

Study of Efficacy of Tranexamic Acid in Reducing Blood Loss during Internal Fixation of Distal Femur Fractures

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Abstract

Background: Blood loss and subsequent blood transfusion is quite common phenomenon in orthopedic trauma. Hence Tranexamic Acid (TXA) is used as an antifibrinolytic agent to stabilize blood clot and limit blood loss.

Method: 42 (forty-two) adult patients undergoing internal fixation of distal femur fractures were studied. TXA was administered through Intra venous 15mg/kg, 15-20 minutes before incision. Surgery was performed using standard internal fixation technique under appropriate anaesthesia. Intra operative blood loss was measured in millilitre (ml).

Results: Intra operative and post-operative drain output blood was measured in ml and total blood loss was also measured and compared with historical controls (without TSA) had significant p value ($p < 0.001$) in all parameters. Preoperative Hb% was 12.9 (± 1.2), postoperative Hb% was 11.5 (± 1.2) mean Hb% drop has significant p value and only 3 (%) patient required blood transfusion ($p < 0.001$). No thrombo embolism was observed.

Conclusion: In orthopedic trauma surgeries TXA reduces the risk of blood loss and blood transfusion and no symptomatic thromboembolic events were observed.

Keywords: Thromboembolism, Blood Transfusion, Hb% Profile, Antifibrinolytic Agent.

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Introduction

Loss of blood in orthopaedic trauma patient is a major cause of morbidity and mortality. Blood transfusions are also associated with an increased risk of bacterial infection, increased hospital length of stay, will be an extra financial burden to middle socio-economic status patients. Blood loss and subsequent blood transfusion is not limited to orthopaedic trauma patients [1].

Tranexamic acid (TXA) is a lysine analogue that acts as an antifibrinolytic to stabilize blood clot and limit blood loss. Its use was associated with reduced overall mortality and morbidity in orthopaedic trauma patients [2].

TXA has demonstrated rates without increasing complications in patients undergoing elective orthopaedic surgery including internal fixation of distal femur fractures and spine surgery [3]. Despite of benefits established in the literature TXA is not routinely used in treating orthopaedic trauma patients. Many clinicians are hesitant to administer TXA secondary to theoretical concern

of increased thromboembolic complications. It is also reported that, TXA used in all orthopaedic trauma surgery would demonstrated a decreased risk of blood transfusion and total blood loss without altering the risk of thromboembolic events [4]. Hence an attempt is made to evaluate the use of TXA in internal fixation of distal femur fractures in adults.

Material and Method

42 (forty-two) adult patients admitted at Parbhani medical college and research hospital parbhani Maharashtra-431537 were studied.

Inclusion Criteria: Patients who need internal fixation due to distal femur fractures. Patients above 18 years old, patients fit for surgery and for general and spinal anesthesia. The patients who gave their consent in writing for study were selected.

Exclusion Criteria: Patient having history of thromboembolic disorders. (Eg. deep venous

thrombosis, pulmonary embolism) known hyper sensitivity or contraindication to Tranexamic acid, patients under the treatment of coagulopathies or anti-coagulants therapy. Severe renal or hepatic impairment. Patients with pathological fractures or open fractures involving contamination were excluded.

Method: Demographic details mode of fracture type preoperative haemoglobin profile, intra operative blood loss, postoperative drain output postoperative haemoglobin levels, transfusion requirement and any thromboembolic complications were recorded.

Every patient received standard preoperative Txaxaemic acid was administered through Intravenous 15mg/kg 15-20 minutes before incision. Surgery was performed using standard internal fixation techniques under appropriate anaesthesia. Intra operative blood loss was measured in MI using suction collection and weighing of surgical sponges, while postoperative blood loss was estimated from drain output.

Duration of study was from April 2025 to May 2026.

Statistical Analysis: Baseline data or clinical manifestations were studied with percentage. Intra operative and post-operative blood loss was

compared with historical control mean of 650.5 ($\pm$ 85.6) and changes in haemoglobin parameters were studied with t test and significant findings are recorded. The statistical analysis was carried out SPSS software. The ratio of male and female was 2:1.

Observation and Results

Table 1: Clinical manifestations in patients with distal femur fractures

- Mechanism of injury: 30 (71.4%) RTA (Road travelling accident), 12 (28.5%) Fall
- ASA grade: I – 27 (64.2%) and II – 15 (35.7%)
- Pre-operative: 12.9 ($\pm$ 1.2) haemoglobin (g/dl)

Table 2: Study of intra-operative and post-operative blood loss 452.2 ($\pm$ 75.3) Intra operative blood ($p < 0.001$), 122.5 ($\pm$ 23.4) post-operative drain output, 574.7 ($\pm$ 98.7) total (Intra + post-operative)

Table 3: Study of haemoglobin parameter and transfusion data 12.9 ($\pm$ 1.2) pre-operative Hb (g/dl), 11.5 ($\pm$ 1.2) post-operative Day 1 Hb (g/dl), 1.2 ($\pm$ 0.02) mean Hb% (g/dl) drop ($p < 0.001$), 3 (7.1%) patients required transfusion ($p < 0.001$).

Table 4: Study of post-operative complication: 0% - Deep venous thrombosis, 0% - pulmonary embolism, 6 (14.2%) Minor swelling edema, 2 (4.7%) wound infection.

Table 1: Clinical manifestation in patients with distal femur fractures

Manifestations	Details	Mean $\pm$ SD
Mechanism of injury	RTA 30 (71.4%) Fall 12 (28.5%)	--
ASA Grade I/II	27 (64.2%) 15 (35.7%)	--
Preoperative Haemoglobin (g/dl)	12.9 ($\pm$ 1.2)	--

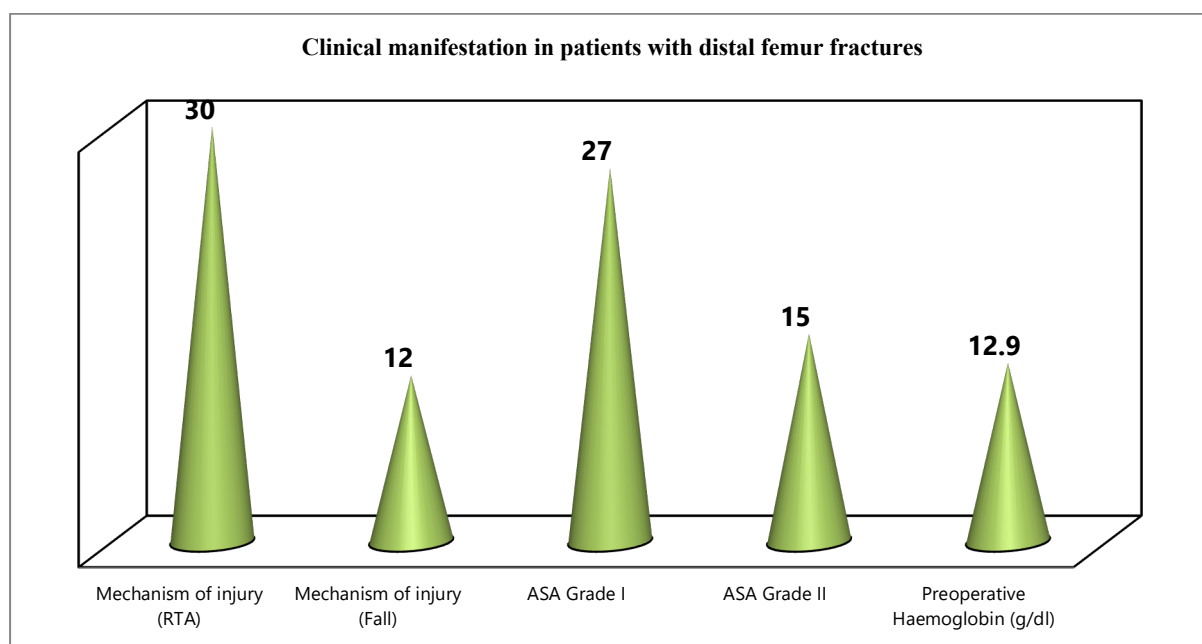


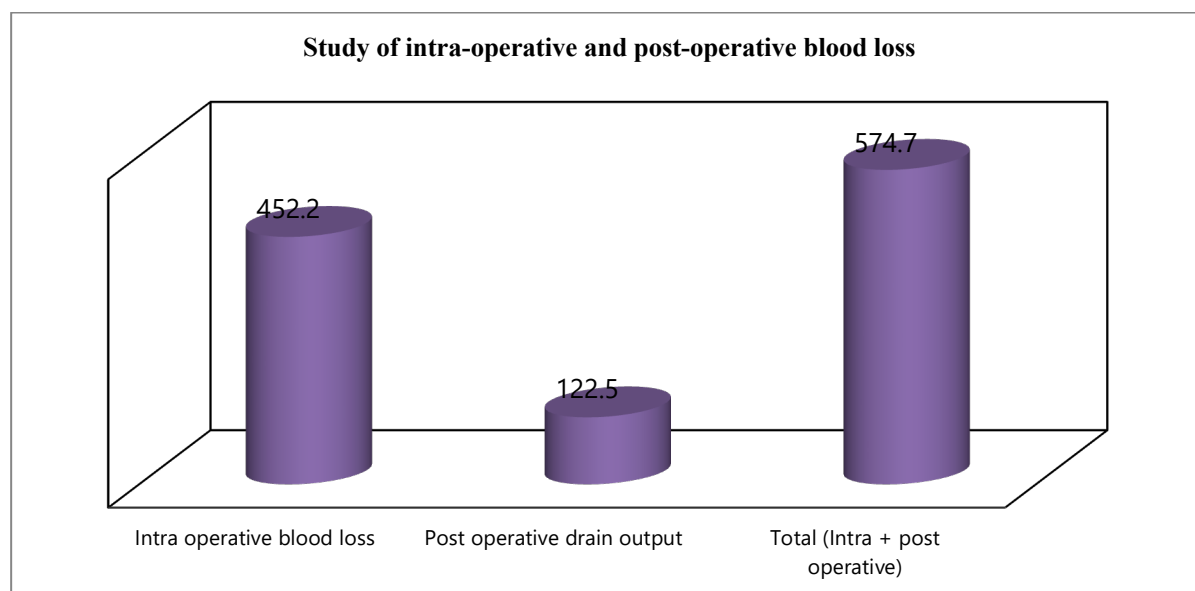
Figure 1: Clinical manifestation in patients with distal femur fractures

Table 2: Study of intra-operative and post-operative blood loss

Blood loss parameter	Mean value $\pm$ SD (ml)	P value
Intra operative blood loss	452.2 ($\pm$ 75.3)	P<0.001
Post-operative drain output	122.5 ($\pm$ 23.4)	P<0.001
Total (Intra + post-operative)	574.7 ($\pm$ 98.70)	P<0.001

t test was compared with historical controls (without tranexamic acid) p value was significant in both intra-operative blood loss and post-

operative drain out. (Total blood loss was compared with historical control mean value 650.5 ($\pm$ 85.6) and p<0.001)

**Figure 2: Study of intra-operative and post-operative blood loss****Table 3: Study of haemoglobin parameter and transfusion data**

Parameter	Mean value $\pm$ SD (ml)	P value
Pre-operative Hb (g/ml)	12.9 ($\pm$ 1.2)	--
Post-operative Day 1 Hb (g/dl)	11.5 ($\pm$ 1.2)	--
Mean Hb drop (g/dl)	1.2 ($\pm$ 0.02)	P<0.002
Patients requiring transfusion	3 (7.1%)	P<0.004

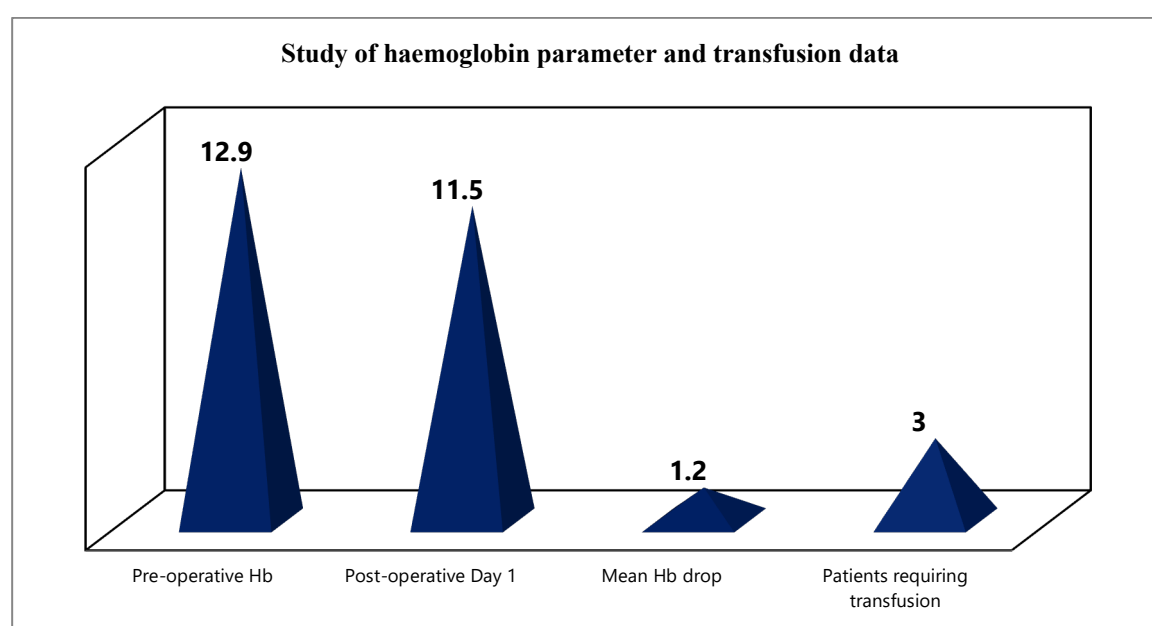
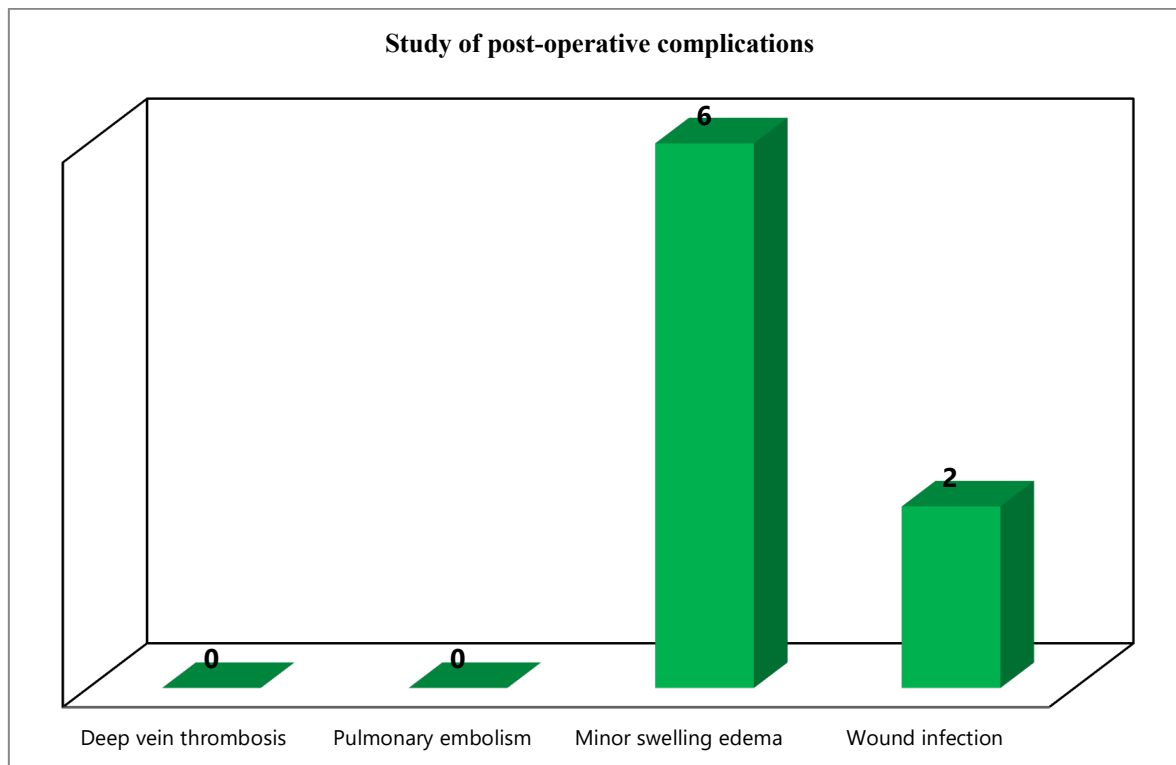
**Figure 3: Study of haemoglobin parameter and transfusion data**

Table 4: Study of post-operative complications

Details	Percentage (%)
Deep vein thrombosis	0%
Pulmonary embolism	0%
Minor swelling edema	6 (14.2%)
Wound infection	2 (4.7%)

**Figure 4: Study of post-operative complications**

Discussion

Present study of efficacy of TXA in reducing blood loss during internal fixation of distal femur fractures in Maharashtra population. The mechanism of injury were 30 (71.4%) RTA, 12 (28.5%) due to fall, 27 (64.2%) had ASA-I, 15 (35.7%) had ASA-II, pre-operative Hb% was 12.9 (± 1.2) (Table 1).

Intra-operative and post-operative blood loss was compared with historical controlled group and had significant p value ($p < 0.001$) (Table 2). Mean Hb% drop, patients requiring blood transfusion had significant p value ($p < 0.001$) (Table 3). No thromboembolism was observed during the study only 6 (14.2%) minor swelling/edema, 2 (4.7%) wound infection. These findings are more or less in agreement with previous studies [5,6,7].

The effect of TXA in reducing blood loss was the strongest reducing blood loss was in the first 24 hours compared to total blood loss. As TXA has half-life of 3 hours, it is logical that, the association between TXA administration and decreased blood loss is strongest in the first 24 hours and begins to weaken over the subsequent days of hospital stay.

It is also confirmed that age did not modify the efficacy of TXA [8]. The major hesitations to administer TXA in orthopedic trauma surgeries is increased risk of thromboembolic events. 0.4 to 7.5% of increased risk of fatal pulmonary embolism was observed in arthroplasty patients rather than orthopedic trauma surgeries [9]. Moreover there was no significant increased risk of systematic thromboembolic events identified during orthopedic trauma surgeries [10].

A single bolus dosage and a bolus followed by an infusion of TXA were found equally effective in decreasing peri-operative blood loss during orthopedic trauma surgeries. According to the results the due to bolus dosage of TXA, there was very less blood loss was observed [11].

Summary and Conclusion

In orthopedic trauma surgery patients, TXA reduces the risk of blood loss and has no significant effect on the risk of symptomatic thrombo embolic events. Larger well designed randomized controlled trial studies are needed to ensure the safety of the drug in these patients because exact mode of action, contra indication of TXA is still unclear.

Limitation of study:

Owing to remote location of research centre, small number of patients, lack of latest techniques, we have limited findings and results.

This research work was approved by the ethical committee of Parbhani medical college and hospital Parbhani Maharashtra-431537.

References

1. Saleh A, Small T: Allogenic total blood transfusion following total hip arthroplasty, results from the nationwide in patient sample J. Bone joint Surg. Am. 2014, 96; e55.
2. Emara WM, Moez KK: Topical versus intra venous tranexamic acid as blood conservation intervention for reduction of post-operative bleeding in hemiarthroplasty. Anaesth. Essay Res. 2014, 8 (18); 48-53.
3. Pfizer: Study of Tranexamic acid for reduction of blood loss in patients undergoing surgery for long bone fracture 2011 August 16, 2016 <http://clinicaltrials.gov/ct2/show/NCT00824564> viewed on 23 February 2026.
4. Raksakietisak M, Sathitkarmanee B: Two doses of tranexamic acid reduce blood transfusion in complex spine surgery spine J. 2015, 38 (1); 280-285.
5. Dakir A, Ramlingam B: Efficacy of Tranexamic acid in reducing blood loss during maxillofacial trauma surgery J. Clin. Diagn. Res. 2014, 8; 6-8.
6. Uganath Subash B, Sundaramoorthy M: Effects of tranexamic acid in major orthopaedic procedures Int. J. of research in orthopaedics 2019, 5 (4); 551-554.
7. Lei J, Zhang B: Tranexamic acid reduces hidden blood loss in the treatment of intertranchantric fractures with PFNA J. orthop. Surg. Res. 2017, 12 (1); 124-28.
8. Poieran J, Rasul R: Tranexamic acid use and post-operative outcomes in patients undergoing total hip or knee arthroplasty in United states. BMJ 2014, 349; 4829-32.
9. Duncan CM, Gillette BP: Venous thromboembolism and mortality associated with tranexamic acid use during total hip and knee arthroplasty J. Arthroplasty. 2015, 30; 272-6.
10. Lee C, Freeman R: The efficacy of tranexamic acid in hip hemiarthroplasty surgery J. Injury 2015, 46; 1978-82.
11. Vijay BS, Bedi V, Mitra S: Role of tranexamic acid in reducing post-operative blood loss and transfusion requirement in patients undergoing hip and femoral surgeries Saudi J. Anaesthesia 2013, 7; 29-32.