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Cost Effective Trend in Epistaxis Management

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Abstract

Background: Epistaxis affects much of the population and is a common medical complaint seen across a variety of medical settings. Current standard of care treatment includes a range of options from topical therapy to invasive intranasal device insertion in the absence of on-demand specialist involvement. **Aim:** The aim of this article is to not only highlight superior outcomes in patients with acute nontraumatic epistaxis that are treated with noninvasive nebulized tranexamic acid instead of more invasive options, but also monetary benefit to the community through reduced costs. **Case Presentation:** this case report highlights a successful epistaxis resolution with use of tranexamic acid in a 64-year-old female after she was subjected to intranasal device insertion that did not resolve bleeding. **Conclusion:** Nebulized tranexamic acid is a cost-effective medication that not only reduces rates of recurrence, but it also increases patient satisfaction while minimizing overall healthcare costs, and therefore should be the first choice therapy in uncomplicated epistaxis management.

Keywords

Epistaxis, TXA, Tranexamic Acid, Rhinorocket, Nasal Packing

1. Introduction

Epistaxis affects much of the population and accounts for 1 in 200 emergency room visits, with children and elderly being the most affected populations. [1] Currently, primary treatment includes standard measures such as silver nitrate cauterization, topical medication application with agents such as oxymetazoline, nasal packing, evaluation, and management by an otolaryngology specialist, and/or a combination of the above therapies [2] [3]. The use of tranexamic acid (TXA) is an emerging adjunct treatment for epistaxis, usually used to soak the packing material. However, the nebulized form of TXA is a leading alternative for definitive treatment of epistaxis which can also provide the patient with a

more comfortable and less invasive option.

Tranexamic acid belongs to the class of medications called antifibrinolytics. It prevents excess blood loss by preventing blood clots from breaking down and achieves this by inhibiting the conversion of plasminogen into plasmin – the activated form of plasminogen that is responsible for the degradation of fibrin clots [4]. The drug is approved by the Federal Drug Administration for the treatment of heavy menstrual bleeding and short-term prevention for patients with hemophilia prior to dental procedures [5]. It also has many widely accepted off-label uses. Intravenously, it is used off-label in elective cesarean sections, non-traumatic subarachnoid hemorrhages, or orthognathic surgeries to reduce blood loss to name a few. Oral TXA is used off-label for hereditary angioedema, or tooth extractions in patients who are orally anticoagulated. Topically, it is used for treatment of traumatic hyphemas and epistaxis. It can also be used in the nebulized form to manage hemoptysis, post-tonsillectomy hemorrhages and epistaxis [5].

The objective of this paper is to contrast the effectiveness of the currently available medical therapies in the management of uncomplicated epistaxis while highlighting the all-around benefit of using nebulized tranexamic acid as a primary option in the treatment of epistaxis.

2. Case Report

A 64-year-old nonsmoker female who was not on any medications and without bleeding diatheses history presented to the emergency department with a 3-day history of spontaneous, intermittent non-traumatic left-sided epistaxis. Patient endorsed no fever, recent upper respiratory complaints, or headache. Three hours earlier patient was seen in the same emergency room with hours-long persistent epistaxis, where after failed topical oxymetazoline administration an anterior/posterior nasal packing Rapid Rhino® was placed. At the time of initial presentation, physical examination revealed copious hemorrhage from left naris without sinus tenderness on exam. During the return visit, patient complained of difficulty swallowing that she attributed to anxiety from Rapid Rhino® and being unable to breathe through either naris. She denied swallowing blood, nausea, vomiting, or headache. All vitals remained stable throughout the emergency room stay. At this point, the Rapid Rhino® was removed and a physical reexamination revealed minimal bleeding without clear source point and the absence of septal hematoma. The patient was then treated with 2000 mg of nebulized tranexamic acid which led to prompt resolution of symptoms without need for repacking. Patient also reported a resolution of anxiety. A complete blood count and comprehensive metabolic panel did not reveal any gross abnormalities (**Table 1**). Patient was reexamined 30 minutes later. Her epistaxis was controlled, and she was discharged with a 10-day supply of cephalexin and an outpatient otolaryngology follow-up. Vitals at discharge remained stable. Since the epistaxis was nontraumatic, imaging was not deemed necessary.

Table 1. Blood analysis during initial presentation.

Hematology and Chemistry			
WBC	7.6 μL	Sodium	139 mmol/L
RBC	3.65 μL	Potassium	4.8 mmol/L
Hemoglobin	11.6 g/dL	Chloride	108 mmol/L
Hematocrit	34.70%	Carbon dioxide	26 mmol/L
Platelets	266 μL	Anion gap	5
MPV	9.4 fL	BUN	16 mg/dL
MCV	95.1 fL	Creatinine	0.8 mg/dL
MCH	31.8 pg	Glucose	148 mg/dL
RDW	12.9%	Calcium	9.2 mg/dL

At the time of discharge, patient reported no side effects for nebulized TXA as summarized above, although commented on the resolution of side effects from Rapid Rhino®, such as anxiety or inability to pass air through either naris. Patient was instructed to proceed with otolaryngology outpatient follow-up as scheduled. A three-day telephone follow-up revealed that patient had no recurrence of epistaxis and experienced no side effects from TXA administration. Due to resolution of epistaxis, patient never followed up with an otolaryngologist.

3. Discussion

Recent studies indicate that topical or inhaled TXA is more effective than other treatment options in stopping the hemorrhage and decreasing rates of re-bleeding. [2] [3] [6] [7] [8] From the adverse risk standpoint, the most common side effects reported are gastrointestinal (nausea, diarrhea) and bronchospasm, but are mild and uncommon. [6] [9] Other studies have shown no evidence that use of TXA increased one's risk for thromboembolic events or had any adverse events associated with TXA inhalation. [10] [11] The patient in this case reported experiencing none of the commonly reported symptoms. Although nebulized TXA is an emerging management trend for epistaxis, it has been routinely used to treat hemoptysis and post-tonsillectomy hemorrhages. A double-blind, randomized control trial by Wand *et al.* compared nebulized TXA to normal saline placebo for treatment of hemoptysis. [12] Study concluded that TXA treatment significantly reduced the amount of time to resolution of symptoms ($n = 47$, 96% vs 50% within 5 days, $p = 0.0005$), shortened the length of hospital stay ($n = 47$, 5.7 vs 7.8 days, $p = 0.046$), decreased the number of patients needing invasive procedures ($n = 47$, 0% vs 18.2%, $p = 0.041$), and decreased rate of recurrence at the 1-year mark.

Numerous studies have looked at the benefit of using TXA off-label for epistaxis (**Figure 1**). A metanalysis by Janapala *et al.* compared the management of epistaxis by various modalities and concluded that not only patients that

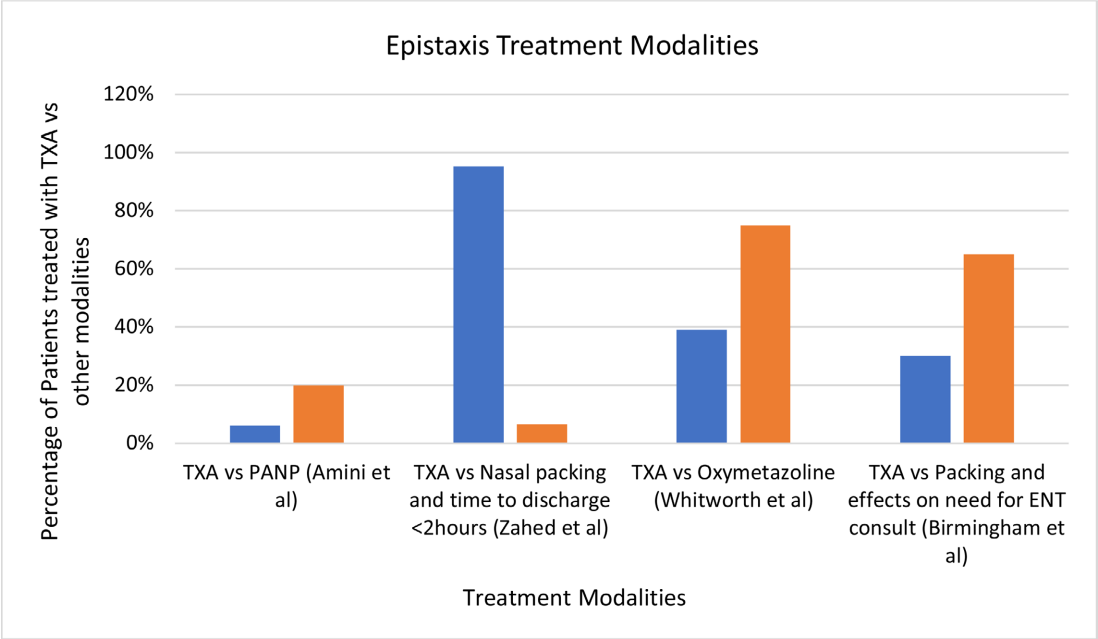

Figure 1. The rate of recurrence in epistaxis is compared between Tranexamic Acid (TXA), phenylephrine-lidocaine nasal packing (PANP), nasal packing and time to discharge (<2 hours), oxymetazoline, and requirement for otolaryngology consultation. The figure demonstrates that treatment with TXA leads to less rebleeding in patients and carries much shorter length of stay.

received TXA had significantly lower (3.5 times) rates of epistaxis recurrence (n = 1299, 95% CI 1.3 - 9.7), the TXA patients also were 63% less likely to return with recurrent epistaxis within 24 - 72 hours (n = 613, p = 0.001). [2] A retrospective multiyear review by Birmingham *et al.* examined the benefits of TXA in patients with epistaxis and concluded that use of TXA decreased the need for otolaryngology consults (n = 122, 30% vs 65.2%, p = 0.002) and need for nasal packing (n = 122, 16.7% vs 23.9%, p = 0.003 respectively) when compared to other standard of care therapies. [13] Patient in the case scenario not only returned due to recurrence of epistaxis, but she was also uncomfortable due to the invasive therapy side effects. Furthermore, she failed to follow up with an otolaryngology specialist due to persistent resolution of symptoms following TXA administration, which is a good indicator of overall long-term effectiveness of TXA therapy. Considering adverse risk profile, nasal packing is not only extremely uncomfortable and anxiety-inducing for the patient, but it can also cause nasal trauma if repeated. While oxymetazoline was utilized as a primary treatment option of epistaxis in the case scenario, it is contraindicated in patients with hypertension and other common cardiovascular disease risk factors, which are so common in the aging population. [3]

While oxymetazoline combined with nasal packing insertion is the most commonly used therapy in the emergent setting to control epistaxis, the use of TXA is a growing trend. A prospective study by Whitworth *et al.* concluded that 39% of TXA patients and 75% of oxymetazoline patients experienced recurrent hemorrhage (n = 38, 95% CI). [14] Furthermore, a randomized control

trial by Zahed *et al.* concluded that the use of topical TXA instead of anterior nasal packing showed more efficacy in stopping the hemorrhage within 10 minutes (n = 216, 71% vs 31.2%, p < 0.001), lowered rates of recurrence (n = 216, 4.7% vs 11%, p = 0.128), provided a quicker time to discharge (less than 2 hrs) (n = 216, 95.3% vs 6.4%, p < 0.001), while increasing patient satisfaction (n = 216, 8.5% vs 4.4%, p < 0.001). [8] A similar prospective, double-blind, parallel-group, randomized clinical trial examined use of TXA versus phenylephrine-lidocaine nasal packing (PANP) where 6% of patients treated with TXA had recurrent bleeding, compared to 20% of patients treated with PANP (n = 100, p = 0.003). [15] Numerous other studies evaluated the effectiveness of TXA and variety of packing products came to similar statistical conclusions as seen in this trial. [16] [17]

Considering the increasing medical care costs, TXA is an excellent option when compared to standard modalities (**Table 2**). Relative costs for each modality were calculated based on average market prices and relative value units (RVU) per current procedural terminology (CPT) code for each option. [18]-[22]

4. Conclusion

While the TXA treatment option is the cheapest, when combined with significantly lower rates of recurrence compared to standard modalities, including cost savings from reduced re-visits to emergency department and specialist involvement as well as improved patient satisfaction, it should be the primary option for a clinician managing patients with nontraumatic uncomplicated epistaxis. Nebulized TXA should also be heavily considered in patients that have a financial or social limitation of follow-up with otolaryngology since TXA has a higher overall success rate when compared to other modalities.

Table 2. The approximate cost of different treatment modalities (in US dollars) for epistaxis.

Direct Cost of Epistaxis Treatment Modalities		
Treatment Modality	**Breakdown of Cost (Medicare)**	**Approximate Cost**
Nebulized Tranexamic Acid (100 mg/mL) 100 ml	Tranexamic Acid [18] + CPT Code 94,640 [19]	$54.88
Oxymetazoline 0.05%	Oxymetazoline [18] + CPT Code 30,901 [19]	$116.94
Rapid Rhino® with Saline	Rapid Rhino® [21] + CPT Code 30,903 [19]	$186.69
Rapid Rhino® soaked with Phenylephrine-Lidocaine	Phenylephrine-Lidocaine [22] + Rapid Rhino® [21] + CPT Code 30,903 [19]	$197.14
Otolaryngologist evaluation	Office visit (99,203) [19] + CPT Code 31,238 [19]	$246.29

Key Points

1) Tranexamic acid is the cheapest non-invasive option to control uncomplicated epistaxis.

2) Use of nebulized TXA leads to the lowest recurrence of hemorrhage when compared to standard treatment modalities.

3) Tranexamic acid use in patients with epistaxis reduces overall healthcare costs and carries higher patient satisfaction.

Consent

The informed consent from the patient was obtained.

Conflicts of Interest

The authors declare no conflicts of interest regarding the publication of this paper.

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