ORIGINAL ARTICLE

The effect of intravenous tranexamic acid in reducing blood loss in vaginal delivery

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Abstract

Background: ***Postpartum haemorrhage (PPH) is a significant global complication following caesarean and vaginal deliveries that significantly raises the risk of maternal death and close calls.***

Aim: ***To ascertain how prophylactic tranexamic acid (TA) affects observed and computed blood loss during the vaginal birth.***

Patients and methods: ***120 women with singleton pregnancies participated in this randomised controlled experiment, which ran from December 2021 to June 2022 at the Obstetrics and Gynaecology department at AL-HUSSIEN University Hospital and Isis Specialised Hospital for Obstetrics and Gynaecology in Luxor. After the foetus was delivered, women were randomly randomised to receive 10 IU of oxytocin and one gramme of intravenous TA or a placebo. Only the personnel were aware of which patients were on which regimen.***

Results: ***There was no significant difference in hemoglobin pre-operatively between the groups, but a significant decrease in hemoglobin post-operatively. Intraoperative events were not significantly different, but total blood loss was significantly different (P <0.001).***

Conclusion: ***Since no woman is immune to postpartum haemorrhage, intravenous TXA, when given to avoid primary PPH, reduces the loss of blood after vaginal birth safely and efficiently with no increased maternal risks. As such, it ought to be made accessible to women who are chosen for a vaginal delivery.***

Keywords: Intravenous tranexamic acid; Vaginal delivery; Blood loss

1. Introduction

Postpartum haemorrhage (PPH) is a significant global complication following caesarean and vaginal deliveries that significantly raises the risk of maternal death and close calls. An average of 2-4 hours passes between the beginning of PPH and mortality in 1-2 percent of moms with PPH every year .[1]

The two main approaches to preventing PPH are non-pharmacological ones (like uterine massage) and pharmacological ones (like uterotonic drugs like oxytocin and ergometrine).[2] antifibrinolytic drugs have been used to lessen bleeding during different types of surgery.[3] An antifibrinolytic drug called tranexamic acid (TA) prevents plasminogen from attaching to fibrin at its lysine-binding site. As a result, fibrinolysis is suppressed, the clot disintegrates, and excessive or repeated bleeding is decreased.[4]

TA is most frequently used in gynaecology and obstetrics for the treatment of idiopathic menorrhagia, and when taken orally, this is a secure and efficient medication. TA has also been used to treat pregnancy-related bleeding (placental abruption, placenta previa).[5]

It could counteract the effects of the fibrin breakdown products and plasminogen produced after placental separation. This medication has been shown to be safe to use in non-pregnant women in the past, with no thromboembolic side effects.[6]

Tranexamic acid does not impact overall blood circulation; instead, it inhibits fibrinolysis at the site of bleeding. Nausea, vomiting, diarrhoea, disorientation, seizures, and vision problems are some of the possible adverse effects.[7]

The purpose of this study was to ascertain how prophylactic tranexamic acid (TA) affected measured and computed blood loss during vaginal birth.

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2. Patients and methods

120 singleton pregnant women participated in this randomised control experiment at AL-HUSSIEN University Hospital's Obstetrics and Gynaecology department, and Isis Specialized Hospital for Obstetrics and Gynecology in Luxor from December 2021 to June 2022.

Randomization

After the foetus was delivered, women were randomised to receive 10 IU of oxytocin along with one gram of injectable TA or a placebo. Only the personnel were aware of which individuals were on which regimen.

Inclusion criteria: Women who are between the ages of eighteen and thirty-five; singleton pregnancies with a cephalic presentation; gestational ages between thirty-eight and forty-two weeks; and those who intend to give birth vaginally.

Exclusion criteria: Women with a history of diabetes and preeclampsia, haemorrhaging after delivery during prior pregnancies, grand multiparity (parity ≥5), prolonged beginning of labour induction (oxytocin management for at least twelve hours), bleeding or a condition that might hinder initial hemostasis, and any other conditions that could compromise these outcomes should be taken into consideration.

Methods

The following was applied to each patient:

Comprehensive medical, obstetric, and personal history comprising Personal history, menstrual history, obstetric history, medical history, Past surgical history, family history, and the present history of pregnancy and labor.

The file was revised for:

The examination is done on admission: The obstetric examination involves superficial palpation to check tenderness-mass, deep palpation to determine organomegaly, and Joseph's maneuvers to assess EFW, liquor, frequency, and duration of contractions. Patients were monitored for temperature, pulse, respiratory rate, blood pressure, and scar tenderness. Fetal distress was assessed through cardiotocography, including tachycardia, Bradycardia, poor variability, absence of acceleration, decelerations, and presence of meconium in liquor.

The patient file was revised for intrapartum management.

The potential danger of rupture of the uterus should be discussed as part of informed consent for TOLAC. A baseline type of blood and screen, as well as hematocrit. Intravenous access insertion at discharge. It is good to have the anaesthesia staff evaluate the patient, whether or not they were admitted, both to assess labour analgesia choices and in case a caesarean birth becomes required. It has not been seen that ruptured uterus symptoms may be concealed by neuraxial anaesthesia, nor can it reduce the chance of vaginal delivery following caesarean section.

Vaginal Examination

First, a digital examination of the vagina was taken to determine the extent of foetal presentation, effacement, and cervical dilation. Examining the vagina using the Bishop Score: prior to the start of labour. A Bishop score of five or below is thought to be important for cervical softening and advantageous for labour induction.

Assessment of fetal well-being

The amniotic fluid index, the umbilical artery Doppler, approximated foetal weight, CTG-FHR pattern, and signs of activity in the uterus are all measured using pelvic ultrasonography. Levels of haemoglobin and hematocrit are tested prior to birth as well as twelve to twenty-four hours after.[7] The loss of blood was computed as the amount of blood lost ({predelivery HCT – post-delivery HCT}/pre-delivery HCT) as a percentage of haematocrit prior to and following delivery (0.75 9 {[maternal height (inches) 9 50] + [maternal weight in pounds 9 25]}). While the control group receives a placebo, the intervention group's women receive one gram of injectable TA. The Brandt-Andrews manoeuvre was used to deliver the placenta after the umbilical cord was clamped and severed. Blood loss data is gathered and measured. Twenty minutes after placental birth, both groups receive 500 mL of normal saline containing 10 IU oxytocin. Blood loss is assessed in two time intervals: from the time the foetus is delivered until the placenta is delivered, and from the time the placenta is delivered until the end of the second hour following childbirth. Before and after usage, blood-soaked gauzes, gowns, sheets, and tampons are weighed, and the Gai et al.[8] technique is used to quantify blood loss. Blood volume (mL) equals (weight of materials utilised - weight of materials prior to use)/1.05. Outcomes: primary outcome: postpartum bleeding and secondary outcomes: hemoglobin and hematocrit level, length of the third stage of labor, and need to use additional uterotonic agents after vaginal delivery.

Lab assessment

The routine postpartum testing (PTL) procedure at our hospital involves the measurement of blood counts, CRP, enzyme levels in the liver, kidney function, and urine content. Foetal heartbeat tracing and ongoing uterine activity tracking are required if any anomalies arise. Abdominal discomfort, waning contractions, foetal heart rate anomalies, and maternal hemodynamic fluctuations can all be indicators of uterine rupture. In women who experience ongoing

discomfort or require repeated dosages, clinical attention is essential. For TOLAC, both induction and augmentation are appropriate treatments; however, because of the elevated risk of uterine rupture, care must be taken in these situations.

Postoperative evaluation was revised in the files for any postoperative complications like postpartum hemorrhage and sepsis.

Statistical analysis

The twentieth edition of the Statistical Programme for Social Sciences (SPSS Inc., Chicago, IL, USA) was used to analyse the data. The standard deviation and mean were used to characterise the quantitative variables. Numbers and percentages were used to convey qualitative traits. A Student t-test was used to evaluate parametric quantitative data between both groups. When frequencies were less than five, the exact Fisher test or the chi-square (X2) test was used to compare the qualitative variables. Pearson correlation coefficients were utilised to evaluate the relationship between two data sets with normal distributions. When a variable lacks normal distribution, a P value of less than 0.05 is deemed noteworthy. Operational design: After outlining the study's purpose, the researcher gave a brief introduction to each participant before asking them to take part. The goal and anticipated benefits of the study were fully disclosed to each and every one of the chosen participants. Every ethical factor was taken into account during the whole project.

Administrative design

Approval: The subjects' parents gave their verbal informed consent, and data privacy was guaranteed. The head of the department of obstetrics and gynaecology at the same institution, the management of the hospital at Al Azhar institution, and the dean of the college of medicine all provided an official written statement of administrative authorization. To secure their cooperation, the study's title and aims were communicated to them.. Ethical committee: Along with institutional review board clearance, authorization was also acquired from the Faculty of Medicine ethics committee.

3. Results

Table 1. Comparison of the patients under study based on GA and age

	GROUP A (N = 60)	GROUP B (N = 60)	TEST OF SIG.	P
AGE (YEARS)				
RANGE.	25 – 39	25 – 38	t=	0.396
MEAN ± SD.	29.77 ± 3.79	30.35 ± 3.71	0.852	
GESTATIONAL AGE (WEEKS)				
RANGE.	32 – 41	26 – 41	t=	0.496
MEAN ± SD.	38.27 ± 1.4	38.03 ± 2.25	0.683	

There was statistically insignificant difference between the studied groups regarding age and Gestational age P>0.05. (Table 1)

Table 2. Comparison of the patients under study based on Hb

		GROUP A (N = 60)	GROUP B (N = 60)	TEST OF SIG.	P
HB. (G/DL)	Preoperative				
	Range.	10.1 – 14.3	9.8 – 14	t=	0.699
	Mean ± SD.	12.11 ± 1.26	12.03 ± 1.18	0.388	
	Post-operative				
	Range.	9.1 – 13.8	7.7 – 13.8	t=	<0.001*
	Mean ± SD.	11.5 ± 1.31	10.67 ± 1.48	3.259	
	p1 (t1)	<0.001*	<0.001*		

Regarding haemoglobin pre-operative P>0.05, there was statistically insignificant variation between the groups under investigation. However, there was a statistically significant change (P<0.05) in haemoglobin levels after surgery. In the two groups under investigation, haemoglobin levels significantly decreased after surgery. (Refer to Table 2)

Table 3. Comparison of the patients under study based on HCT

		GROUP A (N = 60)	GROUP B (N = 60)	TEST OF SIG.	P
HCT%	Preoperative				
	Range.	32 – 42.5	30.4 – 43.6	t=	0.372
	Mean ± SD.	37.58 ± 3.26	36.99 ± 3.84	0.897	
	Post-operative				
	Range.	27.3 – 42.4	23.4 – 41.1	t=	<0.001*
	Mean ± SD.	34.66 ± 3.82	31.48 ± 4.93	3.949	
	p1 (t1)	<0.001*	<0.001*		

Regarding HCT% pre-operative P=0.372, there was statistically insignificant difference between the groups under study. Regarding HCT% post-operatively, there was a statistically significant difference (P<0.001). In the two groups under study, there was a noteworthy reduction in HCT% following surgery.

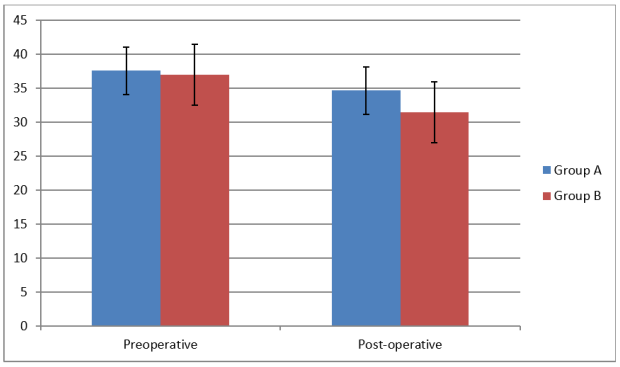

Figure 1. Comparison of the patients under study based on HCT

Table 4. Comparison of the patients under study based on outcome

	GROUP A (N = 60)		GROUP B (N = 60)		TEST OF SIG.	P
TOTAL BLOOD LOSS						
RANGE.	310 – 690		370 – 930		t=	<0.001*
MEAN ± SD.	516.83 ± 110.8		656.83 ± 182.32		5.083	
INTRAOPERATIVE EVENTS	No.	%	No.	%		
ACCESSORY HEMOSTATIC SUTURES OF THE UTERINE INCISION	19	31.7	16	26.7	χ^2= 3.568	0.168
BLOOD TRANSFUSION	0	0.0	3	5.0		
UTERINE ARTERY INJURY OR LIGATION	1	1.7	2	3.3		

While there was a statistically significant variance in total blood losses (P <0.001), there was statistically insignificant difference in intraoperative events across the groups under study. (Table 4)

4. Discussion

Synthetically derived from the amino acid lysine, TA has the ability to improve the efficacy of the patient's haemostatic processes by reversibly blocking the lysine binding sites on plasminogen molecules, which is how it achieves its antifibrinolytic action. As a result, excessive or repeated bleeding is decreased, and clot breakdown (fibrinolysis) is controlled.[9]

The main results of our study were as follows:

In this investigation, we discovered that there were no age- or GA-related significant distinction among the groups under investigation (p>0.05).

According to Ali et al.[10] there was no significant difference seen between the groups in terms of age distribution, which ranged from 18 to 40 years old at 24.45 ± 5.78 and from 17 to 43 years old at 25.80 ± 6.44.

We concluded from the present research that there was a postoperativepostoperative arterial pressure difference between the analysed groups that was of statistical significance.

According to Kashanian et al.[11] the intervention group had greater haemoglobin levels six hours after birth, whereas the control group had lower blood pressure one hour after delivery.

In this investigation, we discovered that the hematocrit post-operatively varied statistically significantly across the groups under investigation.

According to Diab et al., there was a significant difference (p < 0.001) between the study group's postoperative hematocrit and the control group's reduction in hematocrit (p < 0.001).[12]

In this investigation, we proved that, in terms of total blood loss, there was a statistically significant distinction between the groups under investigation.

According to Kashanian et al.[11], the control group experienced a higher mean loss of blood and a requirement for misoprostol (p=.033 and p<.0001, respectively).

According to Chawla et al.[13] women who received tranexamic acid saw a noteworthy decrease in the amount of blood loss within the 6-hour postpartum period.

According to Igboke et al.[14] there was a mean difference of 166.2 ml (48.7%) in the mean estimated blood loss between the TXA group and the placebo group (174.87 ± 119.83 ml vs 341.07 ± 67.97 ml, respectively; P < 0.0001).

According to Ali et al.[10] blood loss varied across groups as follows: 203.67 ± 141.12 and 355.5 ± 264.96, correspondingly. The TXA group had considerably less loss of blood.

According to Diab et al.[12] there was a significant difference in total loss of blood (p < 0.001) between the study group and the control group. Additionally, the study group's vaginal pads were substantially less saturated in the initial twenty-four hours postpartum than the control group's (p < 0.001).

Limitations: The research has some drawbacks, including a limited sample size, a single-center design, and an insufficient power to measure postpartum haemorrhage. Therefore, it is advised that bigger sample sizes be used in future research to evaluate the medication's potential to reduce the loss of blood following vaginal birth, particularly during periods of postpartum haemorrhage.

4. Conclusion

Because no woman is resistant to postpartum bleeding, intravenous TXA, when given to prevent primary PPH, safely and efficiently reduces blood loss following vaginal birth without raising maternal risks. This treatment should be made available to women who are chosen for vaginal delivery.

Disclosure

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Authorship

All authors have a substantial contribution to the article

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Conflicts of interest

There are no conflicts of interest.

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