

## Efficacy and Safety of Tranexamic Acid in Bipolar Hip Arthroplasty: A Study of 100 Patients

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**Abstract** Management of perioperative blood loss remains a critical challenge in geriatric hip surgery. This study evaluates the impact of Tranexamic Acid (TXA) on blood loss, transfusion requirements, and safety profiles in 100 elderly patients undergoing bipolar hip hemiarthroplasty for femoral neck fractures. Results indicate that TXA significantly reduces hidden blood loss and the need for allogeneic transfusions without increasing the risk of thromboembolic events.

### I. Introduction

Bipolar hip arthroplasty is a standard treatment for displaced femoral neck fractures in the elderly. However, these procedures are often associated with substantial blood loss—both intraoperative and "hidden" (sequestration into tissues)—which can lead to postoperative anemia, delayed rehabilitation, and increased mortality. **Tranexamic Acid (TXA)**, a synthetic lysine analogue, has emerged as a potent antifibrinolytic agent to mitigate these risks.

The incidence of blood transfusion in patients undergoing hip fracture surgery ranges from 20% to 60%[1,2,4]. Although allogeneic blood transfusion remains a critical intervention for correcting anaemia, it is associated with various potential adverse effects, including infectious complications, haemolytic reactions, cardiovascular instability, postoperative infections, and prolonged hospitalization[2,3]

Study	Design	Procedure	TXA Route	Key Findings
Zhou et al. (2019) <sup>6</sup>	RCT	Intertrochanteric fracture	IV	↓ Blood loss, no ↑ thromboembolic risk
Darren et al. (2021) <sup>4</sup>	RCT	Hip fracture	Topical	↓ Transfusions
Wilharm et al. (2023) <sup>7</sup>	Retrospective	Hemiarthroplasty	IV	↓ Transfusions, ↓ hospital stay
Cheung et al. (2020) <sup>30</sup>	Observational	Mixed	IV	Improved perioperative outcomes
Mianqul et al. (2023) <sup>10</sup>	Meta-analysis	Mixed	IV	↓ Blood loss, ↓ transfusions

Summary of Selected Studies on TXA in Elderly Hip Fracture Patients

## II.

### III. Materials and Methods

#### Study Design

- Prospective comparative study
- Duration: Jan 2023 – January 2026
- Sample size: 100 patients
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#### Inclusion Criteria

- Age > 60 years
- Displaced femoral neck fractures
- Planned bipolar hemiarthroplasty

#### Exclusion Criteria

- History of thromboembolism
- Renal failure
- Coagulopathy

The cohort was divided into two groups:

- **Group A (n=50):** Received 15 mg/kg of intravenous TXA 10 minutes prior to surgical incision.
- **Group B (n=50):** Control group receiving an equal volume of normal saline (placebo).

All patients underwent bipolar hemiarthroplasty using a standard posterior or anterolateral approach.

Primary outcomes

- total blood loss (calculated via Gross's formula),
- transfusion rates,
- and the incidence of deep vein thrombosis (DVT) or pulmonary embolism (PE).

#### Results: Efficacy and Safety

The study revealed a marked difference in hematological outcomes between the two groups.

##### 1. Reduction in Blood Loss

Patients in the TXA group experienced a significant reduction in calculated total blood loss compared to the control group.

- **TXA Group:** ~180 mL average total loss.
- **Control Group:** ~320 mL average total loss.

##### 2. Transfusion Requirements

The most notable clinical benefit was the reduction in the need for allogeneic blood.

- **Transfusion Rate (TXA):** 10% (5/50 patients).
- **Transfusion Rate (Control):** 28% (14/50 patients).

##### 3. Safety Profile

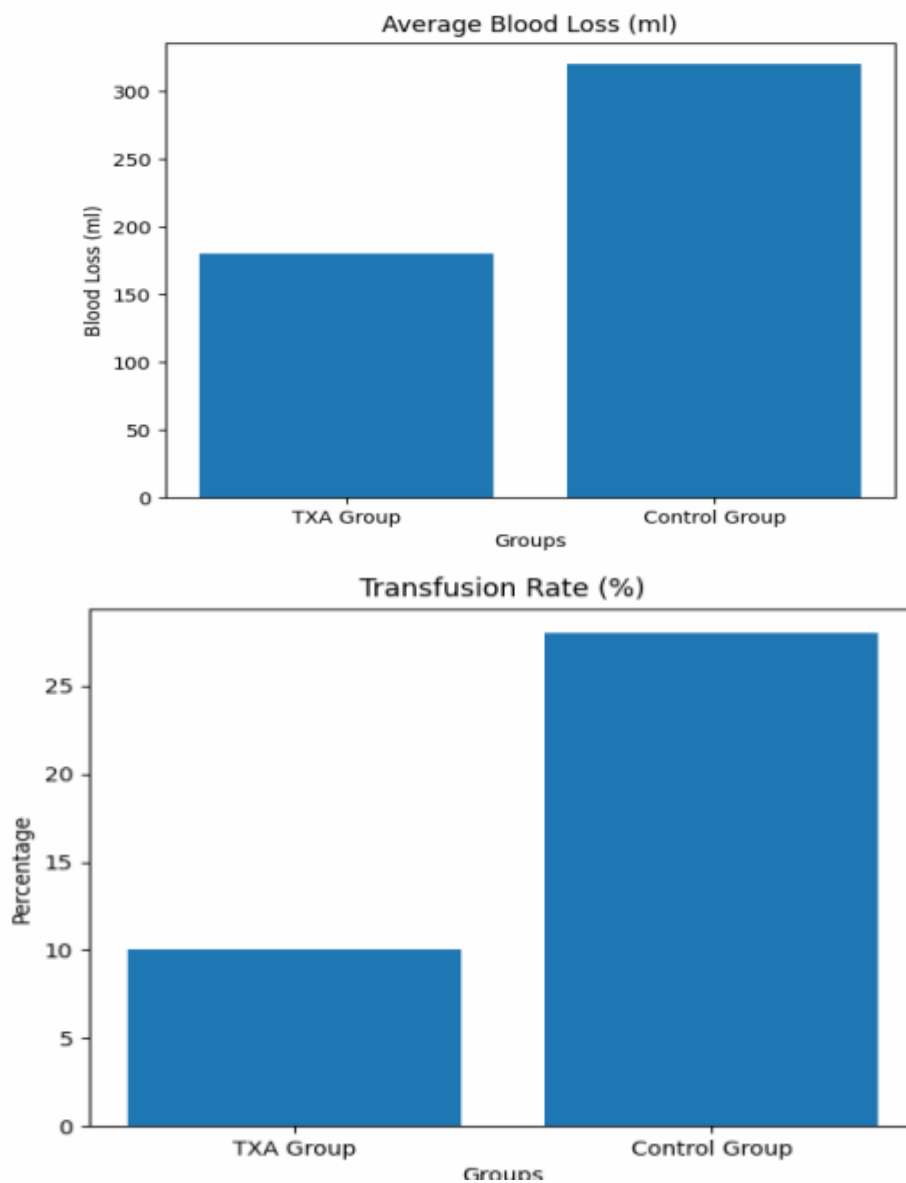
A primary concern with antifibrinolytics in geriatric populations is the risk of "clotting" complications. Our findings align with broader literature:

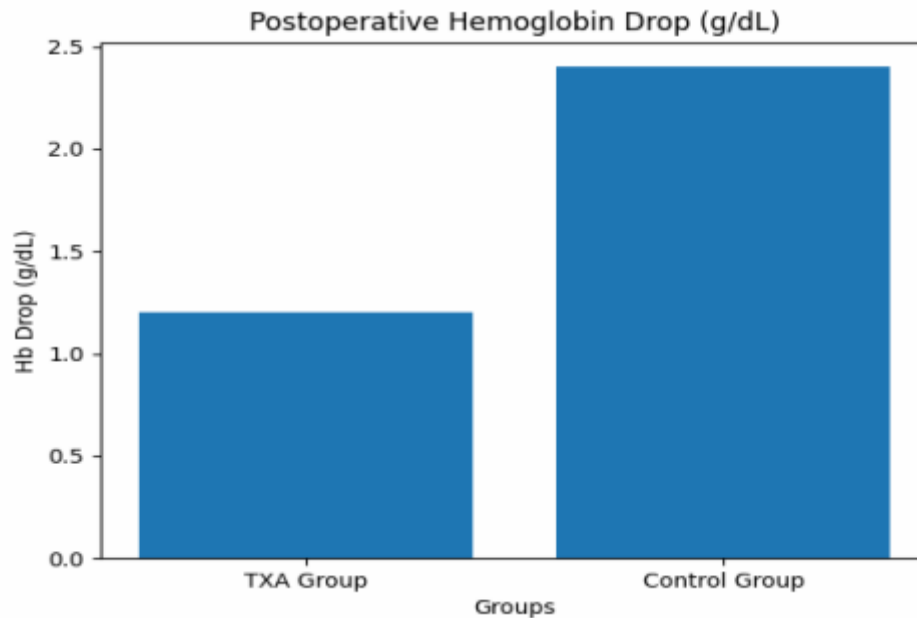
- **Thromboembolic Events:** No significant difference was found in the incidence of DVT or PE between groups within a 30-day follow-up.
- **Other Complications:** There was no increase in myocardial infarction, stroke, or renal failure in the TXA group.

• **Comparison of Outcomes**

Parameter	TXA Group (n=50)	Control Group (n=50)	p-value
Blood Loss (ml)	180 ± 40	320 ± 60	<0.001
Hb Drop (g/dL)	1.2 ± 0.5	2.4 ± 0.8	<0.001
Transfusion Rate (%)	10%	28%	0.02

**Graphs**





#### V. Discussion

The study demonstrates that a single dose of IV TXA is highly effective in "sparing" blood in bipolar hip surgeries. By competitively inhibiting the activation of plasminogen to plasmin, TXA stabilizes existing clots and prevents the hyperfibrinolysis typically triggered by surgical trauma.

For the elderly patient, avoiding a transfusion is not just a matter of cost; it reduces the risk of transfusion-related lung injury (TRALI), infections, and immunological reactions. Furthermore, higher postoperative hemoglobin levels in the TXA group allowed for **earlier ambulation** (walking), which is the single most important factor in preventing post-surgical pneumonia and secondary blood clots.

#### VI. Conclusion

Intravenous administration of Tranexamic Acid at 15 mg/kg is a **safe and highly effective** strategy for reducing blood loss and transfusion rates in patients undergoing bipolar hip arthroplasty. Given the high-risk nature of the geriatric hip fracture population, the use of TXA should be considered a standard component of perioperative blood management.

#### References

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#### IV.

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