ORIGINAL ARTICLE

THE ROLE OF TRANEXAMIC ACID (TXA) TOPICAL APPLICATION IN PRIMARY HEMIARTHROPLASTY

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ABSTRACT

Introduction: Tranexamic acis is an inhibitor of fibrinolysis & plasminogen activator which inhibits blood loss during surgery. Intravenous route administration can cause thromboembolic complications. Hence we decided to carry out randomised controlled trial of intraarticular administration of TXA versus control group.

Methodology: At MIMER medical college talegaon. randomised controlled trial was carried out on 60 patients (30 were given topical/intraarticular TXA & 30 were control group) who underwent primary hemiarthroplasty.

Results: In TXA administered patients mean 24 hour blood loss was 466 +/- 313 ml and in control group it was 743 +/- 358 ml. the treatment effect was 277ml (P+0.002) which was significant by Student's t test.

Conclusion: Intraarticular local TXA administration significantly decreases 24 hour postoperative blood loss in primary hemiarthroplasty without significant complications

Keywords: Tranexamic acid, intraarticular,blood loss, hemiarthroplasty

INTRODUCTION

Tranexamic Acid is an inhibitor of fibrinolysis and plasminogen activator which inhibits blood loss during surgery.[1] Many previous studies have demonstrated that administration of TXA reduced post operative blood loss and transfusion rate after total hip arthroplastyand Intravenous administration of TXA during hip surgery has been shown to decrease blood loss.[2,3] However, it has many disadvantages (systemic) like thromboembolic events including Deep Vein Thrombosis and only a small part of intravenous drug reaches the target site (hip surgery).[4] Hence, more efficient method of administration of TXA is desired and some researchers claim that topical administration of TXA into the joint in the form of irrigation into the wound or injecting into the joint during surgery is safe and easy administration route which achieves similar results like intravenous administration route.[3] In orthopaedic surgery blood loss is unavoidable but when every drop of blood counts especially in geriatric population in whom fracture neck of femur is common and many patients are anaemic so every attempt should be made to decrease blood loss during hemiarthroplasty without much thromboembolic complications risk.[5]

Also data on the topical use of TXA in fracture of neck femur surgery in literature is limited and most studies are focussed on primary total hip replacement, total knee replacement, oral, spine, cardiac surgeries only. Hip fractures are associated with many adverse events and increased mortality in perioperative period in elderly and hidden loss of blood may be as high as 1500 cc in addition to intraoperative blood loss.[5]

TXA has theoretically anti-inflammatory properties in addition to antihaemarrhagic action and could decrease blood loss and help in early recovery of operative patients.[6,7]

Hence, we decided to carry out a prospective randomised controlled trial to assess whether topical administration route is effective to decrease intraoperative and postoperative blood loss during primary hemiarthroplasty

METHODOLOGY

Written informed consent was obtained from participants. Local ethical committee approval was obtained from MIMER Medical College and BSTRH Hospital, Talegaon (D) , Pune.

At a single centre (MIMER Medical College and BSTRH Hospital, Talegaon (D) , Pune), a single blind (patient) Randomised Controlled Trial was car-

ried out. Patients who were scheduled for elective Primary Hemiarthroplasty under spinal anaesthesia were selected for this study. Criteria for exclusion were known allergic reaction to TXA, patients already on anti-platelet drugs, Vitamin K antagonists less than 7 days prior to surgery, oral contraceptives, cancer, alcohol abuse.

Prior to surgery, patients were randomised into two groups. In one group, patients were given intra-articular 1 gm TXA after closure of hip capsule and external rotators and in the second group, patients were not given intra – articular TXA. Patients were blinded but operating surgeons were not. Patients were operated under spinal anaesthesia with 1.5 to 2 ml of Bupivacaine (5 mg/ml) given by experienced anaesthetists. All patients were given injection Ceftriaxone 1 gm intravenous pre-operatively. Intra-operative fluid therapy was decided by the anaesthetists. Blood transfusion was given if Haemoglobin level decreased to less than 7.5 g/dl or if any anaemia related complications arouse. Intra-operative surgical swabs were weighed and also suction drains were measured for intra-operative blood loss. 24 hours blood loss was calculated as difference in Haemoglobin levels using the Gross Formula.[2] For Thromboembolic complications, patients were followed up for 6 months.

RESULTS

Out of 66 patients who underwent Primary Hemiarthroplasty for fracture neck femur, 5 patients were excluded according to our exclusion criteria, one patient declined to participate. Hence, 30 patients were included in each group. All patients were followed up for 6 months.

Table 1: Comparison of different variables

Variable	Case (n=30)	Control (n=30)	p-Value
Age	63.2 +/- 0.6	65.5 +/- 7.8	-
Sex (Female)	18	16	-
Pre-operative Haemoglobin	13.9 +/-1.1	13.7 +/- 1.3	0.65
24 hour Haemoglobin (g/dl)	12.6 +/- 1.1	11.8 +/- 1.3	0.01
Intra-operative blood loss	206 (137.5 – 262.5)	208 (150 – 250)	0.78

None of the patients developed anaemia related complications. Blood transfusion was given to no patient in the local TXA group and one patient in non – TXA group. Hence, overall no significant blood transfusion was required in any group. Pulmonary embolism did not occur. 2 Patients in the TXA group developed Deep Vein Thrombosis, confirmed by venous doppler and 2 patients in the Control group developed Deep Vein Thrombosis, confirmed by venous doppler. Hence, nothing appeared different for this complication.

Mean 24 hour blood loss was 466 +/- 313 ml in TXA group and 743 +/- 358 ml in control group. Treatment effect was 277 ml (p = 0.002) - significant by student t test.

DISCUSSION

The use of intravenous TXA in hip surgery has been well established to reduce blood loss.[3,6,7] Advantage of topical TXA administration is that it is acting at the site of bleeding and has anti-fibrinolytic activity locally which might reduce joint swelling and improve wound healing.[6,7]

Also, TXA locally has been reported to maintain a half life of 2 to 3 hours within joint fluid and increase microvascular haemostasis.[8,9] However, some studies report that local TXA reduces blood loss but it is not statistically significant and hence intravenous route TXA has predictable maximum efficacy.[10,11] Some researchers found significant Deep Vein Thrombosis prevalence with intravenous TXA in hemiarthroplasty surgery.[4]

With all these conflicting reports, we performed a Randomised Controlled Trial to see results of local TXA during hemiarthroplasty surgeries at MIMER Medical College and BSTRH Hospital, Talegaon (D), Pune. In our study, 1 gm of TXA was used topically. Some authors recommend more than 2gm TXA locally,[10,12] but it is mostly used in total hip arthroplasty and in our study we did a partial hip arthroplasty. Hence, we used 1 gm (2 ampoules of 5 ml Injection Pause).

TXA accumulated in extra vascular tissue with a potentially prolonged local effect and hence in our study there was persistent sustained reduction in blood loss of 277 ml over 24 hours post-operatively which was statistically significant as compared to the control group.

In our study, there was no significant thromboembolic complications in either group and also no significant difference in blood transfusion rate in both groups. However, our sample size was small and follow up was up to 6 months only. Probably this might have been clear had the sample size been large.

Hence, we cannot draw any conclusions about these issues.

CONCLUSION

Intra-articular local TXA administration decreases 24 hour post-operative blood loss significantly without any significant adverse reactions and hence can be used instead of systemic TXA as it has at least theoretical risk of thromboembolic complications. Also, it is cheaper and easily administered during hip surgery and has prolonged effect.

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