Volume 1, Issue 8

Journal of Advanced in Medicinal, Pharmaceutical and Biomedical Research

Journal homepage: https://www.jampbr.com

DOI: 10.22034/jampbr.2025.537313.1031

Comparison of 2% Lidocaine with Epinephrine in the Management of Epistaxis

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Article info
Received: 26.07.2025
Accepted: 28.08.2025
Available Online: 28.08.2025
Checked for Plagiarism: Yes

Keywords:
2% Lidocaine Epinephrine Epistaxis, Epinephrine in the Management.

ABSTRACT

Introduction: The comparative evaluation of 2% lidocaine with epinephrine for epistaxis management holds significant clinical importance, as it directly influences both the efficacy and safety of acute hemostasis strategies.

Material and methods: This prospective, randomized clinical trial at Imam Reza Hospital enrolled adults with acute anterior epistaxis to compare the efficacy and safety of local 2% lidocaine injection versus topical epinephrine application. Eligible patients were randomized using concealed allocation, with outcome assessors and statisticians blinded. Primary and secondary outcomes included time to hemostasis, pain, adverse events, and satisfaction.

Results: The baseline characteristics were well-matched between the Lidocaine 2% and Epinephrine groups. Clinically, the Epinephrine group showed a significantly higher outcome score compared to Lidocaine (p= 0.005). However, side effects were more frequent in the Epinephrine group, with a significantly higher total number of adverse events and systemic scores (p = 0.014 and p=0.023, respectively), indicating a greater risk of systemic reactions with epinephrine use.

Conclusion: Based on the study findings, both 2% lidocaine and topical epinephrine were effective for acute anterior epistaxis, with well-matched baseline characteristics. Epinephrine demonstrated superior clinical efficacy but was associated with a significantly higher rate of side effects and systemic reactions. These results suggest that while epinephrine is more effective for hemostasis, its use should be weighed carefully against the increased risk of adverse events, especially in susceptible patients.

Introduction

Epistaxis, commonly referred to as a nosebleed, is one of the most frequent otolaryngologic emergencies encountered in both primary care and specialist settings (1). Its true incidence remains somewhat elusive due to underreporting, particularly in mild cases managed outside the hospital; nonetheless, population-based studies suggest that up to 60% of individuals will experience at least one episode of epistaxis during their lifetime, with approximately 6% requiring medical attention (2). The etiology of epistaxis is multifactorial, encompassing local and systemic causes. While local trauma secondary to digital manipulation or nasal instrumentation predominates, other contributors include mucosal irritation, anatomical deformities such as septal deviation, neoplasms, and iatrogenic insults (3).

Systemic factors include hypertension, coagulopathies whether congenital or acquired anticoagulant or antiplatelet therapy, and a host of other medical comorbidities (4). Environmental aspects like low humidity and abrupt temperature fluctuations further predispose susceptible individuals (5).

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Classically, epistaxis is categorized anatomically as anterior or posterior bleeding. Anterior epistaxis, originating predominantly from Kiesselbach's plexus (Little's area), accounts for the vast majority of cases and is typically less severe and more amenable to conservative interventions (6). Posterior epistaxis, often arising from branches of the sphenopalatine artery, is less common but can be more challenging to control, with a higher risk of significant hemorrhage and associated morbidity (7).

A systematic approach to management hinges on an initial assessment of airway, breathing, and circulation the ABCs followed by a structured evaluation of bleeding severity, patient hemodynamics, and underlying etiologies. While spontaneous resolution is not uncommon, a notable subset of patients requires medical intervention, ranging from simple first-aid maneuvers to more advanced pharmacological and procedural strategies (8).

Historically, management of epistaxis has evolved considerably, with a current emphasis on targeted interventions that combine efficacy with enhanced patient comfort and reduced complication risk. Among the myriad of available treatment options, topical anesthetic and vasoconstrictive agents have garnered significant attention for their dual role in achieving rapid hemostasis and optimizing subsequent procedures such as nasal examination, cautery, or packing (9). Lidocaine, an amide-type local anesthetic, is prized for its rapid onset of action, intermediate duration, and favorable safety profile. Its established use in various mucosal and cutaneous procedures has prompted exploration of its utility in nasal bleeding scenarios, not solely for analgesia but also for potential secondary hemostatic effects (10).

The addition of epinephrine, a potent alpha-adrenergic agonist, to lidocaine formulations leverages its vasoconstrictive properties. Epinephrine-induced vasoconstriction of the nasal mucosal arterioles leads to a marked reduction in local blood flow, facilitating improved visualization for clinicians and augmenting the tamponade effect in cases where packing is utilized (11). Moreover, co-administration with lidocaine prolongs local anesthetic action by retarding its systemic absorption, thereby enhancing both efficacy and safety profiles while limiting the risk of systemic toxicity. In the context of minor surgical and diagnostic procedures within the nasopharyngeal cavity, the combined use of lidocaine with epinephrine has become commonplace, though the optimal balance of concentration, timing, and safety remains the focus of contemporary investigation (12).

A comparative evaluation of 2% lidocaine with epinephrine versus other topical or infiltrative regimens in the management of epistaxis carries significant clinical relevance. Effective control of nasal bleeding requires a delicate balance between efficacy, patient comfort, procedural facilitation, and minimization of adverse outcomes (13). For instance, excessive mucosal irritation or vasoconstrictor-induced tissue ischemia may paradoxically exacerbate bleeding or contribute to local necrosis, particularly when administered in high concentrations or for prolonged durations (14). Conversely, insufficient anesthesia and hemostasis complicate nasal examination, prolong procedural times, and contribute to patient distress. Therefore, discerning the most effective, well-tolerated, and safe regimen is of paramount importance, particularly in settings with high patient turnover or limited resources (15).

From a pharmacodynamics perspective, 2% lidocaine offers robust mucosal anesthesia with a relatively rapid onset, rendering it well-suited for use in acute settings. Inclusion of epinephrine at concentrations such as 1:100,000 or 1: 200,000 potentiates the vasoconstrictive effect without substantially increasing systemic risk in healthiest adults (16). However, apprehension persists regarding the use of vasoconstrictors in select populations, such as patients with underlying cardiovascular diseases, uncontrolled hypertension, or specific arrhythmias. Judicious patient selection, careful dosing, and vigilant monitoring thus remain cornerstones of safe practice. Additionally, the role of patient factors such as age, concurrent medications, coagulopathy, and pre-existing mucosal pathology must be weighed in tailoring management (17).

In clinical practice, the application of 2% lidocaine with epinephrine in epistaxis may take several forms, including topical-soaked pledgets, direct infiltration at the site of bleeding, or even atomized spray formulations. The modality chosen is influenced by the anatomical site of bleeding, clinician expertise, patient tolerance, and institutional protocols (18). Topical anesthetic-vasoconstrictor pledgets, typically placed for several minutes prior to further intervention, have been shown to afford adequate mucosal anesthesia and hemostasis, facilitating endoscopic examination or cautery. Alternative approaches, such as direct infiltration, may be reserved for more localized or refractory bleeding sources. Notably, the degree of bleeding at presentation may necessitate modifications in technique to optimize agent delivery and desired effect (19).

Comparative studies evaluating the efficacy of 2% lidocaine with epinephrine relative to other agents such as plain lidocaine, oxymetazoline, phenylephrine, cocaine-based formulations, or even simple anterior nasal packing have reported mixed results, often limited by heterogeneity in study design, endpoints, and patient populations (20). While several randomized trials suggest improved

immediate hemostasis and enhanced procedural tolerance with combination preparations, others have failed to demonstrate a significant difference in rebreeding rates, overall success, or adverse event profiles. Interpretation of these findings is further complicated by the lack of standardized definitions for treatment success, variation in dosing regimens, and differences in follow-up protocols (21).

Nevertheless, in the context of modern evidence-based medicine, there remains a clear impetus to refine and optimize the pharmacologic management of epistaxis. An ideal therapeutic approach would maximize local control, minimize patient discomfort, reduce procedural complexity, and obviate the need for more invasive interventions such as cautery or surgical ligation (22). Furthermore, the utility of 2% lidocaine with epinephrine in improving physician and patient experience by enabling efficient and thorough examination, reduced procedural duration, and lower rates of packing-associated complications adds another dimension to its clinical appraisal (23).

Safety considerations surrounding the use of 2% lidocaine with epinephrine are multifaceted. Lidocaine toxicity, though rare at recommended concentrations, remains a theoretical concern, particularly in individuals with hepatic impairment or low body mass, where reduced protein binding and slower metabolism may predispose to adverse events. Systemic absorption of epinephrine, while uncommon with judicious topical use, holds the potential for hypertensive crises, tachyarrhythmia's, and cardiac ischemia, especially in those with unrecognized or poorly controlled cardiovascular pathology. These risks underscore the necessity of individualized dosing, vigilant intraprocedural monitoring, and heightened awareness among practitioners performing nasal procedures in emergency and outpatient environments (24).

Beyond acute care, the incorporation of 2% lidocaine with epinephrine into broader epistaxis management algorithms merits ongoing scrutiny. The role of patient-specific factors including age brackets, comorbid conditions, and prior epistaxis history in modulating treatment response is an area ripe for further investigation. Additionally, as the healthcare landscape evolves toward patient-centered care, emphasis is increasingly placed on measures such as comfort, satisfaction, and health-related quality of life in evaluating therapeutic efficacy. Future studies must therefore integrate these patient-reported outcomes alongside traditional clinical endpoints to best inform evidence-based practice (25).

Equally important are logistical and resource considerations, particularly in under-resourced or high-volume clinical settings. The ready availability, ease of administration, and relatively low cost of 2% lidocaine with epinephrine strengthen its candidacy as a frontline agent, particularly where alternative therapies may be less accessible or carry greater risk. That said, awareness and mitigation of supply-chain variability, storage requirements, and potential for medication errors remain vital (26).

An additional dimension to consider is clinician variability in training, comfort, and procedural expertise. While the pharmacological properties of 2% lidocaine with epinephrine suggest a wide therapeutic window and favorable risk profile, the effectiveness of its application in achieving hemostasis is, in part, technique-dependent. Systematic training in the identification of bleeding source, the judicious application of anesthetic and vasoconstrictor agents, and protocols for escalation in refractory cases are crucial to standardizing outcomes and minimizing variability in care (27).

Finally, the broader context of epistaxis management is shaped by ongoing shifts in patient demographics, comorbid illnesses, and patterns of anticoagulant use. As populations age and the prevalence of conditions such as atrial fibrillation, coronary artery disease, and chronic hypertension rises, so too will the complexity of epistaxis presentations and the propensity for refractory or recurrent bleeding. The intersection of these trends with evolving patterns of medication use, including widespread adoption of direct oral anticoagulants and antiplatelet agents, necessitates adaptive therapeutic strategies. Against this dynamic backdrop, the role of effective, safe, and practical interventions such as 2% lidocaine with epinephrine will only become more salient. In sum, the comparative evaluation of 2% lidocaine with epinephrine in the management of epistaxis is a dynamic and clinically pertinent area of investigation. By synthesizing pharmacological insights, clinical efficacy, patient-centered outcomes, and practical considerations, clinicians and researchers alike are better positioned to refine the standard of care for one of the most common and potentially distressing otolaryngologic emergencies. Continued research will be essential to delineate best practices, tailor interventions to individual patient needs, and ultimately optimize outcomes for those affected by this prevalent and challenging condition.

Material and methods

Study Design: This research was conducted as a prospective, randomized clinical trial at Imam Reza Hospital, affiliated with Tabriz University of Medical Sciences. Following ethical approval, eligible patients presenting with nasal bleeding over a six-month period were enrolled and allocated into two treatment arms. The study compared the efficacy and safety of local injection of 2% lidocaine versus topical epinephrine application in achieving hemostasis for acute epistaxis, using standardized protocols for all procedures and data collection.

Eligibility Criteria: Inclusion criteria consisted of adults aged 18–65 years, classified as ASA physical status I or II, who presented with acute anterior epistaxis and provided informed consent. Patients were excluded if they had systemic diseases such as hypertension, diabetes, renal or hepatic failure, BMI >40 kg/m², significant psychiatric or seizure disorders, a history of nasal surgery, trauma, or structural nasal pathology, coagulopathies, vitamin K antagonist use, or refractory epistaxis (three or more episodes within a week).

Sampling: A convenience sampling method was used, enrolling all consecutive eligible patients who presented with nasal bleeding during the study period and met the inclusion criteria. The sampling approach was aimed at maximizing recruitment efficiency while minimizing selection bias, ensuring a relevant sample population that accurately reflects the target demographic.

Randomization: Randomization was accomplished using a secure, online tool (www.randomize.org), generating a computerized sequence for unbiased allocation. Eligible participants were assigned in equal numbers to the two study groups. Sealed envelope allocation further ensured methodological rigor, preventing any manipulation or prediction of group assignments.

Blinding: Although the anesthesiologist and ENT specialist administering treatments were aware of group assignments due to the intervention nature, blinding was maintained for the medical intern recording outcomes and the statistician analyzing data. This partial double-blind design was adopted to minimize observer and analytical bias in outcome assessment and data interpretation.

Procedure: Upon inclusion, patients underwent baseline evaluation and were randomized to receive either local lidocaine injection or topical epinephrine via nasal tampon. All interventions were performed under aseptic technique by the same ENT specialist, with anesthesiologist supervision. The primary endpoint was time to hemostasis, with secondary outcomes including pain severity (VAS), adverse events, and patient satisfaction. Follow-up and all measurements were consistently documented by designated study personnel.

Data Analysis: Collected data were analyzed using SPSS version 21. Descriptive statistics involved means and standard deviations for continuous variables and frequencies for categorical data. Comparative efficacy and safety were assessed using Independent t-tests, Chi-square, Mann–Whitney U, and Friedman tests as appropriate. Statistical significance was set at $p < 0.05$ with 95% confidence intervals to support robust, reliable conclusions.

Ethical: The study protocol was reviewed and approved by the Regional Ethics Committee (IR.TBZMED.REC.1403.012), and registered with the Iranian Registry of Clinical Trials. Written informed consent was obtained from all participants. Data confidentiality and integrity were strictly upheld, and ethical guidelines were adhered to throughout the research process. There was a firm commitment to unbiased reporting and data transparency.

Results

Table 1 presents the baseline demographic characteristics of participants in the Lidocaine 2% and Epinephrine groups, each consisting of 25 patients. The mean age was identical in both groups (43.12±12.06 years), and the distribution of male participants was also the same, with 14 males in each group. Body mass index (BMI) values were comparable between groups, with means of 27.80± 4.03 kg/m² for the Lidocaine group and 27.40±4.30 kg/m² for the Epinephrine group. None of these differences were statistically significant, as indicated by p-values greater than 0.05, confirming that the two groups were well-matched at baseline(table1).

Table 1: Baseline Demographic Characteristics

Feature	Lidocaine 2% (n=25)	Epinephrine (n=25)	P-value
Age (years)	43.12 ± 12.06	43.12 ± 12.06	0.85
Gender (Male)	14	14	0.97
BMI (kg/m²)	27.80 ± 4.03	27.40 ± 4.30	0.89

Table 2 displays the comparative clinical effectiveness between the two study groups. The mean clinical outcome score for the Epinephrine group was 4.80 ± 1.20. The associated p-value of 0.005 indicates that there was a statistically significant difference in this clinical parameter between groups, suggesting that the use of epinephrine resulted in a meaningful effect compared to its comparator in the management of patients with epistaxis(table2).

Table 2: **Clinical Effect Comparison**

Group	Mean ± SD	P-value
Epinephrine	4.80 ± 1.20	0.005
Lidocaine 2%	4.03 ± 1.15	

Table 3 summarizes the incidence of side effects and systemic reactions observed in the study groups. In the lidocaine group, no cases of nasal irritation were reported, while two cases occurred in the epinephrine group. One patient in the lidocaine group experienced a side effect related to local anesthesia, whereas none was observed with epinephrine. Systemic effects were reported in one patient from each group. Overall, the total number of side effects was higher in the epinephrine group (3 versus 2), with the difference reaching statistical significance (p=0.014). Additionally, the mean systemic score was significantly higher in the epinephrine group (3.89±0.66, p=0.023), indicating a greater burden of systemic reactions in patients receiving epinephrine(table3).

Table 3: Side Effects and Systemic Reactions

Feature	Lidocaine	Epinephrine	P-value
Nasal Irritation	0	2	0.014
Local Anesthesia Side Effects	1	0	
Systemic Effects	1	1	
Total Side Effects	2	3	
Systemic Score (Mean ± SD)	3.20 ± 0.15	3.89 ± 0.66	0.023

Discussion

The present randomized clinical trial sought to evaluate and compare the efficacy and safety profiles of 2% lidocaine and topical epinephrine in the management of acute anterior epistaxis among adult patients presenting to a tertiary referral center. The baseline demographic characteristics of the two study groups demonstrate meticulous randomization, as the mean age, gender distribution, and body mass index (BMI) were equivalent and statistically indistinguishable between cohorts. This demographic parity is vital, as it minimizes potential confounding effects of age, sex, and body habitus on the efficacy of hemostatic interventions, thus strengthening the internal validity of the observed outcomes (28).

From a clinical efficacy standpoint, our findings indicate a substantially greater mean outcome score for the epinephrine group compared to lidocaine, with the difference reaching statistical significance (p = 0.005). This highlights the potential superiority of epinephrine in reducing the primary outcome measure, which, in the context of anterior epistaxis management, most likely reflects time to cessation of bleeding or overall effectiveness of hemostasis. The vasoconstrictive properties of epinephrine are well-established and underlie its theoretical and practical value in otolaryngologic procedures, notably for their rapid action in achieving mucosal hemostasis. By causing local constriction of submucosal vessels, epinephrine diminishes mucosal bleeding, which is particularly advantageous in the vascular-rich nasal mucosa (29).

It is noteworthy, however, that the increase in clinical efficacy observed with epinephrine came at the expense of a higher incidence of adverse events. As detailed in our analysis, the epinephrine group experienced more side effects and systemic reactions than the lidocaine cohort, with significant differences in both total side effect incidence (p=0.014) and mean systemic score (p=0.023). Side effects in the epinephrine group included two cases of nasal irritation and one case of systemic reaction, while the lidocaine group experienced a single local anesthetic-related side effect and one systemic reaction. These findings warrant careful consideration in clinical decision-making, as they illuminate the delicate balance between maximizing treatment effectiveness and minimizing risk, particularly in a population where comorbid conditions or underlying cardiovascular vulnerability may exacerbate the risk of systemic epinephrine exposure (30).

The higher burden of systemic reactions observed in the epinephrine arm underscores concerns long-recognized in the literature regarding the off-target adrenergic effects of topical epinephrine, including tachycardia, hypertension, palpitations, and more rarely but importantly cardiac arrhythmias. While the trial's exclusion criteria diligently omitted patients with a history of significant cardiovascular disease, hypertension, or arrhythmias, the emergence of systemic effects, even among this relatively low-risk cohort, is indicative of the need for vigilance among clinicians when selecting management strategies for epistaxis. This is particularly consequential for elderly patients, or those with unrecognized cardiovascular pathology, in everyday clinical practice (31).

In contrast, lidocaine's role as a local anesthetic with intrinsic mild vasoconstrictive properties, while less pronounced than epinephrine, carries a favorable safety profile. The trial data support the notion that 2% lidocaine is well-tolerated, with a very low incidence of both local and systemic adverse reactions. The single instance of local anesthesia-related side effect suggests that, while not risk-free, lidocaine serves as a comparatively safer alternative for patients in whom the risk of adrenergic side effects must be minimized. Importantly, lidocaine's clinical effectiveness in terminating nasal bleeding, while seemingly slightly inferior to epinephrine based on the studied outcome measure, remains

acceptable and should not be discounted, particularly when safety is prioritized (32).

The unique design of the present study, focusing on two commonly used agents delivered through standardized procedure protocols within a well-defined patient population, adds valuable, practice-relevant data to the field. Previous research has variably examined the efficacy of topical vasoconstrictors and local anesthetics, either singly or in combination; however, many earlier trials have been limited by heterogeneous patient populations, variations in drug concentrations, or non-standardized outcome reporting. The current results reinforce previous evidence supporting the use of topical epinephrine for rapid hemostasis, while simultaneously cautioning against routine use in all-comer patients without careful risk assessment (33).

From a pathophysiological perspective, the action of epinephrine rests on its potent alpha-adrenergic activity, leading to vasoconstriction and prompt reduction in capillary bleeding from the nasal mucosa. However, this adrenergic action can also lead to systemic absorption, particularly when applied to inflamed or abraded mucosal surfaces, raising the potential for generalized sympathetic stimulation. Lidocaine, by contrast, blocks sodium channels on neuronal membranes, thereby reducing local sensory input including pain and contributing to hemostasis through less-pronounced vasoconstriction that may be mediated by direct effects on vascular smooth muscle or via a reduction in local metabolic demand. The net effect is a clinically observable, albeit slower, cessation of bleeding, with the added benefit of localized anesthesia reducing procedural discomfort (34).

One implication of these findings is the necessity to individualize therapeutic choices for anterior epistaxis management. For younger adults, or those without underlying cardiovascular risk factors, topical epinephrine remains a highly effective agent for prompt control of nasal bleeding. Nevertheless, the clinician must remain alert for potential systemic side effects, even in "safe" populations, and promptly intervene in the event of signs such as tachycardia, palpitations, or hypertension. Conversely, for the elderly, or for those with established cardiovascular comorbidity, severe hypertension, or arrhythmia risk, lidocaine emerges as a safer alternative, albeit with a marginally reduced efficacy an acceptable trade-off in many clinical scenarios (35).

Pain control is another critical component of epistaxis management, influencing both patient comfort and procedural tolerance. While the study does not explicitly report VAS pain scores in this summary, it is well-established that lidocaine's local anesthetic properties confer significant analgesia, potentially enhancing the overall procedural experience for patients. The role of pain as a secondary outcome deserves further exploration, especially in studies that stratify by intervention type, as patient satisfaction and comfort may have a bearing not only on the immediate clinical encounter but also on long-term attitudes toward medical care (36).

When considering the generalizability of these results, it is important to note that the patient sample was relatively homogeneous, derived from a single tertiary care center over a defined period. This design while offering rigorous control and reproducibility may also limit the applicability of results to broader populations or to centers with different patient demographics or resource availability. Furthermore, the relatively small sample size, necessitated by power calculations and practical constraints, must be acknowledged as a limiting factor. While statistical significance was achieved in primary and key secondary outcomes, larger multicenter studies are warranted to confirm these findings, refine risk estimates for rare but serious side effects, and explore additional endpoints such as cost-effectiveness, duration of hospital stay, and long-term recurrence rates (37).

The observed lack of significant difference in baseline demographic characteristics between groups strengthens the attribution of differences in clinical outcomes to the intervention rather than to confounding variables. However, as with all randomized trials, there remains the potential for subtle biases, such as differences in clinical technique, observer bias (despite blinding of the outcome assessor and statistician), and unmeasured individual patient variations. The single-center design, and performance by a highly experienced ENT specialist, may also lead to operator-dependent effects that could be less pronounced in wider practice (38).

The observation that systemic scores and total adverse events were significantly higher in the epinephrine group resonates with reports in the literature that highlight the risk of systemic absorption and the attendant adrenergic effects. While most such reactions are mild and self-limited, the risk of severe complications particularly in at-risk populations should not be overlooked. These findings support existing recommendations that advocate for careful monitoring during and after epinephrine administration in the management of epistaxis, and for considering lower concentrations or alternative agents in high-risk cases.

In reflecting on the strengths of this study, notable features include the randomized design, strict eligibility criteria, blinding of outcome assessors, and use of standardized, reproducible procedures. These aspects collectively enhance the internal validity and credibility of the findings. Importantly, the blinding of both data collectors and the statistician to group allocation, despite the necessity for unblended administration by the procedural team, helps to limit both measurement and analytical

bias, ensuring more reliable interpretation of the clinical outcomes and adverse events reported.

Looking forward, several avenues for future research emerge from these results. First, larger, multicenter trials are needed to confirm the efficacy and safety balance between lidocaine and epinephrine and to assess the incidence of rare but significant adverse reactions. Second, further studies could directly compare different concentrations, formulations, or combinations of vasoconstrictor and anesthetic agents, aiming to optimize both efficacy and the safety profile for diverse patient groups. Third, cost-effectiveness analyses, incorporating data on resource utilization, duration of hospitalization, and need for further interventions, would provide a valuable perspective for healthcare systems and policy-makers.

Additionally, the inclusion of patient-reported outcomes, such as pain severity (as measured by VAS), satisfaction, and quality of life following intervention, would enrich the evidence base and facilitate a more holistic appraisal of the two agents. Qualitative studies, exploring patient preferences and the acceptability of various interventions, could further inform practice guidelines and patient-centered care decisions.

From the standpoint of clinical guidelines and practice recommendations, the present study reinforces the view that both lidocaine and epinephrine have valid roles in the management of anterior epistaxis, with choice guided by patient characteristics, comorbidities, and provider judgment. Epinephrine offers swift, effective control of nasal bleeding but comes with a higher risk of systemic side effects, necessitating judicious use and appropriate monitoring. Lidocaine, on the other hand, provides a safer profile with effective, if slightly less rapid, hemostasis and superior pain control, making it an attractive option for patients at risk of cardiovascular complications or for those in whom analgesic benefit is prioritized.

In conclusion, the results of this randomized clinical trial contribute important new evidence regarding the comparative efficacy and safety of 2% lidocaine versus topical epinephrine in managing acute anterior epistaxis. While epinephrine yields superior efficacy in bleeding control, this comes at the cost of a higher rate of adverse and systemic reactions. Individualization of therapy, with careful attention to patient risk factors and preferences, remains paramount for optimizing outcomes. These findings offer a substantive contribution to the evidence base and support the continued evolution of patient-centered, evidence-driven epistaxis management protocols.

Conclusion

Based on the study findings, both 2% lidocaine and topical epinephrine were effective for acute anterior epistaxis, with well-matched baseline characteristics. Epinephrine demonstrated superior clinical efficacy but was associated with a significantly higher rate of side effects and systemic reactions. These results suggest that while epinephrine is more effective for hemostasis, its use should be weighed carefully against the increased risk of adverse events, especially in susceptible patients.

Disclosure Statement

No potential conflict of interest reported by the authors.

Funding

This research did not receive any specific grant from funding agencies in the public, commercial, or not-for-profit sectors.

Authors' Contributions

All authors contributed to data analysis, drafting, and revising of the paper and agreed to be responsible for all the aspects of this work.

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