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A Study on Use of Tranexamic Acid in Reducing Blood Loss during Lower Segment Caesarean Section

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Abstract: ***Aim of the study: To study the effectiveness of anti fibrinolytic agent Tranexamic acid in reducing blood loss during and after lower segment caesarean section. Materials & Methods: This was a randomized, case controlled, prospective study on 100 women undergoing LSCS (between February 2013 and January 2014). 50 patients were given tranexamic acid 1gm slow IV 20 minutes before LSCS & were compared with 50 others who did not receive tranexamic acid. Blood lost was collected and measured during the two periods – the first period was from placental delivery to the end of LSCS and the second from the end of LSCS to 2 hours post partum. Results: Tranexamic acid significantly reduced the quantity of blood loss during LSCS (298.4+_72.4 ml) in the study group versus (329+_56.9 ml) in the control group. It also significantly reduced the quantity of blood loss from placental delivery to 2 hours post partum: (360.7 +_ 110.9 ml) in the study group, versus 443+_ 88.65 ml in the control group. (P= 0.0008). No complications or significant side effects were reported in either group. Conclusion: Tranexamic acid significantly reduces the blood loss during and after the caesarean section. Side effects eg. nausea, vomiting, diarrhea & thrombosis are rare. Thus, Tranexamic acid can be used effectively in women undergoing LSCS to decrease the blood loss.***

Keywords: antifibrinolytis agent, tranexamic acid, caesarean section, blood loss.

Abbreviations: LSCS – lower segment caesarean section
PPH- post partum haemorrhage
NPOL: non progress of labour

1. Introduction

With the rising incidence of Caesarean Section today, the complications associated with it also have increased (1). One of the most common and dreaded complications is primary or secondary haemorrhage, which if not prevented or controlled in time leads to maternal morbidity and mortality. Thus it is imperative to reduce the maternal bleeding during and after LSCS.(1). One of the most promising approach is to minimize perioperative bleeding through the prophylactic use of antifibrinolytic agents eg. Aprotinin, Tranexaminic acid and Amino caprionic acid (2). Tranexaminic acid is a synthetic derivative of the amino acid lysine that exerts its antifibrinolytic effect through the reversible blockade of lysine binding sites on the plasminogen molecules (3,4). Tranexamic acid has been used intravenously routinely for many years now to reduce haemorrhage during and after many surgical procedures eg. scoliosis surgery, coronary artery bypass, oro-maxillary surgeries etc. In this study the efficacy of tranexamic acid in reducing the blood loss during and after LSCS in two periods namely, first period from the time of placental delivery to the end of LSCS, and second, from the end of LSCS to 2 hours post partum, and the efficacy of tranexamic acid in reducing the incidence of PPH (post partum haemorrhage) and the adverse drug reactions associated with its use were studied.

2. Materials and Methods

It was a prospective randomized case control study done in the study period of one calendar year (February 2013 to January 2014). Hundred pregnant women undergoing LSCS (both elective and emergency) in Teerthanker Mahaveer Medical College & Research Centre (TMMCRC), Moradabad, U.P, India, were included in this study. They were randomly divided into two groups- Group A (study group) comprised of 50 patients who received tranexamic acid and Group B (control group) who did not receive tranexamic acid.

For Group A patients tranexamic acid injection 1 gm/10 ml with additional dilution of 10 ml IV slowly infused over 5 minutes was given 20 minutes before incision. Group B patients did not receive tranexamic acid. Patients of both the groups were given the standard dose of 10 U Oxytocin in 500 ml of DNS by IV drip over 30 minutes, with the delivery of the baby. The patients with medical or surgical problems involving heart, liver and kidney, history of thromboembolic phenomena, placenta previa, placental abruption, multiple pregnancy, polyhydramnios, pregnancy complicated with uterine myoma were excluded from the study.

Amount of blood loss was calculated as follows: The quantity of blood (ml) = (weight of gauze pads used after surgery minus weight of gauze pads used prior to surgery) + (the volume of blood in suction bottle after placental delivery). In addition, the sanitary pads used after completion of LSCS to 2 hours post partum were separately weighed.

Statistical Analysis

Data was analyzed using statistical methods 1 (Mean +_ SD 2) 'Z' test

3. Results

This was a prospective case control study done in one calendar year (from February 2013 to January 2014). 100 pregnant women undergoing LSCS in TMMCRC, Moradabad, U.P, India, were included in this study.

Group A (study group) consisted of 50 women who received tranexamic acid and 50 women (control group) who did not receive tranexamic acid.

Table 1 shows that the possible confounding variables eg age, height, weight were matched effectively in both the groups.

Table 1: Characteristics of patients selected

Variables	Group A (study group) (Mean +_SD) n= 50	Group B (control group) (Mean +_SD) n= 50	Z test	P value
Age (years)	23.62+_3.429	24.5+_3.982	Z = 1.19	P = 0.239 NS
Height (cm)	152.56+_5.75	153.2+_6.0	Z = 0.54	P = 0.588 NS
Weight (kg)	52.54+_7.86	53.5+_7.45	Z = 0.63	P = 0.532 NS

Table 2 shows distribution of patients according to indication of LSCS in both the groups. There was no statistical significance in indication of LSCS between the two groups. The indication of LSCS can have a bearing on the amount of intraoperative blood loss. The fact that these were matched adequately in the study group removes the effect of these confounding variables.

Table 2: Indications for LSCS

Indication for LSCS	*Group A (study group) (no. of cases)*	*Group B (control group) (no. of cases)*
Fetal Distress	17	19
Primi with breech	5	3
Previous LSCS with CPD	11	14
Previous LSCS with abnormal presentation	5	3
Previous >= 2 LSCS	2	1
CPD (cephalo pelvic disproportion)	4	3
Previous LSCS with scar tenderness	3	5
NPOL/arrest of descent	3	2

Table 3 shows mean blood loss from the time of placental delivery to completion of skin closure was 289.4 ml in Group A & it was 328.4 ml in Group B. P value being 0.004, suggesting that there was statistically highly significant difference in blood loss in both the groups. Patients who received tranexamic acid had 40 ml less blood loss than the patients who did not receive tranexamic acid.

Table 3 shows mean blood loss from the time of completion of skin closure to 2 hours post partum was 75.5 ml in Group A and it was 112.6 ml in Group B. P value being 0.0002, suggesting that there was statistically highly significant difference in blood loss in both the groups. Patients who received tranexamic acid had 50 ml less blood loss than the patients who did not receive tranexamic acid.

Table 3: Effect of Tranexamic Acid: comparison of blood loss:

Mean blood loss (ml)	Group A (study group)	Group B (control group)	Z test	P value
Period one(from placental delivery to skin closure)	298.4+_72.4	329.4+_56.9	2.98	0.004 Highly significant
Period two(from skin closure to 2 hour post partum)	71.5+_53.6	112.6+_51.7	3.9	0.0002 Highly significant

Table 4 shows incidence of blood loss > 500 ml in both the groups. Group A had 18 % less incidence of blood loss > 500 ml than Group B, P value being 0.002, the difference was found to be statistically significant.

Table 4: Effect of Tranexamic Acid: comparison of incidence of patients with blood loss > 500 ml in both groups

	Group A (study group)	*Group B (control group)*	*Z test P value*
Blood loss (> 500 ml)	6 (12 %)	15 (30 %)	2.27 P=0.002

Table 5 shows adverse drug reactions due to use of tranexamic acid. The incidence of side effects eg. Nausea, vomiting and diarrhea were not increased in Group A (study group)as compared to Group B (control group) suggesting that the use of tranexamic acid had no significant adverse drug reactions. In addition, there was no increase in the incidence of thrombosis in Group A.

Table 5: Comparison of adverse drug reactions in the two groups

	Group A	Group B	Z test	P value
Nausea	16	13	0.66	0.508 NS
Vomiting	09	08	0.08	1.135 NS
Diarrhoea	01	00	1.01	0.312 NS
Signs of thrombosis	00	00		

4. Discussion

Tranexamic acid is an antifibrinolytic agent and it exerts its antifibrinolytic effect by blocking the lysine binding locus of the plasminogen and plasmin molecules, thereby preventing the binding of the plasminogen & plasmin to the fibrin substrate. Tranexamic acid also inhibits conversion of plasminogen to plasmin by plasminogen activators (3,4). During placental delivery, fibrinogen & fibrin are rapidly degraded whereas plasminogen activators & fibrin degradation products (FDP) increase due to activation of the fibrinolytic system. This activation can last upto 6 – 10 hour's post-partum causing more bleeding. Tranexamic acid acts on this fibrinolytic system thus exerting its effect on reducing blood loss which was the main motivator behind this trial.

Our study showed that tranexamic acid significantly reduces bleeding from the time of placental delivery to 2 hours post-partum in LSCS. Results show that Group A patients had

reduction in blood loss by 20 % and also tranexamic acid reduces the incidence of PPh by 18 %. Similar studies carried by Ming – Ying Gai, Lian-Fang Wu & co-workers (5) in China, showed reduction in blood lossby 30 % as compared to control group & also reduced the incidence of PPH by 25.7 %.These results co-related well with our study results.

Zheng SR, Yang HX et al (6), showed similar results. The incidence of thrombosis during pregnancy & puerperium is five to six times higher than in general population. But tranexamic acid use did not increase the incidence of thromboembolic phenomena.

Suanberg & co-workers (7) reported 67 cases treated by tranexamic acid because of abruption placentae & thrombosis occurred in none of the cases. Beskassy Z, Astedt A (8) included 3014 women including 45 pregnant women & gave tranexamic acid to prevent bleeding at cervical conization, thromboembolic episodes were absent.

Ming Ying Gai, Ling Fang Wu & co-workers (5)- in their study of tranexamic acid in LSCS also showed no thrombosis in the study group. The side effects of tranexamic acid eg. Nausea, vomiting & diarrhea were not statistically significant in both the groups in our study. These results were similar with previous studies.

All the data were studied, demonstrated that tranexamic acid can be used safely without increasing the occurrence of thrombosis, but still need more cases to be observed for occurrence of thrombosis.

5. Conclusion

Antifibrinolytic agent, tranexamic agent significantly reduces the amount of blood loss during and after LSCS. Its use is not associated with increased risk of adverse drug reactions like nausea, vomiting, diarrhea or thrombosis. Tranexamic acid can be safely used during LSCS to reduce thr blood loss.

6. Ethical Approval

The study was approved by the institutional ethics committee.

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