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EFFICACY OF TOPICAL TRANEXAMIC ACID COMPARED WITH TOPICAL XYLOMETAZOLINE IN MANAGEMENT OF PATIENT WITH EPISTAXIS TAKING ANTIPLATELET DRUGS.

Original Research

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ABSTRACT

Background: Epistaxis is a frequent emergency room presentation, with a significant portion of cases requiring active medical intervention. While anterior nasal packing remains a conventional approach, newer pharmacological options like topical tranexamic acid (TXA) have gained attention due to their antifibrinolytic action. Xylometazoline, a topical decongestant with vasoconstrictive properties, is commonly used in emergency settings for anterior epistaxis, yet comparative data between the two agents remain limited.

Objective: To compare the efficacy of topical application of intravenous TXA with topical xylometazoline in achieving hemostasis in patients presenting with anterior epistaxis who are on antiplatelet therapy.

Methods: This prospective randomized controlled trial was conducted at the Emergency Department of the Pakistan Institute of Medical Sciences, Islamabad, from December 2023 to November 2024. A total of 88 patients, aged 13–60 years, using antiplatelet medications and presenting with anterior epistaxis were enrolled. Patients were randomized into two groups (n=44 each). Group A received 100 mg/mL of intravenous TXA applied topically via nasal spray. Group B received 2–3 puffs of 0.1% xylometazoline spray in each nostril. Hemostasis was assessed at 30 minutes post-administration. SPSS version 25.0 was used for statistical analysis, and chi-square test determined significance at $p<0.05$.

Results: The mean age was 47.3 ± 7.4 years in Group A and 45.3 ± 8.6 years in Group B ($p=0.846$). Group A comprised 26 males (59%) and 18 females (41%), while Group B had 28 males (63.63%) and 16 females (36.36%) ($p=0.568$). Hemostasis at 30 minutes was achieved in 10 patients (22.73%) in Group A and 29 patients (65.91%) in Group B, showing a statistically significant difference ($p<0.001$).

Conclusion: Topical xylometazoline demonstrated significantly higher efficacy compared to intravenous TXA preparation in achieving hemostasis for anterior epistaxis in patients on antiplatelet therapy, supporting its role as a first-line intervention in emergency care.

Keywords: Antiplatelet Therapy, Emergency Treatment, Epistaxis, Hemostasis, Randomized Controlled Trial, Tranexamic Acid, Xylometazoline.

INTRODUCTION

Epistaxis, commonly known as nosebleed, is one of the most frequent nasal emergencies encountered in clinical practice, with nearly 60% of individuals experiencing at least one episode during their lifetime and approximately 6% requiring medical intervention (1,2). While the majority of cases are self-limiting and idiopathic, a variety of systemic and local factors can influence the severity and recurrence of the condition. Among systemic causes, the use of antiplatelet and anticoagulant medications is particularly notable. These agents, especially aspirin and clopidogrel, are routinely prescribed for the prevention and management of cardiovascular diseases, yet they are associated with prolonged bleeding episodes and pose challenges in the clinical management of epistaxis (3,4). Although the overall risk of developing epistaxis does not significantly differ between patients using aspirin or clopidogrel, bleeding control in such individuals remains more difficult. Anterior nasal packing (ANP), often the first-line intervention in the emergency setting, has been a traditional management technique. However, this method is not without drawbacks, including significant patient discomfort, mucosal trauma, risk of rebleeding upon removal, and the potential for synechiae formation (5,6). These limitations underscore the need for alternative or adjunctive strategies that are both efficacious and better tolerated, particularly in high-risk patients.

Recent attention has shifted toward the use of topical agents, including vasoconstrictors such as epinephrine and phenylephrine, decongestants like xylometazoline, and local anesthetics such as lidocaine, all of which aim to achieve rapid hemostasis in anterior epistaxis (7). However, these agents do not directly address the fibrinolytic activity contributing to continued bleeding in some patients. Tranexamic acid (TXA), a synthetic antifibrinolytic agent commonly used to control hemorrhage in trauma and major surgical procedures, has emerged as a promising topical treatment for epistaxis owing to its ability to stabilize clots and reduce bleeding (8,9). Despite encouraging findings from preliminary studies suggesting that topical TXA may reduce bleeding duration and emergency room stay, there remains a paucity of randomized controlled trials (RCTs) evaluating its comparative effectiveness against standard agents such as xylometazoline in anterior epistaxis management. Furthermore, optimal dosage and administration protocols are yet to be standardized. Therefore, the objective of this study is to evaluate and compare the efficacy of topical tranexamic acid versus xylometazoline in achieving hemostasis in patients presenting with anterior epistaxis, with the aim of identifying a more effective, safer, and patient-friendly treatment alternative.

METHODS

This randomized controlled trial was conducted over a one-year period from December 2023 to November 2024 at the Department of Otorhinolaryngology – Head & Neck Surgery, Pakistan Institute of Medical Sciences (PIMS), Islamabad, following ethical approval from the Institutional Review Board (IRB), with the official letter issued prior to study initiation. All participants were recruited from the Emergency Department of the same institution. Informed written consent was obtained from every patient prior to inclusion, in accordance with ethical research standards and patient rights. Patients were enrolled consecutively using a non-probability convenience sampling technique. Eligibility criteria included adults aged 13 to 60 years of both genders who were actively using antiplatelet medication in any form. Exclusion criteria encompassed patients with posterior epistaxis, a history of nasal or nasopharyngeal surgery within the preceding six months, known hypersensitivity to tranexamic acid (TXA) or xylometazoline, facial or nasal trauma, and pregnant or lactating women (10). All enrolled patients underwent a thorough clinical evaluation and were diagnosed with anterior epistaxis before randomization. Participants were randomly assigned to two intervention groups using a lottery method to eliminate selection bias. Group A received topical application of tranexamic acid, in which the intravenous formulation (100 mg/mL) was drawn using a sterile syringe and transferred into a nasal spray bottle for administration. This allowed uniformity in the delivery method across both groups. Group B was treated with 2–3 puffs of xylometazoline nasal spray (0.1% w/v) in each nostril. The administration of either agent was repeated up to three times within a 30-minute observation window, depending on the patient's clinical response. Treatment efficacy was assessed based on the presence or absence of active nasal bleeding at the end of 30 minutes. Patients who achieved complete hemostasis without the need for further intervention were classified as treatment responders. In contrast, those with ongoing bleeding requiring anterior nasal packing were considered non-responders. Patients failing to respond to both medications were managed with standard nasal packing and recorded accordingly. All data were entered and analyzed using IBM SPSS Statistics for Windows, Version 25.0 (IBM Corp., Armonk, NY). Descriptive statistics, including frequencies and percentages, were calculated for categorical variables.

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The chi-square test was used to compare the efficacy outcomes between the two treatment groups, with statistical significance set at $p<0.05$.

RESULTS

The present study included a total of 88 patients, with 44 patients allocated to each treatment group. In Group A, which received topical tranexamic acid (TXA), the mean age was 47.3 ± 7.4 years, while in Group B, which received topical xylometazoline, the mean age was 45.3 ± 8.6 years. The difference in age distribution between the two groups was not statistically significant ($p = 0.846$). Regarding gender distribution, Group A consisted of 26 males (59%) and 18 females (41%), whereas Group B included 28 males (63.63%) and 16 females (36.36%). The gender composition between the two groups also did not show a statistically significant difference ($p = 0.568$), indicating a relatively balanced distribution across the study population. In terms of treatment efficacy, a significant difference was observed between the two groups. In Group A (TXA), effective hemostasis at 30 minutes was achieved in only 10 patients (22.73%), while the remaining 34 patients (77.27%) had persistent bleeding. Conversely, Group B (xylometazoline) demonstrated a markedly higher efficacy, with 29 patients (65.91%) achieving hemostasis and only 15 patients (34.09%) experiencing continued bleeding. This difference in outcomes was statistically significant ($p < 0.001$), indicating superior performance of xylometazoline over tranexamic acid in controlling anterior epistaxis within the observed timeframe. Subgroup analysis based on gender revealed further insights into treatment efficacy. In the TXA group, hemostasis was achieved in approximately 23.1% of males and 22.2% of females, indicating no substantial gender-based difference in treatment response. Conversely, in the xylometazoline group, efficacy was notably higher in both males and females, with 71.4% of males and 56.3% of females achieving successful hemostasis. The average efficacy across both genders was significantly greater in the xylometazoline group by approximately 41.2%, suggesting a consistently superior response irrespective of patient sex. These findings reinforce the primary results while highlighting that gender did not markedly influence the relative performance of either treatment.

Table 1: Comparison of Mean Age Between Treatment Groups Receiving Topical Tranexamic Acid and Xylometazoline

Study Groups	Age ± SD (years)	p-value
Group A (Cases treated with TXA)	47.3 ± 7.4	
Group B (Cases treated with Xylometazoline)	45.3 ± 8.6	0.846

Table 2: Gender Distribution Among Patients Treated with Topical Tranexamic Acid and Xylometazoline for Anterior Epistaxis

Study Groups	Gender	Total N (%)	p-value
	Male N (%)	Female N (%)	
Group A (Cases treated with TXA)	26 (59)	18 (41)	44 (100)
Group B (Cases treated with Xylometazoline)	28 (63.63)	16 (36.36)	44 (100)

Table 3: Comparison of Treatment Efficacy Between Topical Tranexamic Acid and Xylometazoline in Anterior Epistaxis

Study Groups	Efficacy	Total N (%)	p-value
	Yes N (%)	No N (%)	
Group A (Cases treated with TXA)	10 (22.73)	34 (77.27)	44 (100)
Group B (Cases treated with Xylometazoline)	29 (65.91)	15 (34.09)	44 (100)

Table 4: Subgroup Analysis: Gender-wise Efficacy

Group	Gender	Total (n)	Hemostasis (n)	No Hemostasis (n)	Hemostasis (%)
TXA	Male	26	6	20	23.08%
TXA	Female	18	4	14	22.22%
Xylometazoline	Male	28	20	8	71.43%
Xylometazoline	Female	16	9	7	56.25%

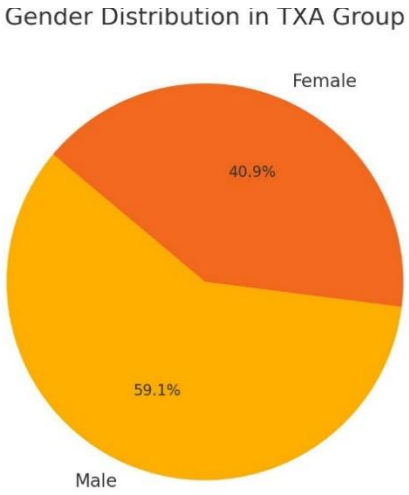

Figure 1 Gender Distribution in TAX Group

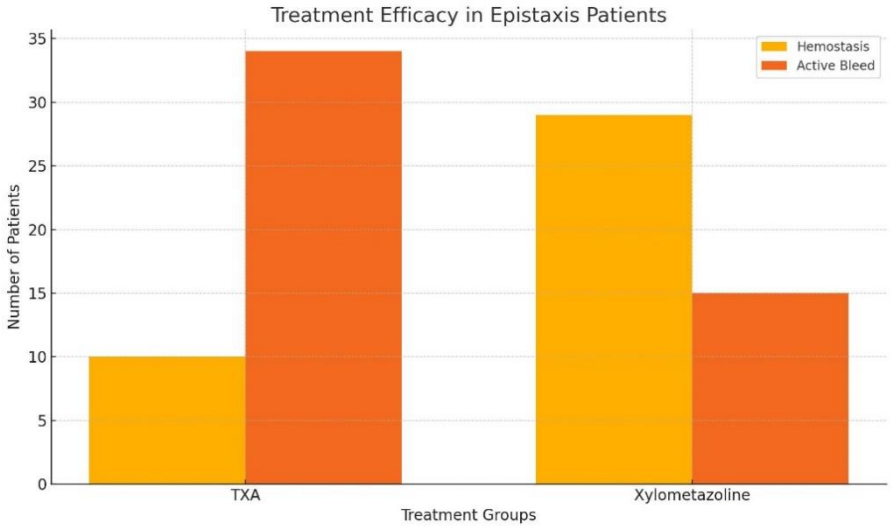

Figure 2 Treatment Efficacy in Epistaxis Patients

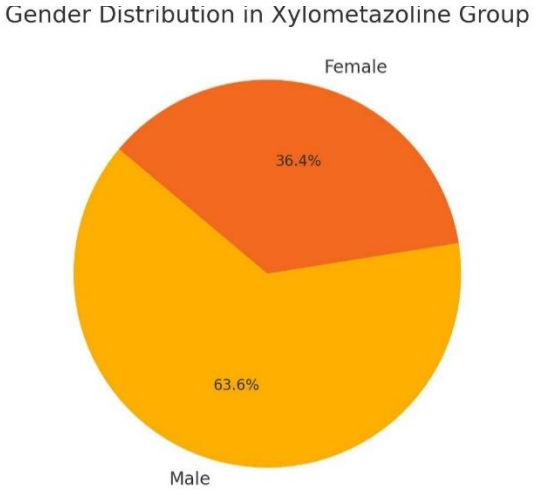

Figure 3 Gender Distribution in Xylometazoline Group

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DISCUSSION

The findings of the current study demonstrated that topical xylometazoline was significantly more effective in achieving hemostasis in anterior epistaxis than the intravenous formulation of tranexamic acid administered topically. A marked difference in treatment efficacy between the two groups was observed, with xylometazoline achieving a higher success rate within the 30-minute observation period. These results, while clinically significant, diverge from several previously published trials that reported greater efficacy of topical tranexamic acid in epistaxis control. In contrast to the present findings, earlier studies showed substantially higher hemostasis rates with topical TXA, with some reporting up to 73% bleeding control compared to only 29% in those managed with anterior nasal packing (11-13). Additional investigations also supported the superior efficacy of TXA over topical vasoconstrictors and nasal packing, highlighting its anti-fibrinolytic mechanism as a contributing factor to better hemorrhage control (14,15). However, the current study, which reported only 23% hemostasis in the TXA group, stands in contrast. The observed variation may be attributed to the specific inclusion criteria in this study, which focused solely on patients taking antiplatelet medications—a population inherently predisposed to prolonged and more resistant bleeding episodes (16).

Moreover, the current findings are more aligned with studies evaluating xylometazoline, where up to 86% of patients achieved successful hemostasis through cotton packs soaked in the decongestant (17). Another comparative study also reported higher success rates in the TXA group compared to oxymetazoline, with 78% versus 35%, respectively (18), further supporting the mixed evidence in the literature. It is plausible that differences in study populations, drug administration techniques, and definitions of treatment success have contributed to the variability in outcomes across trials (19). A noteworthy strength of this study was its focus on a clinically relevant subgroup of patients—those on antiplatelet therapy—which represents a common challenge in emergency epistaxis management. By narrowing the study population, a clearer understanding of treatment performance under compromised hemostatic conditions was achieved. However, this strength also introduces certain limitations in generalizability, as the findings may not extend to the broader population with anterior epistaxis unrelated to antiplatelet use.

Several limitations merit acknowledgment. The relatively small sample size and restricted age range potentially limited the statistical power and external validity of the findings. The absence of blinding for both clinicians and patients introduces a risk of performance and observer bias. Moreover, the subjective assessment of bleeding severity prior to treatment initiation may have led to imbalance between the groups, which was not fully adjusted due to the lack of stratification or severity scoring. The discretionary role of the treating physician in deciding patient inclusion and treatment allocation, despite randomization efforts, may have further skewed the outcomes. Future research should focus on conducting large-scale, blinded randomized trials with standardized epistaxis severity scoring and broader inclusion criteria to enhance generalizability (20). Stratified analysis based on antiplatelet medication type, comorbidities, and epistaxis severity could further delineate the optimal treatment approach. Additionally, comparative cost-effectiveness and patient comfort profiles of TXA versus vasoconstrictors like xylometazoline would offer valuable insights for clinical decision-making in emergency care settings.

CONCLUSION

This study concluded that topical xylometazoline demonstrated superior efficacy compared to intravenous tranexamic acid in achieving hemostasis for anterior epistaxis among patients on antiplatelet therapy. The findings support the continued use of xylometazoline as a reliable first-line intervention in emergency settings, particularly in patients with impaired clotting function due to antiplatelet medications. By highlighting the practical advantage of a readily available and well-tolerated agent, this research reinforces its relevance in clinical decision-making for acute epistaxis management.

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AUTHOR CONTRIBUTION

Author	Contribution
Maesum Ali*	Substantial Contribution to study design, analysis, acquisition of Data Manuscript Writing Has given Final Approval of the version to be published
Saleh Khurshied	Substantial Contribution to study design, acquisition and interpretation of Data Critical Review and Manuscript Writing Has given Final Approval of the version to be published
Altaf Hussain	Substantial Contribution to acquisition and interpretation of Data Has given Final Approval of the version to be published
Muhammad Ali	Contributed to Data Collection and Analysis Has given Final Approval of the version to be published
Ali Khurshid	Contributed to Data Collection and Analysis Has given Final Approval of the version to be published

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