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Anaesthesiology

THE EFFECT OF TRANEXAMIC ACID ON PERIOPERATIVE BLOOD LOSS AND POSTOPERATIVE BLOOD TRANSFUSION REQUIREMENT IN TOTAL KNEE REPLACEMENT

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ABSTRACT

Aim Of The Study- To assess the effect of TRANEXAMIC acid on
(1)peri operative blood loss
(2)postoperative blood transfusion requirements in patients undergoing TKR surgeries when compared with control group.

Materials & Methods- A randomized single blind clinical trial conducted on 60 patients.
Study design was approved by hospital ethical committee and all patients have consent for the surgery.
The sample size was calculated depending on the previous study 33 and the case load in the hospital with a power of 80% to detect a difference at the 95% confidence interval . Considering A Type I error (α) of 5% and Type II error (β) of 20% Power of the study, the sample size was 60. The patients were randomised in 1:1 ratio into two groups .Group 1 included 30 patients who underwent TKR without TA while group 2 included 30 patients who underwent TKR with TA . Group 2 received tranexamic acid 10 mg/kg, just before cementation followed by 2 similar doses 3 and 6 hours later, this group is the study group. The group 1 did not receive any treatment for prevention of blood loss and is the control group.

Conclusions-- To conclude - the effect of TRANEXAMIC acid on
(1) peri operative blood loss is clinically insignificant
(2)postoperative blood transfusion requirements is clinically and statistically significant

KEYWORDS : Tranexamic acid, TKR(Total Knee replacement), Blood transfusion

INTRODUCTION

BACKGROUND: Extensive blood loss in total knee replacement (TKR) surgery is well known and is associated with a high transfusion rate of allogenic blood. Risks and costs of allogenic blood transfusions mandate strategies to reduce blood loss in surgery. The delayed bleeding associated with TKR surgery may be a result of a torniquet-induced imbalance of the procoagulant and fibrinolytic systems. There are conflicting results in the literature about tranexamic acid in reducing perioperative blood loss and the number of blood transfusions. The objective of this study was to assess the efficacy of tranexamic acid in reducing perioperative blood loss and blood transfusion requirement during TKR surgeries. Tranexamic acid, a synthetic derivative of the amino acid lysine, is an effective antifibrinolytic agent. It acts by reversibly blocking lysine binding sites on the plasminogen molecules and inhibiting plasmin formation. Tranexamic acid is being increasingly used in orthopaedic surgery due to its efficacy, safety and low cost.

AIMS AND OBJECTIVES -

To assess the effect of TRANEXAMIC acid on
(1) peri operative blood loss
(2)postoperative blood transfusion requirements
in patients undergoing TKR surgeries when compared with control group.

MATERIALS AND METHODS

A randomized single blind clinical trial conducted on 60 patients.
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- **Inclusion criteria:**
- A diagnosis of osteoarthritis or aseptic bone necrosis, but not inflammatory arthritis
- Unilateral, primary, cemented TKR for osteoarthritis
- Combined spinal epidural anaesthesia
- ASA I/II/III
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- **Exclusion criteria:**

- Bil.TKR
- Anaemia
- Severe renal and hepatic insufficiency
- congenital and acquired haemostatic diseases
- History of coagulopathy or thrombosis, embolism, or both
- Inflamatory Arthritis

All patients underwent a pre anaesthetic check up and were pre-medicated with oral Tab. Alpraxolam 0.25 mg and Tab Omeprazole 20 mg night before and morning of surgery.

Patients were monitored with five lead electrocardiography (ECG), pulse oximetry, end-tidal carbon dioxide, temperature and non-invasive blood pressure. Patients were anaesthetized using sub-arachnoid block with 0.5% hyperbaric Bupivacaine. An indwelling epidural catheter was placed for post operative pain relief. The extremity to be operated upon was drained of blood by elevation and the pneumatic tourniquet was inflated to a pressure of 150 mm Hg above systolic pressures.

The indication for blood transfusion as per our institutional protocol is based on haemodynamic parameters, cardiovascular history, ASA grade, haemoglobin level, blood loss and age. The trigger point for transfusion is set at a haemoglobin value of <9gm/dl and a post op mean arterial pressure <70mm Hg in ASA I & II patients and a haemoglobin value of <10gm/dl and a post op mean arterial pressure <80mm Hg in ASA III patients. Higher mean arterial pressure is aimed in these patients considering their autoregulatory range which is set at a higher level, to avoid compromise of tissue perfusion.

RESULTS AND OBSERVATIONS-

Sixty patients were randomized in this study. The two groups were comparable for age, weight, length of surgery and preoperative coagulation test results. In this study group 56.7% of the patient's with treatment belongs to ASA grade II which was more as compared to

46.7% among patient's without treatment but difference was not significant. 20.0 – 23.3% of the total cases belongs to ASA grade I. 23.0-30% of the total cases belongs to ASA grade III. No patients required conversion to general anaesthesia. Mean arterial blood pressure maintained during surgery

GENERAL DATA

	GROUP WTA (1) N=30	GROUP TA (II) N=30
Age (YRS)	72 .23+/6.06	72+/-5.878
Weight (KG)	61.50+/-7.56	58.73+/-7.63
ASA Grade (I/II/III)	O7/14/09	06/17/07
Pre op Hb	11.277+/-1.046	11.110+/-0.648
Pre op Hct	34.367+/-0.556	34.533+/-0.681
Platelet Count (Lac/cumm)	2.227+/-0.443	2.007+/-0.615
INR	1.18+/- 0.116	1.183+/-0.115
Mean Arterial Blood Pressure During Surgery (mmHg)	99.7333+/-5.552	101.10+/-5.938
Tourniquet time(min)	136.667+/-3.79	134.5+/-5.469
Mean Duration Of Surgery	1.913+/-0.107	1.910+/-0.118
Intraoperative Crystalloids	2.40+/-0.498	2.367+/-0.49
Patients with Intraoperative Colloids	20 (66.7%)	19 (63.3%)

COMPARISON OF MEAN BLOOD LOSS BETWEEN TWO GROUPS

Groups	Mean Blood Loss (Mean SD)
With Treatment	288.033+/-11.842
Without Treatment	325.667+/- 13.755

COMPARISON OF NO OF PATIENTS WITH BLOOD TRANSFUSION IN BOTH THE GROUPS

No Blood Transfusion	With Treatment (N = 30) No %	Without Treatment (N = 30) No %
I	1	03
II	0	04
Total Patients	**01 3%**	**07 23.3%**

COMPARISON OF MEAN POST OPERATIVE BLOOD LOSS BETWEEN TWO GROUPS

DURATION	GROUP WTA (I)	GROUP TA (II)
1st Hour	172.833 +/-5.676	160.2 8+/-2.56
6th Hour	63.33+/- 6.989	54.00 +/- 5.477
12th Hour	49.5 +/-4.224	41.00 +/-4.026
24th Hour	40.00 +/-5.724	32.833 +/-5.032
Total	325.667 +/-13.755	288.033 +/-11.842

The study and control groups when compared showed difference in blood loss post operatively which was statistically significant though the difference is not significant clinically. The number of patients who required blood cell transfusion was higher in placebo group. 3% of study group patients required blood transfusion whereas 23.3% patients required blood transfusion in control group. 57.1% of the cases among the without treatment group required two units of blood transfusion. Thus the effect of tranexamic acid on perioperative blood loss is not clinically significant but the blood transfusion requirement is much lower in group given tranexamic acid. The results are similar to the study conducted by Erik Lemay et al[31]

SUMMARY AND CONCLUSION

In conclusion, tranexamic acid as an intravenous bolus dose of 10 mg/kg, just before cementation followed by 2 similar doses 3 and 6 hours later can be safely advocated for use in total knee arthroplasty as an effective strategy to to reduce the blood transfusion requirement

To conclude - the effect of TRANEXAMIC acid on
(1) peri operative blood loss is clinically insignificant
(2)postoperative blood transfusion requirements is clinically and statistically significant

in patients undergoing TKR surgeries when compared with control group. The results of our study is comparable to the one conducted by Erik Lemay et al[31].

In conclusion TXA has a great role to play in reducing the incidence of blood transfusions in patients undergoing TKR surgeries.

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