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PROPHYLACTIC INTRAVENOUS TRANEXAMIC ACID TO DECREASE INTRAOPERATIVE BLOOD LOSS IN CESAREAN SECTION UNDER GENERAL ANESTHESIA

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ABSTRACT

Background: The surgical procedures are associated with perioperative blood loss. Caesarian section is a common operation associated with blood loss of around 600-800 ml, tranexamic acid as antifibrinolytic agent blocks lysine-binding site on plasminogen molecule and it is used to decrease bleeding-related morbidity and mortality in pregnant women. **Aim of the study**: Assess the role of prophylactic tranexamic acid in reducing intraoperative blood loss in Cesarean section under general anesthesia. **Patient and Methods**: One hundred ASA class II adult consented female patients, scheduled for elective C-section were blindly randomized into two groups to receive either (group A) 10 ml of normal saline as Placebo or (group B) intravenous 10mg/kg tranexamic acid 15 min before anesthesia. All patient's total blood loss was measured and recorded perioperatively. **Result:** The tranexamic acid significantly reduced the quantity of total blood loss, 625 ± 25.4 ml in study group as compared to 744.72 ± 55.1 ml in the control group (P<0.01). **Conclusion:** The prophylactic administration of Tranexamic acid had statistically significant in reducing the blood loss without any adverse effects during the study time.

KEYWORDS: tranexamic acid, general anesthesia, C-section.

INTRODUCTION

Cesarean section (CS) is the most common major operation performed worldwide. The rates of CS increased from less than 10% before the 1980s to more than 30% in the last decade in many developed countries.[1]

CS is associated with 2-fold increase in maternal morbidity compared with vaginal delivery.[2]

Morbidities include infection, hemorrhage, thromboembolism and anesthetic complications.[3]

Obstetrical hemorrhage, hypertension and infection constitute the triad of maternal death causes.[4]

Intraoperative maternal hemorrhage is the main operative complications associated with high-risk CS. Placenta previa, multiple pregnancies, and severe pre-eclampsia are all associated with a high risk of major PPH requiring immediate blood transfusion. Many uterotonics as oxytocin, ergometrine and prostaglandins especially misoprostol were tested to minimize both intraoperative and postoperative blood loss during and after CS.[5]

Antifibrinolytic agents as tranexamic acid (TXA) were effective in prevention of bleeding complications with few side effects in various conditions.[6]

Excessive bleeding at delivery is one of the most important causes to maternal morbidity and mortality in the world.[7] However, mean blood loss during cesarean delivery is reported from 400–500 ml in spinal anesthesia while in general anesthesia from 500-800 ml and represents no health risk for most women.[8]

Some studies define excessive blood loss as bleeding more than 1,500 ml[8], whereas others claim a blood loss above 1000 ml as criterion.[9]

Maternal risk factors for excessive bleeding during cesarean delivery in general are increasing age, high body mass index (BMI), previous uterine scar and pregnancy-related conditions such as preeclampsia, placenta previa and placental abruption. Slow progress in labor, emergency cesarean section, and general anesthesia are the most common reported obstetrical risk factors associated with excessive blood loss, whereas fetal risk factors are high birth weight and multiple pregnancies.[9]

PATIENTS AND METHODS

A prospective study was conducted in Baghdad Teaching Hospital/ Medical City Complex from January 2022 to August 2022 after approval from the Arab board council of anesthesia and intensive care.

An informed consent was obtained from all patients before enrolling them in the Study.

Exclusion criteria

- ASA more than 3
- Age below 18 years or above 40.
- Emergency CS.
- Body mass index more than 25 kg/m^2.
- Patient refusal.
- Allergy to drug used in the study.
- Previous C-section scar
- History of deep venous thrombosis or embolism.
- Abnormal Ultrasound for placenta or fetal presentation.

Data were collected using a pre-constructed form sheet and a detailed history was taken from each patient; information about the age of the patient and past medical history. A clinical general examination was performed and vital signs recorded.

Anesthesia was standardized for all patients with standard monitoring.

100 patients were randomly allocated in 2 groups:
Group A includes 50 patients received 10 ml normal saline fluid (placebo).
Group B includes 50 patients received TXA as dose adjusted 10 mg/kg.

Measurement of blood loss was in 2 stages:

- Stage 1: Started from the skin incision to the uterus suturing including:
  - ❖ pack weight (full soaked =100 ml)
  - ❖ (half soaked =50 ml)
  - ❖ Towel soaked (Surgical Cesarean Drape).
  - ❖ Suction device with 2000 ml container.
- Stage 2. Started from the uterus suturing to the skin suturing including:
  - ❖ Pack weight (full soaked =100 ml).
  - ❖ (half soaked =50 ml).
  - ❖ Towel soaked (Surgical Cesarean Drape).
  - ❖ Vaginal pack.

Total blood loss collected for statistical analysis.

The data analyzed using Statistical Package for Social Sciences (SPSS) version 26. The data presented as mean, standard deviation and ranges. Categorical data presented by frequencies and percentages. Independent t-test (two tailed) was used to compare the continuous variables accordingly. A level of p-Value less than 0.05 was considered significant.

RESULTS

This study involves 100 pregnant female randomly divided into two groups (TXA GROUP and placebo group).

The distribution of study patients by general characteristics is shown in table 1. Study patient's age was ranging from 18 to 35 years with a mean of 26.16 years and standard deviation (SD) of ±5.6 years.

The highest proportion of study patients in the two groups was aged ≥ 25 years (60% and 55%).

Concerning BMI level, the highest proportion of study patients in TXA and placebo groups was overweighed (73.3% and 60% respectively).

Table 1: Comparison between study groups by age and BMI.

Variables	Groups		p-Value
	TXA Mean ± SD	PLA Mean ± SD	
Age (years)	26.8 ± 5.0	25.53 ± 6.3	0.39
BMI (kg/m^2)	22.78 ± 2.0	23.09 ± 1.8	0.529

In comparison between study group by age and BMI, we noticed that there were no significant differences (P ≥ 0.05) in age and BMI between study groups as shown in table 1.

He comparison between study groups by mean of MAP is shown in table 2. In this study, there were no significant differences (P≥0.05) between study groups in means of MAP throughout the surgery.

Table 2: Comparison between study groups by mean arterial pressure (MAP).

Time	MAP (mmHg)		p-Value
	TXA Mean ± SD	PLA Mean ± SD	
Preoperative	99.04 ± 7.86	101.11 ± 8.06	0.319
After induction	89.0 ± 9.09	90.4 ± 9.67	0..566
After 15 min.	89.31 ± 8.16	85.8 ± 12.71	0.09
5 min. after extubation	93.06 ± 9.12	96.0 ± 7.13	0.478

The comparison between study groups by mean of heart rate is shown in table 3. There were no significant differences (P≥0.05) between study groups in means of heart rate at all times.

Table 3: Comparison between study groups by heart rate.

Time	Heart rate (beat/min)		p-Value
	TXA Mean ± SD	PLA Mean ± SD	
Preoperative	87.4 ± 11.82	92.13 ± 13.84	0.16
After induction	91.2 ± 14.28	92.06 ± 14.7	0.818
After 15 min.	90.26 ± 14.55	88.73 ± 13.89	0.678
5 min. after extubation	89.4 ± 13.76	84.2 ± 14.13	0.154

Table 4 shows the comparison between study groups by amount of blood loss. We calculate the total blood loss in two stages.

Table 4: Comparison between study groups by amount of blood loss.

Variable	Blood loss (ml)		p-Value
	TXA Mean ± SD	PLA Mean ± SD	
From skin incision to uterine suturing	528.33 ± 50.3	636.7 ± 62.9	0.001
From uterine suturing to skin	96.66 ± 34.6	93.33 ± 17.3	0.639
From skin incision to recovery	625 ± 25.4	744.72 ± 55.1	0.001

DISCUSSION

Hemostasis depends on a successful balance between the coagulation, complement and fibrinolysis pathways with complex interactions between plasma protein, platelets, blood flow and viscosity and the endothelium. Injury to the arterial or venous wall exposes perivascular, tissue factor-expressing cells to blood. Bleeding can increase the duration of hospital stay, re-operations and necessitate blood transfusion to restore blood loss and to reduce the morbidity.

The risk of hemolytic reaction, anaphylaxis, acute lung injury and infection transmission, are associated with blood transfusion. Transfusion can have potential of adverse immune consequences and end organ effects. Moreover, it is a potentially scarce and expensive resource. In this study, the prophylactic administration of Tranexamic acid has shown significant decrease in total measured blood loss and has reduced the need of blood transfusion.

This study has evaluated prophylaxis of Tranexamic acid to decrease blood loss during C-SECTION. We calculate the total blood loss that in the period from skin incision to the uterine suturing, means of blood loss were significantly lower in TXA group than that in PLA group regarding pack, suction device; while it was significantly lower in PLA group than that in TXA group regarding towel (P < 0.05).

From uterine suturing to the skin, blood loss was significantly lower in PLA group (no loss all) than that in TXA group regarding suction device (P =0.006). There were no significant differences (P ≥ 0.05) between study groups in amount of blood loss regarding pack, and vaginal bleeding.

Totally, from skin incision to the recovery, means of blood loss were significantly lower in TXA group than that in PLA group (625.0 ml versus 644.72 ml, P= 0.001).

Our data confirmed that Tranexamic acid treated patients showed decrease in blood loss intraoperative as pre induction dose which goes with the same results of the study of Massimo Franchini, et al.[11] They used intraoperative TXA as infusion.

This meta-analysis support the evidence of a beneficial effect of Tranexamic acid in reducing blood loss and

need for blood transfusion in pregnant women undergoing caesarean section but as continuous I.V. infusion at a rate of 15 mg/kg/hr.

Efficacy of Tranexamic acid in decreasing blood loss during cesarean section: a randomized controlled prospective study done by Ramesh AC, et al.[12]

In this study, they found that Tranexamic acid significantly reduced the amount of blood loss during and after the first two hours of postpartum period in lower segment cesarean section, and its use was not associated with any side effects when it given immediately before LSCS.

This results also agrees with our study that use of tranexamic acid reduces intraoperative blood loss in cesarean section.

CONCLUSION

The prophylactic administration of TXA had significantly reduced the blood loss without any adverse effects during the study.

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