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ORIGINAL RESEARCH

Factors Associated with Recurrent Emergency Department Visits for Epistaxis in Adults, Cross Sectional Study in Two Tertiary Care Hospitals in Riyadh, Saudi Arabia

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Introduction and Objectives: This study aimed to investigate the prevalence of recurrent and active epistaxis in adult patients presenting to the Emergency Department (ED) and explored the association of recurrent epistaxis with demographic characteristics, comorbidities and medications, and types of emergency interventions in adult epistaxis patients.

Methods: A retrospective cross-sectional study was conducted with data from Eds of two tertiary hospitals over three years, from January 2019 to January 2022. All adult patients aged ≥18 years with active epistaxis not resolved by pressure on the nose or head positioning were included. Demographic data, details of clinical presentation and clinical management were collected from the patient's electronic medical records.

Results: Of 404 patients, 73 (18.1%) revisited the ED with recurrence of epistaxis within 28 days. There was a male predilection in the study, with an average age of 55.4 ± 18.03. Most patients had unilateral (n = 328, 81.2%) and anterior (n = 376, 93.1%) nasal bleeding. Heart failure as a comorbidity was associated with a significantly increased risk of recurrent epistaxis (p = 0.001). The most common treatments included expandable polyvinyl acetate packs (EPAP) (n = 198, 49%); topical xylometazoline (n = 108, 26.7%); and chemical cautery (n = 57, 14.1%). EPAP for controlling initial bleeding was significantly associated with ED revisits due to epistaxis (p = 0.033).

Conclusion: The prevalence of recurrent epistaxis mostly occurs in older-aged males. Congestive heart failure may be an under-recognised risk factor for recurrent epistaxis. In patients with a high risk of epistaxis recurrence, other treatment modalities should be sought aside from expandable polyvinyl acetate packs as they can increase the risk of rebleeding.

Keywords: epistaxis, recurrence, risk factors, comorbidity

Introduction

While epistaxis is quite common and usually self-limited, affecting nearly 60% of the population once during their life,[1] it can become severe and persistent enough to impact the quality of life of affected patients.[2] An estimated 6–10% of people affected by epistaxis seek or require medical help, although this rarely amounts to surgical intervention.[3] In the United States, epistaxis was shown to account for 1 in 200 emergency department (ED) visits, representing up to one-third of all otorhinolaryngology-related ED encounters.[4] A retrospective single-centre study in Saudi Arabia showed a prevalence rate of 0.98% for all ED visits related to epistaxis over 3 years, with most cases reported among people aged 41−50.[5]

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Epistaxis can be attributed to multiple reasons. Common nasal risk factors for epistaxis include repeated trauma and ulceration of nasal mucosa by nose picking; dryness of nasal mucosa due to dry and hot atmosphere in summer or dry and cold during winters; chemical irritation of the nasal mucosa; allergic, viral, or bacterial rhinitis; nasal or sinus surgery; or nasal polyps and tumours.[4–7] Epistaxis can also be caused by hereditary conditions, such as hereditary haemorrhagic telangiectasia, an autosomal dominant disorder in which 93% of affected patients experience spontaneous and recurrent epistaxis.[8] Medical conditions such as hypertension are also considered risk factors for epistaxis: a recent large population cohort study from Korea showed that hypertensive patients had an increased risk and severity of epistaxis, more posterior nasal packing procedures, and requiring more emergency visits in comparison to non-hypertensive patients with odds ratio of 2.69.[9] Recurrent epistaxis has been linked with various causes, including medical conditions such as diabetes, obstructive sleep apnoea, or congestive heart failure;[4,10] use of antithrombotic medications such as warfarin and antiplatelet agents such as Aspirin;[11] and bleeding diatheses.[12]

Despite the common prevalence of epistaxis, knowledge regarding its management is found to be lacking in primary care and ED physicians. A needs assessment of first aid measures practised for managing epistaxis in Canada showed that only 19% of family physicians and 43% of ED physicians knew the correct area to apply compression.[13] A survey in Saudi Arabia showed similar results, with 31% of ED physicians and 24% of family physicians responding correctly about nasal compression and head position (slight forward head tilt) when managing epistaxis.[14] Poor knowledge of first-aid measures for managing epistaxis could translate into patient dissatisfaction and lead to repeated ED admissions for the same problem.

This study aimed to determine the prevalence of recurrent and active epistaxis in adult patients presenting to the ED and to determine demographic, medical, or intervention-related factors that could contribute to recurrence.

Methods

A retrospective cross-sectional study was conducted with data collection from the ED of two tertiary care hospitals in Riyadh, Saudi Arabia. Hospitals included King Saud University Medical City (KSUMC) and King Abdulaziz Medical City (KAMC) in the Ministry of National Guard. Retrospective data were collected from electronic patient records from January 2019 to January 2022. Ethical approval for data collection was obtained from the Institutional Review Boards (IRB) of King Saud University College of Medicine (Ref: E-22-6578) and from King Abdullah International Medical Research Centre (Ref: 1943/22) and Since the data was collected indirectly from patient's medical records without disclosing their identity, IRB offices from both centers have waived the requirement for individual informed consent, as patients had previously consented to research on their medical records in accordance with KSUMC and KAMC regulations. The study complies with the Declaration of Helsinki.

Adult patients aged ≥18 years who presented to the emergency department and were diagnosed with active epistaxis were included in the study. Active epistaxis was defined as epistaxis which did not respond to pressure over the nose with a compression by fingers. Paediatric patients aged <18 and patients with inactive epistaxis were excluded from the study. Recurrence was defined as two or more episodes of epistaxis within the first 28 days after initial presentation, as this is the period within which the nasal mucosa normally begins to heal.[15]

Data collection was conducted using stored data in the patient's electronic records. The electronic medical record (EMR) was searched using the keyword "Epistaxis, nose/nasal bleed, nasal/nose hemorrhage", and all search results were filtered using the inclusion criteria as well as for duplicate information. For eligible patients, data were collected for demographic characteristics (age, gender, date of ED visit, comorbid conditions, medication, and surgical history); clinical presentation (vitals observations, side and pattern of epistaxis, relevant laboratory investigations); and clinical management for epistaxis (such as chemical cautery with silver nitrate, use of absorbable or non-absorbable packs, antibiotic use, tranexamic acid, or the use of intranasal vasoconstrictors). Data were also collected for recurrent presentations; on this basis, patients were divided into two groups: one group with single ED visits and the other group with recurrent visits within 28 days for two or more episodes of epistaxis. Data collection was done following the previously published criteria.[16]

The collected data were inputted into an Excel spreadsheet and analysed using Statistical Package for Social Sciences (SPSS) software version 23. Categorical data were reported as frequency and percentages, while continuous variables

were reported as mean±SD. Bivariate analysis between categorical variables and recurrence was carried out using the Chi-square test; continuous variables were compared using one-way ANOVA. The significance level for all associations was determined as p-value ≤0.05.

Results

Out of 34109 search results for epistaxis on the EMR, 559 ED visits for 404 patients met the inclusion criteria and were utilised for data collection. A male preponderance (n = 244, 60.4%) was noted, with the mean age of patients being 55.37 ± 18.03 (Table 1). Seventy-three (18.1%) patients returned to the ED within 28 days due to recurrent epistaxis. Hypertension (n = 228, 56,4%) and diabetes (n = 182, 45.0%) were the main comorbid conditions, and the average systolic blood pressure on ED presentation was 141.26 ± 24.09 mmHg. Postoperative nasal surgeries accounted for 12% (n = 40) of the patients who presented with active epistaxis in the ED (Table 1).

Among comorbid conditions, only heart failure was significantly associated with recurrent visits (p = 0.001). There was no difference in recurrence between patients with anterior or posterior epistaxis; vital signs on ED admission or prior use of antiplatelets or anticoagulants did not significantly impact overall recurrence (p > 0.05). Expandable polyvinyl acetate pack (EPAP) for management of epistaxis was associated with a higher risk of ED revisit due to rebleeding (p = 0.033) (Table 2).

Table 1 Demographics for All Patients Presented with Epistaxis (n = 404)

Demographic	**N(%) or Mean±SD**
Gender	
Male	244 (60.4%)
Female	160 (39.6%)
Age	55.4 ± 18.03
Comorbid Conditions	
Hypertension	228 (56.4%)
Diabetes Mellitus	182 (45.1%)
Ischemic heart disease	74 (18.3%)
Heart failure	52 (12.9%)
COPD	8 (1.2%)
Anti-platelet Use	
Aspirin	124 (30.9%)
Clopidogrel	35 (8.7%)
Anti-coagulant Use	
Apixaban	20 (5.0%)
Rivaroxaban	10 (2.5%)
Warfarin	32 (7.9%)
Enoxaparin	5 (1.2%)
Heparin	2 (0.5%)
Type of surgery for patients who presented with postoperative epistaxis (n=40)	
Septoturbinoplasty	16 (40%)
FESS with Septoturbinoplasty	12 (30%)
Septorhinoplasty	4 (40%)
FESS with Turbinoplasty	3 (7.5%)
FESS alone	2 (5%)
Endoscopic skull base surgery	2 (5%)
Turbinoplasty alone	1 (2.5%)

Abbreviations: COPD, Chronic obstructive pulmonary disease; FESS, Functional endoscopic sinus surgery.

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Table 2 Comparison of Single versus Recurrent ED Visits for Epistaxis

Variable	Single Visit (n=331)	Recurrent Visits (n=73)	*p*-value
Age	55.3 ± 18	55.5 ± 16	0.952
Gender			0.194
Male	195	49	
Female	136	24	
Co-morbid Conditions			
Hypertension	180	48	0.076
Diabetes mellitus	148	34	0.772
Ischemic heart disease	60	14	0.834
Heart failure	34	18	0.001*
COPD	6	2	0.607
Medication Use			
Anticoagulants	52	15	0.314
Antiplatelets	116	26	0.926
Pattern of Epistaxis			
Unilateral	267	61	0.566
Bilateral	64	12	
Anterior	307	69	0.590
Posterior	24	4	
Vital Signs			
Heart rate (mean)	87.1 ± 16	85.7 ± 15	0.552
SBP (mean)	141.3 ± 24	141.2 ± 24	0.758
DBP (mean)	79.9 ± 17	78.8 ± 16	0.648
Coagulation Profile			
Prolonged PT	50	11	0.994
Prolonged aPTT	36	10	0.492
Clinical Management			
Chemical cautery (Silver nitrate)	47	10	0.911
EPAP	154	44	0.033*
Ribbon Gauze packing	26	6	0.917
Oxidized regenerated cellulose	35	4	0.182
Intravenous Tranexamic acid	36	12	0.184
Topical Xylometazoline	84	24	0.190

Note: *p-value < 0.05 considered significant.
Abbreviations: COPD, chronic obstructive pulmonary disease; SBP, systolic blood pressure; DBP, Diastolic blood pressure; PT, Prothrombin time; aPTT, Partial thromboplastin time; EPAP, Expandable polyvinyl acetate packs.

The admission rates were higher in patients with bilateral epistaxis as well as those presenting after nasal surgery with p-value of 0.013 and 0.003, respectively (Table 3).

There was a significant association of anticoagulation and antiplatelet use, and deranged coagulation profile (prolonged PT and aPTT) with recurrent epistaxis in patients with heart failure compared to those without heart failure (Table 4):

Table 3 Comparison Between Patients Admitted and Discharged from ED Due to Epistaxis

Variable	Subgroup	Admitted (n=20)	Discharged (n=384)	*p*-value
Gender	Male	10	234	0.33
	Female	10	150	
Co-morbidities	Hypertension	10	218	0.552
	Diabetes mellitus	7	175	0.354
	Ischemic heart disease	5	69	0.428
	Heart failure	4	48	0.329
	COPD	1	7	0.329
Medication use	Anticoagulants	2	47	0.765
	Antiplatelets	5	145	0.33
Pattern of epistaxis	Unilateral	12	316	0.013*
	Bilateral	8	68	
Coagulation profile	Prolonged PT	4	57	0.53
	Prolonged aPTT	2	44	0.841
Post-nasal surgery		6	36	0.003*

Note: *p-value < 0.05 considered significant.
Abbreviations: COPD, chronic obstructive pulmonary disease; PT, Prothrombin time; aPTT, Partial thromboplastin time.

Table 4 Comparison of Medication Use and Coagulation Profile in Patients with and without Heart Failure

Variable	Sub-group	Heart Failure (n=52)	No Heart Failure (n=352)	*p*-value
Medication use	Anticoagulants	19	30	0.0001*
	Antiplatelets	30	112	0.0001*
Coagulation profile	Prolonged PT	18	43	0.0001*
	Prolonged aPTT	13	33	0.001*

Note: *p-value < 0.05 considered significant.
Abbreviations: PT, Prothrombin time; aPTT, Partial thromboplastin time.

Discussion

Recurrent visits to the ED for epistaxis present more commonly in older aged male patients, especially during the dry winter season.[17] Our study showed a male preponderance for recurrent epistaxis: while this was not statistically significant, several studies have reported a higher predilection for recurrent epistaxis in men, which could be due to friable blood vessels, higher comorbidities in men, and the protective effect of oestrogen in females.[10] While older age has been linked with higher susceptibility to spontaneous epistaxis due to the limited elasticity of nasal vessels,[10] there is no reported link between older age and ED revisit for epistaxis,[4,18] as supported by our study findings.

Previous studies have shown a link between comorbid conditions such as hypertension, diabetes, congestive heart failure, and anaemia with recurrent epistaxis.[4,10] Congestive heart failure leads to pathologic changes in blood vessels and increases the pressure of blood inside the vessels: due to thinner and delicate blood vessels in the nasal septum, this increased pressure predisposes to epistaxis.[19] In our study, heart failure was the only comorbid condition significantly linked with recurrent visits to the ED. While this could be confounding result related to a higher prescription rate and doses for antiplatelets and anticoagulants in heart failure for the purpose of secondary prevention and to manage complications such as atrial fibrillation,[20] it reflects the importance of a detailed evaluation of comorbid conditions and medication use to decrease the rate of recurrent epistaxis in the ED. High-output heart failure also contributes to the

pathogenesis of Recurrent Epistaxis Kiesselbach Area Syndrome, which occurs in hereditary haemorrhagic telangiectasia due to multiple arteriovenous malformations.[19]

Hypertension causes arteriosclerotic changes in blood vessels and has been significantly associated with active epistaxis at ED presentation,[21] as well as recurrent visits to ED for epistaxis.[4,10,18] Diabetes mellitus has also been described as a risk factor for recurrent epistaxis.[4,10] In our study, patients who had diabetes or hypertension had a higher incidence of recurrent epistaxis: however, this relationship was not statistically significant, possibly due to the smaller sample size of the recurrent visits group.

Around 24–33% of all patients hospitalised for epistaxis use anticoagulants and antiplatelets.[1] Anticoagulants, especially vitamin K antagonists such as warfarin, increase the risk of recurrent epistaxis independent of the international normalised ratio (INR);[11] however, novel oral anticoagulants such as dabigatran (direct thrombin inhibitor) and apixaban or rivaroxaban (factor Xa inhibitors) have not been associated with increased risk of severe or recurrent epistaxis.[1,22,23] Antiplatelet use has also been significantly linked with recurrent epistaxis compared with patients who had episodic epistaxis.[24,25] However, the use of any antiplatelet or anticoagulant medications was not associated with recurrent visits to the ED in our study, and similarly, laboratory values of prothrombin time (PT) or activated partial thromboplastin time (aPTT) did not affect overall recurrence.

Management of recurrent epistaxis depends on severity: mild cases can be treated with pressure and plugging the affected nostril.[26] However, severe cases may require further management like nasal packing, or cauterisation of the bleeding point.[26] Drug therapies such as intravenous tranexamic acid have been found to minimise initial bleeding, prevent epistaxis recurrence, and reduce the need for further interventions.[27] Nasal packs such as EPAP (Merocel®) have a high rate of success (>90%) in managing recurrent bleeding;[28] a study on patients with diffuse epistaxis and multiple comorbidities showed a success rate of 96% with EPAP wrapped with Oxidized regenerated cellulose.[26] However, nasal packing can be associated with rebleeding after removal of the pack: a study comparing nasal packing with EPAP against tranexamic acid for the management of anterior epistaxis showed an almost double rebleeding rate (26%) with EPAP in 24 hours compared to 13.3% rebleeding with tranexamic acid.[28] Another study showed significantly higher rates of rebleeding within 24 hours and at 1 week with anterior nasal packing compared with tranexamic acid.[29] In our study, patients who underwent nasal packing with EPAP for epistaxis had a significantly higher rate of ED revisits due to recurrence of bleeding within 28 days. Surgical treatment with endoscopic endonasal clipping or coagulation of the sphenopalatine artery is usually reserved when conservative treatment has failed, especially for posterior epistaxis.[1,30]

Limitations

Our study had certain limitations: the retrospective design precluded long-term follow-up. The competency level of treating physicians was not assessed, which could have confounded the type of treatment offered to patients, affecting their chances of developing recurrence. Moreover, the severity of epistaxis needed to be delineated. Nevertheless, our study confirms the significant association between heart failure and recurrent epistaxis. It should lead to further research to develop national guidelines for standardising epistaxis management.

Another limitation was that we could not control the treatments provided. Therefore, it is possible that the association of EPAP with recurrent visits for epistaxis reflected increased severity of the epistaxis on the index visit, rather than an intrinsic failure of the management strategy. Also, we could not control for multiple treatment strategies provided to patients on the index visit, and how this might have affected recurrence/revisit rate. In addition, the study does not include pregnancy status of the female patients due to limitations in the data source, which might be important risk factor impacting recurrent epistaxis due to pregnancy-related hemodynamic changes thus we recommended to such variable to be included in future studies.

Conclusion

Prevalence of Recurrent epistaxis has a preponderance in older-aged males. Congestive heart failure is an important but under-recognised risk factor for recurrent epistaxis. Patients with a high risk of epistaxis recurrence should be evaluated by otorhinolaryngologists and in those patients other treatment modalities should be sought aside from expandable polyvinyl acetate packs as they can increase the risk of rebleeding.

Disclosure

Authors have no conflict of interests.

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