International Journal of Innovative Research in Medical Science (IJIRMS)
Volume 03 Issue 03 March 2018, e-ISSN: 2455-8737, p-ISSN: 2455-9341
Available online at - www.ijirms.in

Open Access Journal | Research Article | DOI: 10.23958/ijirms/vol03-i03/10

Study the Efficacy of Tranexamic Acid in Reducing Blood Loss During L.S.C.S.

Dr. Baljeet Kaur Bhatia[1], Dr. Rashim Vachhani[*2], Dr. Rekha Ratnani[3]

[1]Senior Resident Dept. of OBGY, [*2]Assistant Professor Dept. of Anaesthesiology, [3]Professor and HOD Dept. of OBGY
Chandulal Chandrakar Memorial Medical College, Kachandur, Durg (Chhattisgarh) 490024

Corresponding Author
Dr. Rashim Vachhani
Assistant Professor Dept. of Anaesthesiology
CCM Medical College Kachandur, Durg (CG)

Summary:

This is a randomized controlled study for the effectiveness of tranexamic acid to reduce blood loss during caesarean section. The study was undertaken at the department of obstetrics and gynaecology At CCM Medical College. The patients who were not given tranexamic acid during caesarean section were taken in control group and those who received tranexamic acid were taken in study group. Standardisation was done for administration of drug and patient monitoring, and amount of blood loss and possible side effects of drug on mother and neonate were recorded.

Introduction

Blood is the essential for life and the women are prone to lose it in pregnancy. Worldwide trend of caesarean section is increased. In India maternal mortality ratio is 212/100,000(2011 census) life birth,[1] compared to the world scenario of 251/10,000 life births (2008).[2] Major cause was obstetric haemorrhage, antenatal or postnatal. Anaemia is not only an important cause of death in developing countries like India, but also an aggravating factor in haemorrhage, sepsis and pregnancy induced hypertension.[3] Caesarean section rates have increased to as high as 25-30% in many areas of the world. Delivery by C.S can cause more complications than normal vaginal delivery and 20% of the complications are primary or secondary post partum haemorrhage. It leads to increase the maternal mortality and morbidity by bleeding, it is important to reduce the amount of bleeding during and after lower segment caesarean section (LSCS).[4]

It is undoubtedly true that caesarean birth in present time is safer than it ever used to be due to improved anaesthetic techniques, advent of powerful and effective antibiotics, availability of blood transfusion and surgical and operative skills.[5] Even though it is so, it is not without morbidity.

ACOG evaluation of caesarean delivery 2000 found that overall mortality rate from caesarean delivery is 6/100,000, which is 3-7 times greater than that of vaginal delivery. Recent studies show that primary caesarean increases the risk of blood transfusion to about 4.2 times higher than vaginal delivery.[6]

Some clinicians are prompted by the idea that injury sustained during childbirth might contribute to the subsequent development of pelvic floor disorder, which led to question the potential benefit of a prophylactic caesarean delivery.[7,8]

A critical analysis of the blood loss during caesarean section is a valuable factor in order to prevent complications particularly haemorrhage. Blood loss frequently leads to transfusion of allogenic blood products, which expose patients to the risk of transfusion related adverse effects such as febrile non haemolytic transfusion reaction, transfusion errors and blood borne infections. Concerns about blood safety, continual blood shortages and rising cost of blood bank operations have generated interest in the reduction of transfusion requirements during and after surgery. A popular approach is to minimise per operative bleeding through the prophylactic use of the antifibrinolytic agent's aprotinin, tranexamic acid (txa) and epsilon amino caproic acid (EACA).[9]

To reduce this haemorrhage the idea of injecting antifibrinolytic agent like tranexamic acid 1 gm iv 30 min prior to the surgery has been utilised in this study. Tranexamic acid is a synthetic derivative of the amino acid lysine that exerts its antifibrinolytic effect through the reversible blockade of the lysine binding sites on plasminogen molecules.[10,11]

During placental delivery, fibrinogen and fibrin are rapidly degraded and plasminogen activators and fibrin degradation products increase due to activation of fibrinolytic system.

This activation can last upto 6 hrs postpartum, hence Tranexamic acid being an antifibrinolytic was used to reduce the bleeding. Intravenous administration of tranexamic acid has been routinely used for many years to reduce haemorrhage during and after surgical procedure like coronary artery bypass, scoliosis surgery, oral surgery, orthotropic liver transplantation, total hip/knee arthroplasty and urinary tract surgery. Tranexamic acid has been shown to be very useful in reducing blood loss and incidence of blood transfusion in these surgeries. Tranexamic acid has been used in many non obstetric surgeries and found to be effective in reducing blood loss significantly.

In India, anaemia is a major cause of maternal morbidity, reduction of blood loss has paramount significance, especially due to increasing caesarean section rate. This is the motivation for carrying out this study. The purpose of choosing tranexamic acid is because it is inexpensive, easily accessible, well tolerated, 6-7 times more efficacious than its co drugs.[16] In this study, we find out effect of tranexamic acid during and after LSCS.

Materials and Methods

100 pregnant subjects between 37 to 42 weeks gestation undergoing L.S.C.S. who fulfilled the inclusion and exclusion criteria were selected for the study. This prospective study was conducted under two Groups study group and control group. The study was conducted over a period of two years (June 2014 to March 2017).

Group A/Study Group: (n=50) Patients undergoing L.S.C.S who were given tranexamic acid,1gm ,i.v,30 minutes before incision.

Group B/Control Group: (n=50) patients undergoing L.S.C.S who were not given tranexamic acid.

Inclusion Criteria: Inpatient term gravidas with 37 to 42 weeks singleton gestation who were delivered by CS in Department of obstetrics and Gynaecology at CCM Medical College.

Exclusion Criteria:

1. Allergic to tranexamic acid.
2. Medical and surgical complications-renal insufficiency, previous history of thromboembolic disease, hypertension.
3. Ante partum haemorrhage.
4. Multiple pregnancies, Preeclampsia, Macrosomia, Polyhydramnios.
5. Patients with bleeding diathesis.
6. LSCS done under general anaesthesia.
7. Patient on Aspirin or Low molecular weight heparin.

Study group: After the selection of the subject for the study, injection tranexamic acid 1 gm IV diluted with 10 ml of distilled water slowly administered ten minutes before the abdominal incision for caesarean section, after informing the anaesthetist for the study group of 50 patients and 10 units oxytocin in a pint of DNS was given by intravenous drip over 30 min was given after delivery of neonate.

Control group: No tranexamic acid given to control group. 10 units oxytocin in a pint of DNS was given by intravenous drip over 30 min was given after delivery of neonate.

Observations and Results:

Study Design: This is a comparative study with 50 subjects in control and 50 subjects in study group. The patients who were not administered tranexamic acid during caesarean section were taken as the control group and those who did receive the tranexamic acid formed the study group.

Table 1: Age distribution of patients studied.

Age group	Cases		Control	
	No	%	No	%
20-25	10	20.0	7	14.0
26-30	25	50.0	31	62.0
31-35	14	28.0	10	20.0
36-40	1	2.0	2	4.0
Total	50	100.0	50	100.0
Mean ± SD	28.58±3.77		28.70±3.67	

All patients were aged between 20 and 40 years and the maximum age distribution was in the age group of 26-30 years with about 50% in study group and 62% in control group. The average age of two groups was nearly the same and was 28 yrs.

Table 2: Comparison of Weight (kg) & Height (cm) in two groups studied

	Cases	Control	P value
Weight (kg)	70.56±5.81	67.46±7.60	0.024*
Height (cm)	158.86±4.47	158.76±2.95	0.895

Patient's characteristics in view of height and weight were similar, with not much difference between the two groups. This uniformity in height and weight between the two groups ensures fair comparision of blood loss during caesarean section.

Table 3: Category wise distribution

Category	Cases		Control	
	No	%	No	%
Elective	18	36.0	13	26.0
Emergency	32	64.0	37	74.0
Total	50	100.0	50	100.0

Distribution of Elective/Emergency are statistically similar with P=0.280. There is no significant difference observed in the category of caesarean section between the two groups. The no. of emergency caesarean section is higher in both the groups.

Table 4: Indication of LSCS:

Indication	Cases (n=50)		Control (n=50)	
	No	%	No	%
Fetal distress	25	50.0	26	52.0
Prev lscs	9	18.0	6	12.0
CPD	6	12.0	4	8.0
Breech	5	10.0	4	8.0
Arrest of dilatation	1	2.0	3	6.0
RPL	1	2.0	2	4.0
Contracted pelvis	2	4.0	1	2.0
Failed induction	1	2.0	1	2.0
Oligoamnios	3	6.0	1	2.0
Prolonged second stage	2	4.0	1	2.0
Transverse lie	1	2.0	1	2.0

Table 4 shows distribution according to indication of LSCS in both the groups. There was no statistical significance in indication of LSCS between the two groups. The major primary indication of caesarean section was found to be fetal distress in both the groups. The indication of LSCS can have bearing on amount of intraoperative blood loss. The fact that these were matched adequately in the study group removes the effect of these confounding variables.

Table 5: Gestation WK

Gestation WK	Cases		Control	
	No	%	No	%
37	1	2.0	0	0.0
37-40	46	92.0	47	94.0
>40	3	6.0	3	6.0
Total	50	100.0	50	100.0

The average gestational age was about 37-4 wks in both the groups. This implies that samples are matched in the control and the study group in terms of gestational age of mother.

Table 6: AFI

AFI	Cases		Control	
	No	%	No	%
<5	3	6.0	1	2.0
5-10	3	6.0	7	14.0
10-20	43	86.0	40	80.0
>20	1	2.0	2	4.0
Total	50	100.0	50	100.0
Mean ± SD	11.77±3.33		11.94±3.49	

AFI is statistically similar in two groups with P=0.430. In both the groups, amniotic fluid volume was statistically comparable. That indicates, the measured volume of blood and amniotic fluid during caesarean section will have similar amount of amniotic fluid on an average in both the control and study groups and its impact is nullified from the measurements.

Table 7: Comparison of Study variables in cases and controls

Study variables	Cases	Control	P value
Wt Of Dry Mops	113.08±12.89	108.86±14.31	0.125
Wt Of Used Mops	343.64±114.25	346.44±57.02	0.877
Collection In Suction Bottle Before Placental Delivery In Ml	670.20±199.88	593.90±260.48	0.104
Collection In Suction Bottle After Placental Delivery In Ml	291.94±122.14	362.00±98.75	0.002**
Blood In Ml From Mops	219.58±105.84	226.27±48.86	0.686
Blood After Vaginal Toileting In Ml	26.20±9.56	25.30±5.57	0.566

Table 7 suggests that blood in ml from mops was more in control group(226ml) than in case group(219ml).Also there was significantly higher blood collection in suction bottle after placental delivery in control group when compared with case group(p=0.002).although the blood loss after vaginal toileting was similar in both groups.

Table8: Comparison of Study variables in two groups studied

Study variables	Cases	control	P value
Total Blood Loss After Placental Delivery In Ml	552.79±197.30	606.31±122.91	0.107
Total Intra Operative Blood Loss +Liquor Volume	1253.62±313.20	1201.01±325.98	0.412
Wt Of Dry Pad Used Till 2 Hrs Post Partum	20.20±1.41	22.00±4.04	0.004**
Wt Of Soaked Pad At The End Of 2 Hrs Pp	42.60±6.43	50.38±6.37	<0.001**
Blood In Ml At The End Of 2 Hrs	21.33-+5.0	27.02-+2.3	

Table 8 shows mean blood loss from time of placental delivery to completion of skin closure was 552.79 ml in the study group & it was 606.31 ml in the control group (P= 0.107), suggesting that there was significant difference in blood loss in both the groups. Patients who received tranexamic acid had 54 ml less blood loss than patients who didn't received tranexamic acid. Also the blood loss in ml at the end of 2hr postpartum was less in study group as compared to control group

Discussion

Tranexamic acid being an antifibrinolytic , blocks the lysine binding locus of the plasminogen & plasmin molecules, thereby preventing the binding of plasminogen & plasmin to the fibrin substrate. Tranexamic acid also inhibits conversion of plasminogen to plasmin by plasminogen activators. It has been used in the treatment of bleeding for many years.[10,11]

During placental delivery, fibrinogen & fibrin are rapidly degraded, whereas plasminogen activators & fibrin degradation products (FDP) increase due to activation of fibrinolytic system. This activation can last up to 6-10 hrs postpartum, causing more bleeding. It was because of this activation of fibrinolytic system that we decided to use tranexamic acid in this trial.

In the present study, effectiveness of tranexamic acid to reduce blood loss during caesarean section ,100 patients were studied, of which 50 subjects didn't receive tranexamic acid and formed the control group and remaining 50 subjects received tranexamic acid and formed the study group. The average gestational age of subjects in the control group and the study group was similar (37-40 WKS). The majority of the subjects underwent emergency caesarean operations with major indication for caesarean section was either fetal distress or CPD. This trend was similar in both the groups.

All of the above observations suggest that the two groups had subjects with uniform profiles of age, height, weight, gestational age and AFI. Therefore, the subsequent estimation of blood loss during caesarean section was not unduly affected by the dissimilarity of the profiles of subjects in the two groups.

In both the groups amniotic fluid volume was statistically comparable, hence subsequently, the measured volume of blood and amniotic fluid during caesarean section will have similar amount of amniotic fluid on an average in both the control and study groups and its impact is nullified from the measurements.

Intraoperative observations of vitals of the patients showed no statistically significant difference in vital signs of pulse rate, respiratory rate and blood pressure of the patients of two groups. There was no significant alteration in the vital signs of subjects at time of delivery & at 1 hr & 2 hr postpartum. These findings were similar to findings in studies of Ming-ying Gaiet al ,Zheng SR, Yang HX, et al , & M gohel et al.[17-19]

In present study, tranexamic acid reduces blood loss in both the parameters, i.e. from time of placental delivery to completion of skin closure(552 ml in control group vs 606 ml in cases group) & from completion of skin closure to 2 hrs postpartum 27 ml in control group vs 21 ml in cases group). Similar study carried out by Ming-ying Gai, Lian-fang Wu & co-workers[17] in China showed that tranexamic acid significantly reduces bleeding from the time of placental delivery to 2 hrs postpartum. The study group showed total blood loss reduction by 30% as compared to control group. Tranexamic acid also reduced the incidence of postpartum haemorrhage by 25.7% in the study group (22 cases Vs 35 cases in the study & controlled group respectively) (P value was 0.029). These results correlated well with our study.

Zheng SR, et .al[19] showed tranexamic acid significantly reduced postpartum blood loss after vaginal delivery. The occurrence of postpartum haemorrhage was 6.4% in study group as compared to 25.3% in control group, which was statistically significant. There were no significant adverse effects. Therefore, tranexamic acid is efficient & safe in reducing postpartum haemorrhage and Gohel M, et al[18] evaluated tranexamic acid in caesarean section. They showed that showed that tranexamic acid reduces significant blood loss from the end of LSCS to 2 hours postpartum, that is 75.71 ml in the study group verses 133.03 ml in the control group (P = .001). It also significantly reduces the quantity of blood loss from placental delivery to 2 hour postpartum, that is 372.71 ml in the study group versus 469.70 ml in the control group (P = 0.003) . These results were comparable to our study.

Leila Sekhavat et.al.[20] Conducted a prospective randomised study on 90 primiparas divided into two groups who underwent CS. Their results showed that tranexamic acid significantly reduced the blood loss from the end of CS to 2 h postpartum; 28.02 ± 5.53 ml in the tranexamic group versus 37.12 ± 8.97 ml in the control group (p = 0.000). These results were comparable to our study.

The incidence of thrombosis during pregnancy & puerperium is 5-6 times higher than that in the general population. When the anti fibrinolytic drug tranexamic acid is administered, the increased risk of thrombosis should be considered, especially in the LSCS postpartum period. In our study, not a single patient developed signs of thrombosis.

Conclusion

On the basis of our result we concluded that tranexamic acid is safe, effective, easily available iv drug that can be offered prior to caesarean section to decrease the blood loss during caesarean section and immediate postpartum. Tranexamic acid was found to significantly reduce the amount of blood loss during & after the lower segment caesarean section. Therefore, the use of tranexamic acid can reduce the requirement of blood transfusion and that will in turn reduce the problems associated with the blood transfusion. Hence it helps in reduction of maternal morbidity and mortality.

Bibliography:

[1] Maternal & Child Mortality and Total Fertility Rates, Sample Registration System (SRS) http://censusindia.gov.in/2011-common/vitalstatistics.html; Office of Registrar General, India.
[2] IHME 2010, Maternal Mortality (Global), Maternal mortality for 181 countries, 1980-2008: a systematic analysis of progress towards Millennium Development Goal 5, Institute for Health Metrics and Evaluation, <http://www.healthmetricsandevaluation. org/ resources /datasets/ 2010/ mortality /results/maternal/maternal.html.
[3] Pandith, suchitra, Chavan, Anita, Desouza Vijay: Impact of modern technology on reduction of maternal mortality, Optimising labour and delivery for safe motherhood FOGSI Focus2005:62-5.
[4] Kambo I,Bedi N, Dhillon BS, et al. A critical appraisal of caesarean section rates at teaching hospitals in India. Int J Gyneacol Obstet 2002 Nov; 79:151-8.
[5] Anklesaria, Behram and Akolekar, Ranjit ;Cesarean section in modern day obstetrics practice ;optimising labour and delivery for safe motherhood, FOGSI Focus 2005;23/5.
[6] Wilkes,paul T;Wolf,Doughlas M;Kroenbach,David W;kunz,Mirjam;Gibbs ,Ronald S.Risk factors for caesarean delivery at presentation of nulliparous patients in labour,ACOG2003.
[7] Burrows, Lara J; Meyn, Leslie A;Weber, Anne M;Maternal Morbidity Associated with Vaginal versus Cesarean Delivery, ACOG 103(5);Part 1,May 2004;907-12.
[8] Cunningham ,F.Gary;Lenevo, Kenneth j;Bloom, Steven L;Hauth, John C;Gilstrap, Larray c;Wenstorm, Kathrine D , Cesarean delivery and peripartum Hysterectomy,Williams Obstetrics 2005,Chapter 25,587-604.
[9] Tidsskr Nor Taegeforen: Hemmorhage in LSCS; J Obstet Gynaecol Oct 10 (2000) 120(24) 2864-6
[10] Thorsen S. Differences in the binding to fibrin of native plasminogen modified by proteolytic degradation: influence of w- aminocaproic acids. Biochem Biophys Acta 1975; 393:55-65.
[11] Okamoto S, Sato S, Takada Y et al. An active stereoisomer (trans form) of AMCHA & its

fibrinolytic (antiplasminic) action in vitro & in vivo. Kieo J Med 1964; 13:177-85

[12] Hoylaerts M, Linjen HR, Colleen D: Studies on mechanism of antifibrinolytic action of tranexamic acid. Biochem Biophys Acta 1981; 673:75-85.

[13] Widlund L, Stromberg S, Hellstrom H, et al. The disposition of tranexamic acid (AMCA) in various animal species & in man after oral dosage was evaluated. Stockholm, Sweden: Kabi AB 1979

[14] Tovi D, Thulin CA. The ability of tranexamic acid to cross the blood brain barrier & its use in patients with ruptured intracranial aneurysms. Acta Neurol Scand 1972; 48:257.

[15] Tovi D, Thulin CA. The ability of tranexamic acid to cross the blood brain barrier & its use in patients with ruptured intracranial aneurysms. Acta Neurol Scand 1972; 48:257

[16] Tripathi, K.D;Antiplatelet Drugs.Essentialss of Medical Pharmacology 2001,chapter,612.

[17] Miya-ying Gai, Lian-fang Wu, Qi-fengs Su. A clinical observation of blood loss reduced by tranexamic acid during & after caseerian section: A multi centre randomized trial. European J Obstet Gynaecol & repro bio; 112(2004) 154-57.

[18] Yang H, Zheng S, Shi C et al. Clinical Study on the efficacy of Tranexamic acid in reducing postpartum blood lose: a randomized, comparative, multicenter trial Chin J Obstet Gynecol 2001; 6:590 – 2.

[19] Gohel M, Purvi P, Ashoo G, Pankaj D et al Efficacy of tranexamic acid in reducing blood loss during and after the lower segment cesarean section.: A randomized case controlled prospective study.(Obstet Gynecol India.2007 ;50. (3) ;228-230).

[20] Leila Sekhavat, A. Tabatabaii, M. Dalili, et al. Efficacy of tranexamic acid in reducing blood loss after cesarean section. J of Mater-Fetal & Neon Med; 22, 1 Jan 2009: 72 – 75.