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ORIGINAL ARTICLE

Efficacy of Tranexamic Acid in Reducing Blood Loss During and Two Hours of Cesarean Section

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ABSTRACT

Background: Tranexamic acid (TXA) has been known to be effective in reducing blood loss during cesarean section (CS), latter responsible for active postpartum hemorrhage (PPH). This study aims to examine the efficacy of TXA in reducing blood loss during and immediate 2 hours postpartum of CS.

Methods: A total of 80 pregnant women posted for emergency or elective CS were included in this study, 40 in each group were not/treated with TXA, noting amount of blood loss from placental delivery to 2 hours postpartum, drop in hemoglobin (Hb) to less than 8 gm/dl level 24 hours post-CS, need for additional uterotonics or blood transfusion (on loss of more than 30% of blood volume).

Results: None of the 80 women suffered PPH or needed blood transfusion. Mean intra-operative and post-operative blood loss were significantly less in TXA group, none requiring uterotonics than control group that required [6 (15%) p=0.026)].

Conclusion: Tranexamic acid in addition to being secure and affordable, bears no immediate negative effects on either the mother or the baby and may be used in preventing PPH as it exhibits a statistically significant reduction in the requirement of blood transfusions and the risk of bleeding exceeding 1000 mL.

Key-Words: *Blood loss, Cesarean section (CS), Tranexamic acid (TXA)*

INTRODUCTION

During the delivery of placenta, especially at CS, fibrinogen and fibrin are rapidly degraded with activation of fibrinolytic system, inducing increase in plasminogen activators and fibrin degradation products (FDP) causing excessive bleeding or PPH.[1,2]

To combat, an antifibrinolytic agent TXA: a synthetic derivative of the amino acid lysine, working via different mechanism as a reversible competitive blockade of the lysine, binding to a locus on plasminogen molecules, that not only prevents the binding of plasminogen and plasmin to the fibrin substrate but also inhibits the conversion of plasminogen to plasmin by plasminogen activators, justifiable for iv administration intraoperatively.[3-4]

This study aims to find out the efficacy of TXA in reducing blood loss during CS and two hours immediate postpartum period and thereby PPH, as acknowledgement proven benefit in various operative surgeries and surgical procedures.[5]

METHODS

Setting: The Study was conducted in Department of Obstetrics and Gynaecology, Kathmandu Model Hospital.

Duration of Study: Six months from 13th November 2022 to 12th May 2023

Sample Size: It is calculated using the formula for comparing two proportion.

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$n = (Z\alpha/2+Z\beta)2 * (p1(1-p1) +p2(1-p2)) / (p1-p2)2$

where, level of confidence is 95%, margin of error is 5% and power is 80 %

Here the outcome variable is blood loss from placenta delivery to 2 hrs postpartum

≥ 500ml which was 8% in TXA treated and 32% in Control group[1]

- P1: proportion of blood loss from placenta delivery to 2hrs postpartum ≥500ml, in TXA treated=0.08
- P2: proportion of blood loss from placenta delivery to 2hrs postpartum ≥500ml, in control=0.32

And, the sample size is calculated to be 40 in each group.

Study Design: Comparative Study

Sampling Technique: Non- probability Consecutive Sampling

Sample was selected randomly those undergoing El CS or Em CS (except of antepartum hemorrhage). Tranexamic acid 1gm IV was given at the delivery of the baby and before placenta delivery.

Blood loss was measured by measuring the amount of loss in the suction bottle and tetras used at CS.

RESULTS

Maximum of the cases were of age 28-34 years group and most of the CS was done at gestational age of 38+ weeks (Table 1). The average age was 31.48±4.21 years in TXA group and 29.00±4.10 years in control group.

Most of the cases had regular cycle and only few of them had comorbid conditions that were randomised to control group (Table 2,3). Duration of CS was longer and drop in Hb was slightly higher in control group compared to TXA given group (Table 4). There was no significant difference in blood loss based on demographic modifiers. (Table 5).

Mean intra-operative and post-operative blood loss were significantly less in women treated with tranexamic acid as compared to control group. There were only 6 (15%) cases who required uterotonics in control group while no need in TXA groups (p=0.026). There were no cases who required to transfuse.

Table 1: Demographic characteristics

Variables	TXA Group n=40		Not Given TXA Group n=40	
	Mean	SD	Mean	SD
Age (Years)	31.48	4.21	29.00	4.10
Gestational Age (weeks)	38.45	.71	38.48	.51
Weight (kg)	173.53	9.10	168.93	8.31
Height (cm)	90.05	16.03	87.55	16.69
BMI (kg/m^2)	29.99	5.91	30.71	5.65

Table 2: Marital, education and working status

Variables		TXA Group n=40		Not Given TXA Group n=40	
		No	%	No	%
Marital Status	Married	40	100%	40	100%
	Unmarried	0	0%	0	0%
Education	Grade 1-9	1	2.5%	4	10.0%
	Grade 10-11	7	17.5%	6	15.0%
	Bachelor	27	67.5%	25	62.5%
	Master	5	12.5%	5	12.5%
Occupation	On Job	31	77.5%	31	77.5%
	Housewife	9	22.5%	9	22.5%

Table 3: Comorbidly and additional status

Co-morbid condition		Groups			
		TXA Group n=40		Groups Not Given TXA Group n=40	
		No	%	No	%
Menstrual history	Regular cycle	38	95%	37	92.5%
	Irregular cycle	2	5%	3	7.5%
Hyperten-sion	Yes	0	0%	4	10%
	No	40	100%	36	90%
Diabetic	Yes	0	0%	2	5%
	No	40	100%	38	95%
Smoker	Yes	0	0%	0	0%
	No	40	100%	40	100%
Addition	Alcoholic	0	0%	0	0%
	Non-Alcoholic	40	100%	40	100%

Table 4: Mean duration of CS and Hb

Variables	TXA Group n=40		Not Given TXA Group n=40	
	Mean	SD	Mean	SD
Duration of CS (min)	36.38	6.70	40.38	5.59
Preoperative Hb	12.36	1.07	12.60	.83
Postoperative Hb	11.99	1.07	11.43	.94
Drop in Hb	0.37	.20	1.15	.47

Table 5: Intraoperative blood loss and Demographic effect modifiers

Effect modifiers		TXA				P-Value
		Given		Not Given		
		Intra operativeBlood loss		Amount of Blood loss		
		Mean	SD	Mean	SD	
Age Groups (Years)	20-30	243.3	53.0	310.3	50.7	0.0005
	31-40	220.0	32.3	286.4	39.3	0.0005
Gestational age (Weeks)	37-38	235.4	45.4	288.1	44.5	0.0005
	38+1 to 41	218.8	35.9	321.1	48.1	0.0005
Parity	Primiparous	221.4	39.3	302.9	51.4	0.001
	Multiparous	230.3	43.2	304.3	47.5	0.0005
Marital Status	Married	228.8	42.2	303.8	48.6	0.0005
	Unmarried	-	-	-	-	
Education	Grade 1-9	200.0	0	350.0	40.8	0.046
	Grade 10-11	207.1	18.9	316.7	40.8	0.0005
	Bachelor	238.9	46.7	300.0	47.9	0.016
	Master	210.0	22.4	270.0	44.7	0.028
Occupation	On Job	227.4	38.4	298.4	45.6	0.0005
	Housewife	233.3	55.9	322.2	56.5	0.004

Table 6: Blood loss and Clinical effect modifiers

Effect modifiers		TXA Group		Not Given TXA Group		P-Value
		Intra operative Blood loss		Amount of Blood loss		
		Mean	SD	Mean	SD	
Mode of CS	Elective	227.14	40.84	301.79	48.17	0.0005
	Emergency	240	54.72	308.33	513.49	0.027
Duration of CS	≤40	232.8	44.9	300.0	40.8	0.0005
	>40	218.2	33.7	308.3	57.5	0.0005
Menstrual history	Regular cycle	230.3	42.8	301.4	47.9	0.0005
	Irregular cycle	200.0	0	333.3	57.7	0.053
Hypertension	Yes			287.5	25.0	NA
	No	228.8	42.2	305.6	50.4	0.0005
Diabetic	Yes			300.0	0	NA
	No	228.8	42.2	303.9	49.8	0.0005

DISCUSSION

TXA currently in obstetrics is a well-researched antifibrinolytic agent, with innumerable multicenter double-blind, placebo-controlled, randomized clinical trials (RCTs), favorable findings to help this drug to be incorporated in the prevention and treatment of PPH.[6]

Most studies on TXA are seen confined to non-emergent elective CS, differing from our's, which has enrolled both emergency and elective CS.[6,7]

In an exception there is one study where TXA has been administered as antepartum prophylaxis for control of PPH in placenta previa.[8]

In day-to-day practices, for the sake of prevention of PPH, conventional uterotonics as prophylaxis is empirically given to one and all women by and large, undergoing delivery, dreading PPH, the unforeseen and unanticipated obstetrics complication of pregnancy, not even being certain, if at all PPH will befall.

And in this study 40/80 women, unexposed to TXA, had blood loss volume below the level of PPH demarcation and none requiring blood transfusion. Few, however required uterotonics. While TXA recipient study group are on the advantage displaying impressive result projecting significantly lower mean intraoperative blood losses and noticeably lower mean postoperative blood loss up to 2 hours, sharing similar findings with another researcher.[9]

Other study also confirmed beneficial role of TXA, exposing a little higher amount of blood loss close to the range of PPH derived from findings of [443.62±86.73ml / 667.40±131.01ml

(p<0.001)] with mean postoperative hemoglobin drop (g/dl) [0.82±0.27/ 1.86±0.64 (p<0.001)] and insignificant difference in the transfusion between TXA /no TXA recipient group.[10]

One important finding of this study is that, it did not show any statistical significance in terms of mean age, weight, BMI, gestational age, and parity falling almost in line with two other studies.[9,10]

Observed nonoccurrence PPH and none needing blood transfusion overall, TXA exhibiting lesser blood loss vol and drop in Hb certainly ascertains merit. Given the small gain from TXA effectively reducing blood loss, it is less convincing to use TXA as routine prophylaxis for all caesarean deliveries but the high-risk women with prepartum anaemia or placenta previa.[2]

CONCLUSION

Tranexamic acid in addition to being secure and affordable, bears no immediate negative effects on either the mother or the baby and may be used in preventing PPH as it exhibits a statistically significant reduction in the requirement of blood transfusions and the risk of bleeding exceeding 1000 mL.

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