin and hematocrit values decreased significantly in control group than in study group. There was significant reduction of blood loss calculated from placental delivery till the end of surgery in study group as compared to control group. Similarly blood loss measured 24hrs after caesarean section was less in tranexamic acid group compared to control group. Tranexamic acid group has lesser requirement of uterotonic agents. There were no immediate postoperative complications or side effects to mother and neonate. Conclusion: Injection tranexamic acid is the antifibrinolytic agent when given with safe dose plays an effective role in decreasing blood loss during caesarean section. The use of this antifibrinolytic agent was not associated with any side effects or complications in the immediate postpartum period. Hence it can be used safely and effectively in subjects undergoing caesarean section.

Corresponding Author: Dr. Kandru Madhuri, Junior Resident, Department of Obgy, Bvdumch, Sangli, India.

INTRODUCTION

Every year over five million women die worldwide due to causes related to pregnancy and delivery. Postpartum Haemorrhage (PPH) accounts for the major part of the mortality as well as morbidity related to severe anemia needing blood transfusion, hospital stay and infection[1].

The occurrence rate of caesarean section (CS) has increased in both developed and developing countries, which would result in an increased risk of PPH. Although there has been a remarkable improvement in the prevention and treatment of PPH in recent years, deaths due to PPH remain relatively common in some parts of the world. To lower the occurrence rate of major morbidity and mortality due to PPH, it is very vital to reduce blood loss in CS and vaginal delivery (VD)[3]. Though the incidence of early PPH (occurring within 24 hours of delivery) is lower in caesarean section than vaginal delivery, the former is a major surgery and causes greater blood loss. Hence, it is essential to prevent the blood loss effectively in a feasible way. Apart from obstetric, surgical and radiological interventions, pharmacologic management also plays an important role in this aspect. Uterine atony is the most common cause for PPH. First line of therapeutic management for PPH is oxytocin [4]. In India, caesarean section rate is rising, so the impact of prophylactic injection of tranexamic acid in decreasing blood loss during caesarean section would be more beneficial in terms of having minimal blood loss intra operatively and post operatively and thereby decreasing maternal morbidity. Hence present study is an attempt to study the efficacy of prophylactic injection tranexamic acid in decreasing blood loss during and 6hrs after caesarean section.

MATERIALS AND METHODS:

MATERIAL- Pregnant women aged 19years and above, primiparous or multiparous with gestational age between 34 to 40weeks who were to undergo elective or emergency caesarean sections at Bharati Vidyapeeth Medical College and Hospital, Sangli were selected for this study. Informed written consent was taken from all consenting patients.

Patient with history of thromboembolic disorders, any medical disorders (renal, liver or cardiovascular diseases), severe hemorrhagic disease, anemia (Hb< 9g/dl), anticoagulant therapy, allergy to tranexamic acid, morbid adherent placenta were excluded from this study.

METHOD: A retrospective observational study was conducted for a duration of 6 months in 50 ANC patients who fulfilled the inclusion criteria. Full detailed history was taken to exclude the women had exclusion criteria, general physical and obstetric examination was done. All routine investiagtions needed for operation as hemoglobin value, hematocrit value, liver function test, renal function test, coagulation profile and also obstetric ultrasound were done preoperatively. After taking informed consent, they were divided into two equal groups as study and control group. In study group, a bolus injection of 1 gram tranexamic acid diluted in 100ml normal saline was administered slowly 5-10mins before skin incision. No drug was given to control group. After delivery of neonate, routine care was given to both groups, that is 10 units oxytocin was added to ringer lactate and allowed to flow at rate of 75 to 100ml /hr for 3hours after surgery. Blood loss was measured in both the groups by gravimetric method. Hemoglobin and hematocrit values before and after the surgery was estimated and the percentage of difference was compared.

- The blood loss was measured following placental delivery till the end of the surgery by gravimetric method. Blood collected in the suction container was noted. Soaked mops,

operation table perineal sheet), pads (three pads, were used post operatively for six hours were weighed by electronic scale before and after the surgery.

- The total amount of blood loss (ml) was determined as the sum of: 1) Blood absorbed by soaked mops {wet weight of used mop – dry weight} +; 2) Blood absorbed by perineal sheet during vaginal toileting {wet weight – dry weight} +; 3) Blood collected in suction container. Amniotic fluid and the volume of blood lost before placental delivery were not included in the study. Participants were observed till day of discharge. There were no immediate postpartum and neonatal complications.

RESULTS

Table 1: Blood loss during cesarean section(from placental delivery to the end of the surgery (mL).

	STUDY GROUP N=25 (MEAN (ML)	**CONTROL GROUP N= 25 MEAN (ML)**	**DIFFERENCE BETWEEN 2 GROUPS**
BLOOD LOSS DURING CEASREAN SECTION	311	537	226

Table 2: Blood loss after cesrean section (6-hours after birth (mL).

	STUDY GROUP N=25 (MEAN (ML)	**CONTROL GROUP N= 25 MEAN (ML)**	**DIFFERENCE BETWEEN 2 GROUPS**
BLOOD LOSS DURING CEASREAN SECTION	35.9	51.8	15.9

Comparison between study and control group regarding hemoglobin (gm/dl)

Table 3

	MEASURE	**STUDY**	**CONTROL**
PRE-OP Hb	Mean +/- SD RANGE	11.9 ± 1.5 8.2–15.5	11.9 ± 1.2 8.6–14.9
POST-OP Hb	Mean +/- SD RANGE	10.7 ± 1.5 6.1–14.9	10.2 ± 1.2 7.0–12.6

Comparison between study and control group regarding hematocrit %

Table 4

TIME	**MEASURE**	**STUDY**	**CONTROL**
PRE-OP	Mean+/- SD RANGE	33.0 ± 3.9 24.5–41.5	33.2 ± 3.1 26.3–41.3
POST-OP	Mean+/- SD Range	30.5 ± 3.7 21.5–40.1	29.4 ± 2.9 21.3–35.6

The results showed that tranexamic acid significantly reduced bleeding during and after cesarean section. The study group's total blood loss from placental delivery until 6 hours postoperative: (346.9ml) was significantly less than control group (588.8 ml). In this study, postoperative hemoglobin was significantly higher in the study group than in the control group Reduction in hemoglobin was significantly less in the study group than in the control group by (0.6 ± 0.1 gm/dl). In addition, post-operative hematocrit was significantly higher in the study group than in the control group ($p<0.008$). Reduction in hematocrit was significantly less in the study group than in the control group by (1.3 ± 0.3%). In the present study need for additional uterotonic requirement of 21-40 U and >40 U Syntocin was seen in control group (43%) compared to tranexamic acid group(23%). The result showed that the usage of injection tranexamic acid among study group had significantly decreased need for additional uterotonics. Another parameter studied was number of subjects who had more than 10% fall in haemoglobin and % of subjects with > 1000ml blood loss. 12% of subjects in study group and 40% of subjects in control group had more than 10% fall in haemoglobin ($p<0.01$). There were no immediate post-operative complications to the mother and neonate.

DISCUSSION

Tranexamic acid is a synthetic lysine amino acid derivative, which reduces the dissolution of hemostatic fibrin by plasmin. The lysine receptor binding sites of plasmin for fibrin are occupied by tranexamic acid, which prevents binding to fibrin monomers, thus preserving and stabilizing fibrin's matrix structure. The antifibrinolytic effects of tranexamic acid are mediated by reversible interactions at multiple binding sites within plasminogen. The high affinity lysine site of plasminogen is involved in its binding to fibrin. Saturation of the high affinity binding site with tranexamic acid displaces plasminogen from the surface of fibrin. Although plasmin may be formed by conformational changes in plasminogen, it's binding to and dissolution of the fibrin matrix is inhibited. At the time of placental delivery there is activation of the fibrinolytic system which leads to rapid degradation of fibrinogen and fibrin. There is also increase in plasminogen activators and fibrin degradation products (FDP). This activation can last up to 6-10 hours postpartum, causing more bleeding. As we know that tranexamic acid acts as an antifibrinolytic agent, so in this study we used tranexamic acid to reduce bleeding during and after cesarean section. During this study we found that the amount of blood loss is very much reduced from the time of placental delivery to 6 hours postpartum in lower segment cesarean section. With the use of tranexamic acid it was found that there was significant decrease in the incidence of > 1000 mL blood loss in the study group as compared to control group.

CONCLUSION

Injection tranexamic acid is the antifibrinolytic agent when given with safe dose plays an effective role in decreasing blood loss during caesarean section.

Pregnancy is a hypercoagulable state, hence the risk of thrombotic events are more during pregnancy. The use of this antifibrinolytic agent was not associated with any side effects or complications in the immediate postpartum period.

Hence it can be used safely and effectively in subjects undergoing caesarean section.

REFERENCES

1. Novikova N, Hofmeyr GJ (2015): Tranexamic acid for preventing postpartum haemorrhage (Review) Copyright © 2011 The Cochrane Collaboration. Published by JohnWiley & Sons, Ltd.

2. Geller SE, Goudar SS, Adams MG, Naik VA, Patel A, Bellad MB et al. (2014): Factors associated with acute postpartum haemorrhage in low-risk women delivering in rural India. International Journal of Gynecology and Obstetrics, 101(1): 94- 99.
3. Li C, Gong Y, Dong L, Xie B, Dai Z (2017): Is prophylactic tranexamic acid administration effective and safe for postpartum hemorrhage prevention? A systematic review and meta-analysis. Medicine, 96(1): 215-221.
4. Dyer RA, Buiwick AJ, Carvalho B (2013): Oxytocin for labour and caesarean delivery: implications for the anaesthesiologist. Current Opinion. Anesthesiology, 24(3): 255-61. 5. Henry DA, Carless PA, Moxey AJ, O'Connell D, Stokes BJ, Fergusson DA et al. (2012): Antifibrinolytic use for minimising perioperative allogeneic blood transfusion.
5. Satyavathi K, Vemu NJ, Mohammed S (2009): Tranexamic acid: A proven antifibrinolytic agent (A review). Oriental Journal of Chemistry, 25(4): 987-92.
6. Matteson KA, Rahn DD, Wheeler TL (2013): Non-surgical management of heavy menstrual bleeding: A systematic review and practice guidelines. Obstetrics and Gynecology, 121 (3): 632.
7. Movafegh A, Eslamian L, Dorabadi A (2013): Effect of Intravenous Tranexamic Acid Administration on Blood Loss During and After Cesarean Delivery. Obstetric Anesthesia Digest., 33(1):34-5. Role of Prophylactic Tranexamic Acid in Reducing Blood loss during Elective… 6896
8. Movafegh A, Eslamian L, Dorabadi A (2013): Effect of intravenous tranexamic acid administration on blood loss during and after cesarean delivery. International Journal of Gynecology & Obstetrics, 115(3): 224-26
9. Nour NM (2008): An introduction to maternal mortality. Reviews in obstetrics and gynecology, 1(2): 77. 11. Prata N, Bell S, Weidert K (20