

A prospective clinical study on the efficacy of preoperative intravenous tranexamic acid in reducing operative time and blood loss during tonsillectomy.

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ABSTRACT

Background:

Tranexamic acid is widely used in surgical practice to stabilise clot formation by inhibiting fibrinolysis. This study measured the effect of preoperative intravenous tranexamic acid on operative time and intraoperative blood loss during tonsillectomy.

Aim:

To determine whether preoperative intravenous tranexamic acid reduces intraoperative blood loss and shortens operative time during tonsillectomy.

Methods:

A prospective controlled clinical study was conducted in the Department of Otorhinolaryngology, Adichunchanagiri Institute of Medical Sciences, Mandya district. Participants were aged 4 to 50 years and met the inclusion criteria for tonsillectomy. A total of 107 patients were analysed, with 53 receiving tranexamic acid and 54 serving as controls. Blood loss was measured using pre- and postoperative weight assessments of surgical materials. Operative time was recorded from incision to completion of haemostasis. Data were analysed using t-test, chi-square, mean, and standard deviation.

Results:

The study group comprised 53 participants (all age groups and both sexes), and the control group comprised 54 participants. Mean operative time was 58.2 minutes (SD 9.94) in the tranexamic acid group and 63.7 minutes (SD 15) in the control group (P = 0.028). In the study group, the entire cohort achieved haemostasis within 80 minutes, whereas 13 percent of the control group exceeded 80 minutes.

Conclusion:

Preoperative intravenous tranexamic acid reduced operative time and improved haemostasis during tonsillectomy in this cohort. The findings support its use as an adjunct for intraoperative bleeding control.

Recommendation:

Routine use of tranexamic acid can be considered in suitable tonsillectomy candidates to optimise operative efficiency and reduce blood loss.

Keywords: tranexamic acid; blood loss; haemostasis; tonsillectomy; operative time.

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INTRODUCTION

Tonsillectomy has been described for centuries, with early accounts attributed to Paul of Aegina and later refinements by Physick that influenced the guillotine-style technique

used in the nineteenth century [1,2]. Despite advancements in surgical practice, intraoperative haemorrhage continues to be a frequent complication. Bleeding arises partly from activation of the coagulation and fibrinolytic pathways

during tonsillar dissection, driven by release of tissue plasminogen activator and subsequent formation of plasmin [3–5].

Tranexamic acid is a synthetic antifibrinolytic agent that inhibits the conversion of plasminogen to plasmin and stabilises clot formation. Its ability to reduce perioperative blood loss has been demonstrated in several surgical fields, including orthognathic surgery [6], cardiothoracic surgery [7], joint arthroplasty [8–12], and obstetrics [13]. These collective findings support evaluating its effect in tonsillectomy, where continuous mucosal bleeding can impair visibility and prolong surgery.

Objective:

To evaluate whether preoperative intravenous tranexamic acid reduces intraoperative blood loss and shortens operative time during tonsillectomy.

METHODOLOGY

Study design

Prospective controlled clinical study.

Study setting

The study was conducted in the Department of Otorhinolaryngology at Adichunchanagiri Institute of Medical Sciences, B. G. Nagara, Mandya district, Karnataka. The institution is a tertiary-care teaching hospital that receives referrals for routine and complex otolaryngology procedures. Tonsillectomies during the study period were performed by experienced surgeons following standard departmental protocols.

Participants

Eligibility criteria:

Patients aged between 4 years and 50 years of any sex scheduled for tonsillectomy were eligible. Indications included chronic tonsillitis and other clinical indications warranting the removal of the tonsils.

Exclusion criteria:

Patients undergoing adenotonsillectomy; those receiving anticoagulant therapy within five days before surgery; individuals with fibrinolytic disorders requiring intraoperative antifibrinolytic treatment; and patients with haematological disorders, including thromboembolic disease, haemoglobinopathies, coagulopathy,

thrombocytopenia, or haemolytic disease.

Selection process:

All patients admitted for tonsillectomy between November 2016 and May 2018 were screened against the criteria. A total of 107 eligible patients were included, with 53 receiving preoperative intravenous tranexamic acid and 54 serving as controls.

Bias

To limit selection bias, eligibility criteria were uniformly applied to all admitted tonsillectomy cases during the study period. Performance bias was minimised by following consistent operative techniques across both groups. Measurement bias was reduced by using the same pre- and postoperative weighing method for quantifying blood loss and identical timing procedures for recording operative duration.

Study size

The sample size represented all eligible patients operated during the predefined study window. No cases meeting the inclusion criteria were excluded, allowing the entire cohort of 107 patients to be analysed.

Data collection

Data were collected prospectively. Blood loss was measured using the weight difference of surgical materials, recorded on the same sterile glove cover before and after the procedure. Operative time was recorded from the start of dissection to the completion of haemostasis. Demographic variables and clinical details were extracted from surgical records.

Statistical analysis

Data were analysed using descriptive statistics, including mean, standard deviation, frequency, and percentage. Comparison between the two groups was performed using the unpaired t-test for continuous variables and chi-square test for categorical variables. Data entry was performed in Microsoft Excel, and statistical analysis was conducted with IBM SPSS version 22.



Ethical consideration

The study protocol was reviewed and approved by the

of Medical Sciences, B. G. Nagara, Mandya, Karnataka, India. IEC approval number: AIMS/IEC/ENT/2016/042; Date of approval: 18 October 2016

FIG 1. Pre-operative weighing (on sterile glove cover)



FIG 2. Post-operative weighing (on the same glove cover)

Results:

Participant flow

A total of 107 patients scheduled for tonsillectomy met the eligibility criteria during the study period. All were included and analysed. The study group consisted of 53 patients who received preoperative intravenous tranexamic acid, and the control group consisted of 54 patients who underwent tonsillectomy without tranexamic acid. No patients were lost during the operative assessment, and complete data on operative time and blood-loss measurement were available for all participants.

Descriptive data

Participants ranged from 4 to 50 years of age and included both sexes, as per the inclusion criteria. All participants underwent tonsillectomy for chronic tonsillitis or other standard indications. No demographic variables beyond age range and group size were reported in the source document.

Operative time categories

Time spent in surgery for each group is summarised below. The data were originally provided in both a table and a graph; following reviewer guidance, only the table is retained.

Table 1. Time spent in surgery

Time taken	Study group		Control group	
	No. of patients	Percent	No. of patients	Percent
40-50 Min				
51-60 Min	12	22.6	14	25.9
61-70 Min	21	39.6	16	29.6
71-80 Min	13	24.6	7	13
81-90 Min	7	13.2	10	18.5
Total	53	100	54	100

Mean operative time

Mean operative time in the tranexamic acid group was 58.2 minutes (SD 9.94). Mean operative time in the control group was 63.7 minutes (SD 15).

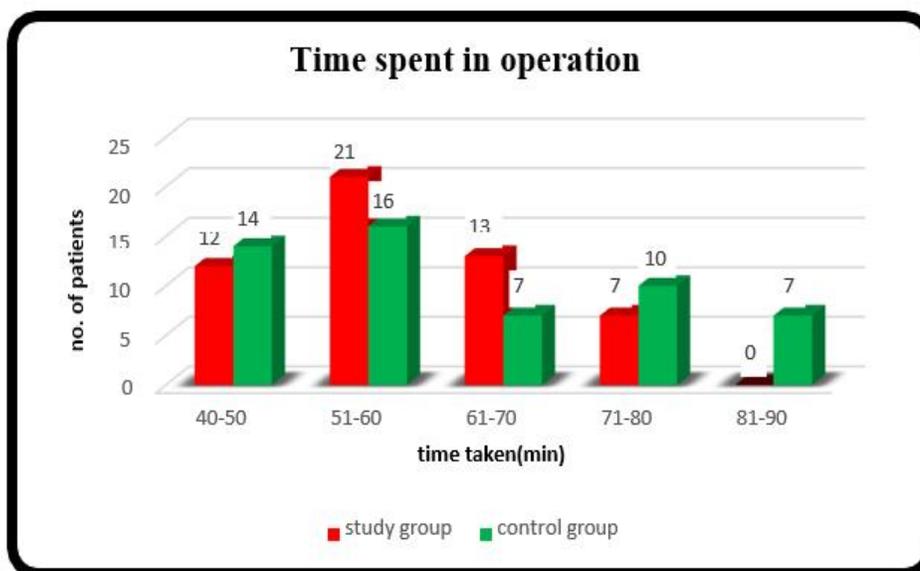
The difference between the two groups was statistically significant (unpaired t test, P = 0.028).

Haemostasis duration observations

All patients in the tranexamic acid group achieved

haemostasis within 80 minutes. In the control group, 13 percent required more than 80 minutes.

This pattern aligns with the difference observed in mean operative duration.



Graph 1. Time spent in surgery

Mean operative time taken

The mean time taken was longer for the study group. On

applying the Unpaired t-test ($t=-2.233$, P value = 0.028), the mean time taken for surgery on the study group and control group was found to be statistically significant.

Table 2. Mean time taken

Mean time taken in minutes	Study group	Control group
	58.2(SD:9.94)	63.7(SD:15)

DISCUSSION

Key results

This study found that preoperative intravenous tranexamic acid reduced operative time and improved operative haemostasis. All patients receiving tranexamic acid completed haemostasis within 80 minutes, unlike the control group, where some procedures required longer.

Interpretation and comparison with existing studies

Bleeding during tonsil surgery is influenced by activation of plasmin, which accelerates fibrinolysis. Tranexamic acid inhibits this pathway, allowing more stable clot formation [3–5]. This aligns with the improved visibility and shorter operative duration observed in the study group.

Similar outcomes have been demonstrated in other surgical specialties. In orthognathic surgery, tranexamic acid

significantly reduced intraoperative bleeding [6]. Cardiothoracic trials have shown reduced blood loss and transfusion requirements [7]. Studies in total knee and hip arthroplasty have repeatedly documented decreased perioperative haemorrhage and fewer transfusions [8–12]. Obstetric studies have also reported substantial reductions in postpartum blood loss with tranexamic acid [13].

Specific to tonsillectomy, George et al. reported reduced intraoperative bleeding when tranexamic acid was used [14], and Castelli & Vogt documented similar benefits with antifibrinolytic therapy during tonsil surgery [15]. The present results are consistent with these findings.

Generalisability

The study was conducted in a tertiary-care environment

with uniform techniques, suggesting applicability to comparable clinical settings. The broad age range increases relevance to most routine tonsillectomy candidates. Differences in surgical technique or anaesthetic protocols across institutions may limit broader generalisation.

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Conclusion

Tonsillectomy is the most common procedure performed in the Otorhinolaryngology department. The procedure has been in practice for more than a century now. Haemorrhage has been the most consistent complication associated with the procedure. The present study was conducted on 107 subjects who presented to the ENT outpatient department of Adichunchanagiri Institute of Medical Sciences, B.G. Nagara, with chronic tonsillitis from November 2016 to May 2018. The time taken for complete haemostasis in the study group was found to be less than 80 minutes in all cases, while in the control group, around 13% cases took more than 80 minutes. The mean operative time taken was 58.2 minutes in the study group and 63.7 minutes in the control group. P value was <0.028 and hence statistically significant.

Conclusion

Preoperative intravenous tranexamic acid improved intraoperative haemostasis and reduced operative time in this cohort.

Limitations

Postoperative haemorrhage outcomes were not recorded. There was no blinding. Blood loss estimation relied solely on weight-based measurement. One time-interval category in the operative-time table contained no numerical data.

Recommendations

Tranexamic acid may be considered as an adjunct for tonsillectomy to optimise haemostasis and operative efficiency. Larger blinded studies with postoperative follow-up are recommended.

Acknowledgement

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List of abbreviations

TXA: Tranexamic acid
SD: Standard deviation

Source of funding

No external funding was received for this study.

Conflict of interest

The authors declare no conflict of interest.

Author contributions

All authors contributed to the study design, data collection, interpretation of results, and manuscript preparation.

Data availability

All data generated during this study are contained within the study records and are available from the corresponding author on reasonable request.

Author biography

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