ENT Updates

ORIGINAL ARTICLE

ENT UPDATES 12(1):37-43
DOI: 10.5152/entupdates.2022.21086

Analysis of 79 Hospitalized Severe Epistaxis Patients and Review of Literature

ABSTRACT

Background: In this study, we analyzed the clinical characteristics and outcomes of severe epistaxis patients admitted to our tertiary center and compared our results with the literature.

Methods: We retrospectively analyzed clinical records of epistaxis patients admitted to our hospital between January 2018 and December 2019 with respect to their age, gender, duration of hospitalization, anterior/posterior nasal packing, hospitalization month, surgical intervention, bleeding diathesis, comorbid diseases, anticoagulant/antiplatelet drug therapy, blood transfusion, and laboratory values.

Results: A total of 79 patients were enrolled in this study, 50 (63.3%) of them were males and 29 (36.7%) were females. The mean age of all patients was 55.3±17.2. Epistaxis was most common in patients over 70 years of age and the most frequent months for hospitalization were January and February. The anterior nasal pack was applied to 74.7% of the patients. The mean hospitalization duration was 3.8±1.8 days (min 2 to max 11) mainly affected by the nasal pack type. The surgical intervention rate was 7.6%, and patients who needed intervention had lower hemoglobulin values and higher blood transfusion rates. The most common comorbid disease was hypertension (54.4%) followed by cardiac disease (29.1%). The low hemoglobulin value on the day of admission was the main factor for blood transfusion and surgical intervention.

Conclusions: Despite recent advances in diagnostic modalities of otolaryngology, epistaxis is still one of the most common emergencies with the same basis of treatment worldwide. Hypertensive male patients over 50 years of age displayed the major clinical profile of our study group. Non-surgical intervention was the main treatment method, and the duration of hospitalization predominantly depended on nasal pack type. Our study showed physicians should be alert to epistaxis patients with low hemoglobulin levels as these patients are prone to surgical intervention and blood transfusion.

Keywords: Epistaxis, nasal surgery, hospitalization

INTRODUCTION

Epistaxis originates from the ancient Greek roots "epi-" and "-staxis" and was first used by Hippocrates (466-377 BC) for any kind of dripping from any surface.[1] The conversion of the word "epistaxis" only to nosebleeds in medical jargon was accomplished by William Cullen (1785) and Philippe Pinel (1818) in their books *Synopsis nosologiae medicae* and *Nosographie philosophique*.[1,2]

Our knowledge for the treatment of epistaxis however dates back to the 17th century BC with the aid of The Edwin Smith Papyrus.[3] The cleaning of blood clots and nasal packing for epistaxis were first performed by ancient Egyptians which was later mentioned in ancient Greek inscriptions.[1,3]

In today's world, epistaxis still affects 60% of the general population and encounters up to 33% of otolaryngology visits.[4,5] Epistaxis is the most common cause for an emergency in ENT with a mortality rate of up to 10%.[6,7] Although treatment methods for epistaxis have evolved recently with the utilization of nasal endoscopes, the basics of these methods have remained the same for centuries. Applying pressure to the bleeding nostril with fingers or nasal pack, cauterization, and using hemostatic agents are still widely used worldwide and are indeed performed throughout ages.

Demet Yazıcı
Gülali Ocar
Orhan Görgülü

Department of ENT, University of Health Sciences, Adana City Training and Research Hospital, Adana, Turkey

Cite this article as: Yazıcı D, Ocar G, Görgülü O. Analysis of 79 hospitalized severe epistaxis patients and review of literature. *ENT Updates.* 2022;12(1):37-43.

Corresponding author:
Demet Yazıcı
Email: *demetyazici@yahoo.com*
Received: *August 26, 2021*
Accepted: *February 22, 2022*

In this study, we retrospectively analyzed data of the hospitalized severe epistaxis patients in various aspects and compared our results with those of the literature.

METHODS

In this study, clinical records of patients admitted to our tertiary referral center with the diagnosis of epistaxis between January 2018 and December 2019 were analyzed retrospectively. After approval from the Ethics Committee of Adana City Training and Research Hospital (ethical approval no: 882/2020), patients were analyzed according to their age, gender, duration of hospitalization, anterior/posterior nasal packing, hospitalization month, surgical intervention, bleeding diathesis, comorbid diseases, anticoagulant/antiplatelet drug therapy, blood transfusion, and laboratory values. All patients underwent nasal endoscopic examination and paranasal computed tomography (CT) examination after nasal package removal. Informed Consent was obtained from all participants. Patients with a history of trauma and tumoral lesions of the paranasal or nasopharyngeal area were all excluded from the study. This study is carried out in accordance with the basic principles of the Declaration of Helsinki.

Statistical Package for the Social Sciences (SPSS) version 23.0 (IBM SPSS Corp.; Armonk, NY, USA) was used for statistical analysis. Chi-square, Mann–Whitney *U* test, Student's *t*-test, Kruskal–Wallis test, and Fisher's exact test were used as appropriate. $P < .05$ was considered statistically significant.

RESULTS

In our study, 79 patients were included in the study, of whom 50 (63.3%) were males and 29 (36.7%) were females. The mean age of all patients was 55.3 ± 17.2 with an age range of 18-90 years. The mean age was 55 ± 17.6 years for men and 55.8 ± 16.9 years for women. The mean hospitalization duration of the patients was 3.8 ± 1.8 days (min 2 to max 11). Characteristics of the hospitalized epistaxis patients and statistical differences between genders are listed in Table 1. The distribution of patients according to age groups is demonstrated in Figure 1. Epistaxis was most common in patients over 70 years of age (22.8%). The most frequent

Table 1. Characteristics of Hospitalized Epistaxis Patients and Statistical Difference Between Genders

	Male	Female	Total	*P*
No. of patients	50 (63.3%)	29 (36.7%)	79 (100%)	
Mean age (years)	55±17.6	55.8±16.9	55.3±17.2	.891
Mean duration of hospitalization (days)	3.9±1.9	3.5±1.6	3.8±1.8	.372
No. of patients with anterior/posterior nasal packing	Anterior 35 (70%) Posterior 15 (30%)	Anterior 24 (83%) Posterior 5 (17%)	Anterior 59 (75%) Posterior 20 (25%)	.209
No. of patients having surgical intervention	2 (33.3%)	4 (66.6%)	6 (100%)	.185
No. of patients with bleeding diathesis	7 (77.8%)	2 (22.2%)	9 (100%)	.473
No. of patients with history of comorbid diseases	29(64.4%)	16(35.6%)	45 (100%)	.807
No. of patients with history of anticoagulant/antiplatelet drug therapy	15 (57.7%)	11 (42.3%)	26 (100%)	.470
No. of patients having blood transfusion	4(50%)	4(50%)	8 (100%)	.456

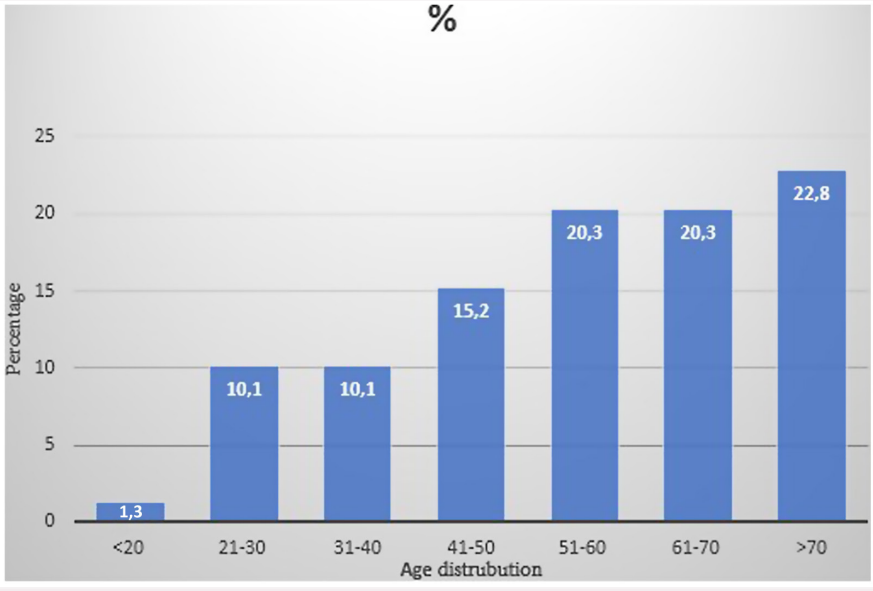

Figure 1. Age distribution of hospitalized epistaxis patients.

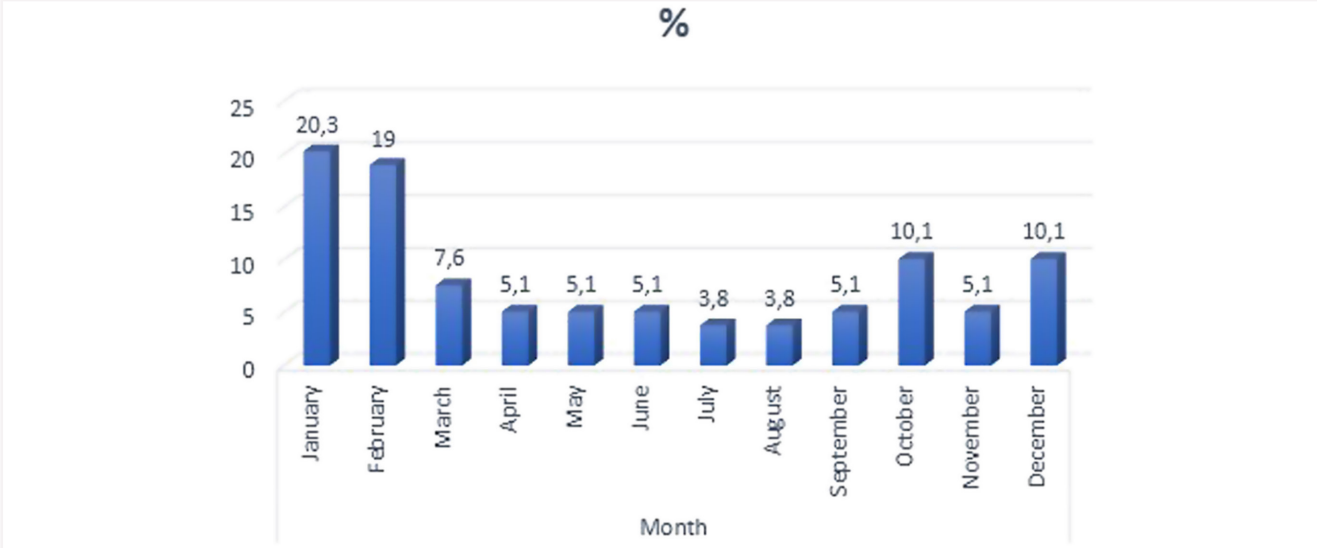

Figure 2. Month distribution of hospitalized epistaxis patients.

months for hospitalization of severe epistaxis patients throughout 2018 and 2019 are shown in Figure 2. Hospitalization due to nosebleeds occurred most frequently in January and February. There were no statistically significant differences between male and female patients regarding age, duration of hospitalization, anterior-posterior nasal packing, surgical intervention, bleeding diathesis, history of comorbid disease, anticoagulant/antiplatelet drug, and blood transfusion rate ($P > .05$ as shown in Table 1). Also, there was no statistically significant difference between hospitalization months regarding age and hospitalization duration ($P = .334$, $P = .379$, respectively).

Anterior nasal packing (merocele or vaseline gauze) was applied to 59 (74.7%) patients and posterior nasal packing (Epistat balloon) was applied to 20 (25.3%) patients. When patients with anterior and posterior packing were compared, no statistical differences were found in terms of gender, age, surgical intervention, presence of bleeding disorder, blood transfusion, anticoagulant use, presence of additional disease, hemoglobin level, and decline ($P = .209$, $P = .952$, $P = .167$, $P = .567$, $P = .410$, $P = .818$, $P = .641$, $P = .172$, $P = .441$, respectively) The mean hospitalization duration was 3.1 ± 0.9 days (min 2 to max 5) in patients with anterior pack, and the mean hospitalization duration was 5.8 ± 2.1 days (min 3 to max. 11) in posterior pack patients, and the difference was statistically significant ($P < .01$).

There were 6 (7.6%) patients who underwent surgical intervention for intractable epistaxis. Endoscopic cauterization of the sphenopalatine artery and/or posterior septal artery or direct endonasal endoscopic cauterization of the offending site was applied to the patients. No statistical differences were found between patients with and without surgical intervention in terms of gender, age, presence of bleeding disorder, use of anticoagulant/antiplatelet medication, and the presence of additional disease ($P = .185$, $P = .369$, $P = .528$, $P = .87$, $P = .695$, respectively). The mean hemoglobin value was 10.6 ± 2.4 in patients with surgical treatment and 12.8 ± 2.1 in patients without surgery, and when patients with and without surgery were compared regarding mean hemoglobin value and the presence of a low hematocrit value, there was a statistically significant difference between them ($P = .014$, $P = .04$). The mean hospitalization duration was 5 ± 3.2 days (min 2 to max 11) for patients undergoing surgical treatment, and 3.7 ± 1.6 days (min 2 to max 9) for other patients. Blood transfusion was applied to 4 of 6 patients with surgery and only 4 of 73 patients without surgical intervention and the difference was statistically significant ($P < .01$).

There were 9 (11.4%) patients with bleeding diathesis. Regarding gender, there was no statistically significant difference between patients with and without bleeding diathesis. The mean age of patients with bleeding diathesis was 64.8 ± 20.6, and the mean age was 54.1 ± 16.6 in patients without diathesis. Bleeding diathesis was detected in older patients, but the age difference between these 2 patient groups was not statistically significant since the number of patients with bleeding diathesis was low in our study group ($P = .08$) The mean hospitalization duration was 3.75 ± 1.4 days (min 2 to max 6) in patients with bleeding disorders and 3.77 ± 1.9 days (min 2 to max 11) in patients without bleeding disorder. Additionally, 6 of 9 patients with bleeding diathesis had low a hematocrit count at the time of hospital admission and the difference between patients with and without bleeding diathesis in terms of low hematocrit count was statistically significant ($P < .01$). However, only 1 of these 9 patients had a blood transfusion. Eight out of 9 patients with bleeding diathesis had heart disease and a history of anticoagulant/antiplatelet drug use, and the difference between patients with and without bleeding diathesis in terms of the presence of heart disease was statistically significant ($P < .01$).

Forty-five (57%) patients had a history of comorbid disease, and 3 (3.89%) had a history of septal surgery. The most common comorbid disease was hypertension and was present in 43 (54.4%) patients. The second most common was cardiac disease (coronary artery disease, heart valve disease, and atrial fibrillation) and was present in 23 (29.1%) patients. Twenty-six (32.9%) of the patients had a history of anticoagulant/antiplatelet medication. The mean age of epistaxis patients with hypertension was 63.9 ± 11 years, for patients without hypertension, it was 45 ± 17.9 years, and this age difference was statistically

significant ($P < .01$). However, regarding gender, hospitalization duration, primary hemoglobin level on admission and surgical intervention, no statistically significant differences were detected between epistaxis patients with and without hypertension ($P = .807$, $P = .347$, $P = .875$, $P = .695$, respectively)

There were 8 (10.1%) epistaxis patients who underwent blood transfusion. There were no statistically significant differences between patients with and without blood transfusion in terms of age, gender, anterior–posterior nasal packing application, presence of bleeding disorder, and additional disease ($P = .694$, $P = .456$, $P = .410$, $P = .917$, $P = .055$, respectively). The mean hospitalization duration for patients who underwent blood transfusion was 4.9 ± 2.7 days (min 2 to max 11), and 3.6 ± 1.6 days (min 2 to max 9) for patients without blood transfusion, and this difference was not statistically significant ($P = .10$). The hemoglobin value at admission for patients who underwent blood transfusion was 10.1 ± 3.1 and 12.9 ± 1.9 for patients who did not, and the difference was statistically significant ($P = .036$).

The mean hemoglobulin value was 12.6 ± 2.2 g/dL in a range of 6.10 to 17 g/dL. The mean hematocrit level (%) at the time of admission was 36.9 ± 6.9 (min 9.6 to max 50.6). When hemoglobulin and hematocrit levels at the time of admission were compared in terms of gender, the difference between male and female patients was statistically significant ($P < .01$) Regarding the reference ranges of different genders, hemoglobulin levels were low in 21 (26.6%) patients, and there was no gender difference between these 21 patients ($P = .599$). Laboratory values of hospitalized epistaxis patients are listed in Table 2.

When analyzed, although there was no statistically significant relationship between the presence of a low hemoglobulin level with age, anterior/posterior nasal packing, anticoagulant/antiplatelet use, and hospitalization duration ($P = .496$, $P = .441$, $P = .962$, $P = .860$, respectively), there was a significant relationship with surgical intervention rate, the presence of bleeding disorder, and blood transfusion, and these parameters were higher in patients with low hematocrit ($P = .04$, $P = .037$, $P = .028$, respectively).

DISCUSSION

In this retrospective study, we analyzed the clinical characteristics of epistaxis patients who have required admission to our hospital for the last 2 years. About 63% of the patients were males and our male to female ratio was 1.7 : 1. In the literature, various studies analyzed hospital admissions with epistaxis and are listed in Table 3.[2,5,6,8-11] In the study of Seidel et al.[12] 15 573 patients having the first diagnosis of epistaxis were assessed and 55.9% of these patients were males. Sowerby et al[13] assessed all cases of epistaxis (with and without hospital admission) and 57.9% of them were males. Chaaban et al[14] assessed that males were 1.24 times more susceptible to epistaxis than females. Like our study, most of the studies in the literature designate the male predominance of epistaxis patients presenting to both emergency departments and ENT clinics.

As in the studies listed in Table 3, the mean age of all hospitalized patients for epistaxis was above 50 years like our study. The peak age for epistaxis is generally above 70 years in the literature and our results were harmonious with the literature.[6,8-10,13] Chaaban et al[14] demonstrated that patients between 66 and 75 years were 1.36 times, from 76 to 85 years were 2.37 times, and above 86 were 3.24 times susceptible to epistaxis compared to patients under 65 years of age.

In this study, the epistaxis patients were mainly hospitalized in January (20.3%) and February (19%) and the least in July (3.8%) and August (3.8%). In the study by Purkey et al[15] from the United States, January had the highest number of epistaxis cases and September was the lowest month.[15] Seidel et al[12] from Germany reported as the peak month as February and nadir month as August, Sowerby et al[13] from Canada specified peak month as December and nadir month as July. Generally, in the literature, epistaxis is more frequent in the winter months and is lowest in the summer months as a result of lower ambient humidity and increased upper respiratory infections.[2,5,8-11]

In nonsurgical interventions, anterior nasal packing (74.7%) was preferred mainly for the treatment of our epistaxis patients. The hospital stay was longer in patients with posterior nasal pack, as expected. As a tertiary referral hospital, all our patients had severe epistaxis that required nasal packing. In general, posterior epistaxis accounts for only 5% of epistaxis cases; however, in the literature, posterior epistaxis ratio is higher than expected as many of the studies are from referral centers.[9,10,16,17]

The mean duration of hospital upon admission was 3.8 days. In the study by Douglas et al. duration of hospitalization was 3.1 days in 1995 and was reduced to 2 days in 2015. In general, the mean hospital stay is 2 to 5 days in the literature, higher in studies where posterior epistaxis dominates the subjects.[5,6,8-11]

Table 2. Laboratory Values of Hospitalized Epistaxis Patients and Statistical Difference Between Genders

	Reference Ranges	Mean Value for Males	Mean Value for Females	*P*
Hemoglobin (g/dL)	12.5-16.3 (male) 10.9-14.3 (female)	13.4±2.07	11.5±1.98	$P < .01$
Hematocrit (%)	36.7-47.1 (male) 31.2-41.9 (female)	39±5.99	33.5±7.3	$P < .01$
Platelets (10^3/μL)	152-348 (male) 179-408 (female)	233±75	262±97	$P = .142$
RDW (%)	12.1-16.2 (male) 12.3-17.7 (female)	14.2±1.26	15.3±3.39	$P = .473$
MPV (fL)	7.4-11.4 (male) 7.9-10.8 (female)	8.92±0.92	9.2±1.19	$P = .283$

Table 3. Comparison of Various Studies of Epistaxis

	Years	Country	No. of patients	Gender	Mean Age	Peak Age	Peak Month	Hospitalization Duration	Surgical Intervention	Blood Transfusion
Douglas et al[6]	1995-2015	Scotland	54 501	52.2% male, 47.8% female	Not specified	71-80 years	not specified	3.1 in 1995, 2.02 in 2015	Not specified	Not specified
Kallenbach et al[8]	2016	Germany	840	60.1% male,39.9% female	66.6 ± 20.9	Above 85	March	4.2 ± 3.2 days	17.4%	4.8%
Sowerby et al[13]	2008-2010	Canada	4315	57.9% male,42.1% female	Not specified	Above 75	December	Not specified	Not specified	Not specified
Marin et al [9]	2005-2012	Belgium	124	63.7% male,36.3% female	65 ± 14.4	Not specified	not specified	3.6 ± 2.8 days	47%	6.8%
Kaygusuz et al[10]	2000-2004	Turkey	68	67.7% male, 32.3% female	56.79 ± 17.3	50-80 years	March	5.94 ± 2.68	30.9%	23.5%
Monjas-Cánovas et al[2]	2003-2008	Spain	178	68% male, 32% female	65	70-79	April	Not specified	Not specified	Not specified
McMullin et al[18]	2015-2017	Canada	476	51.8% male, 48.2% female	59.1	70-79	February	Not specified	Not specified	Not specified
Cohen et al[5]	1999-2015	Israel	653	56% male, 44% female	70	Not specified	winter	2 days	7.7%	Not specified
Reis et al[11]	2009-2015	Portugal	46	69.5% male, 30.5% female	61 ± 17	70-80	winter	7.2 days	1.9%	Not specified
This study	2018-2019	Turkey	79	63.3% male, 36.7% female	55.3 ± 17.2	Above 70 years	January	3 days	7.6%	10.1%

The surgical intervention rate was 7.6% and the blood transfusion rate was 10.1% in this study. As we remarked before, our patients were severe epistaxis patients mainly referred to our tertiary ENT clinic from other hospitals. Patients who underwent surgical intervention had lower hematocrit values at the time of admission, and they stayed longer in the hospital and had a higher blood transfusion rate (66.7%). Various studies represent diverse intervention and blood transfusion rates depending on the characteristics of their cohort, which can be observed in Table 3. Comorbidities, medication, and location of the bleeding site are all contributing factors for intervention.[5,8,9,11]

Comorbidities are the main challenges in the treatment of epistaxis patients. In this study, 54.4% of the patients had hypertension, 29.1% had cardiac disease, and 32.9% of the patients took anticoagulant/antiplatelet drugs. Additionally, the mean age of hypertensive patients was 63.9 ± 11, and of non-hypertensive patients, it was 45 ± 17.9. In the study by Kallenbach et al. 57.7% of the patients had hypertension, 8.3% had coronary artery disease, and 63.8% were under anticoagulant/antiplatelet drug. In Marin et al's study, 56.4% of the patients had arterial hypertension, 28.2% had ischemic coronary artery disease, and 61% used medication that affects coagulation, and in the study of Cohen et al. 63.6% had hypertensive disease and 47% patients had anticoagulant/antiplatelet medication.[5,8,9] In the study by Yavin et al. traditional anticoagulant and antiplatelet medications such as warfarin and enoxaparin increased the risk of severe epistaxis, hospital admission, posterior tamponade, blood loss, and the need for blood transfusion.[19] In the literature, hypertension and coronary artery disease are the main comorbid diseases of epistaxis patients, and the results of our study were in consonance with them.

The mean hemoglobulin value of the patients at the time of hospitalization was 12.6 ± 2.2 g/dL in our study. About 21 (26.6%) patients of 79 had a low hemoglobulin level. When considering the hemoglobulin value, there was a statistically significant difference between the genders caused by the different reference ranges; however, when the presence of a low hemoglobulin level was considered, there was no difference between genders. Few studies are available in the literature evaluating the hemoglobulin level at the time of admission. In the study by Cohen et al. in which hospitalized epistaxis patients were analyzed, the median hemoglobulin value was 12.7 g/dL (11.3-13.8) at the time of initial admission and this value decreased with repeated admissions for epistaxis. Furthermore, 61.7% of the patients had anemia, much higher than our study group.[5] In the study of Hardman et al.[20], epistaxis patients referred to ENT were assessed and low hemoglobulin adjusted for gender was present in 39.8% of the patients. In their study, the gender-adjusted low hemoglobulin level was correlated with nasal pack failure, which was also observed in our study. Six of our patients needed surgical intervention, and four of them had a low hemoglobulin level at their initial hospital admission.

CONCLUSION

In our study, the data of the hospitalized epistaxis patients were evaluated in various ways. Epistaxis was most prominent in male patients above 70 years of age, and January was the most frequent month of hospitalization. Anterior nasal packing was the main preferred treatment method as the need for surgical intervention was only 7.6% in the group. More than half of the patients (57%) had comorbid diseases, and hypertension was the leading one. The mean hospitalization duration was 3 days, which was only affected by the nasal pack type. Otolaryngologists should be alert for epistaxis patients with low hemoglobulin levels, as these patients are prone to surgical intervention and blood transfusion. As our study group number was relatively low, more studies are needed for prospective studies.

Ethics Committee Approval: Ethics committee approval was received from the Ethics Committee of Adana City Training and Research Hospital (No: 882/2020).

Informed Consent: Informed consent was obtained from all patients included in the study.

Peer-review: Externally peer-reviewed.

Author Contributions: Concept - D.Y., G.O. O.G..; Design - D.Y., G.O.; Supervision - D.Y., O.G.; Resource - D.Y., G.O., O.G.; Materials - D.Y., G.O., O.G.; Data Collection and/or Processing - D.Y., G.O.; Analysis and/or Interpretation - D.Y., G.O., O.G.; Writing - D.Y., G.O.; Critical Reviews - D.Y., O.G.

Declaration of Interests: The authors have no conflicts of interest to declare.

Funding: The authors declared that this study has received no financial support.

REFERENCES

1. Feldmann H. Nosebleed in the history of rhinology. Images of the history of otorhinolaryngology presented by instruments from the collection of the Ingolstadt Medical History Museum. *Laryngorhinootologie*. 1996;75(2):111-120. [CrossRef]
2. Monjas-Cánovas I, Hernández-García I, Mauri-Barberá J, Sanz-Romero B, Gras-Albert JR. Epidemiology of epistaxis admitted to a tertiary hospital. *Acta Otorrinolaringol (Engl)*. 2010;61(1):41-47. [CrossRef]
3. Middendorp JJ van, Sanchez GM, Burridge AL. The Edwin Smith papyrus: a clinical reappraisal of the oldest known document on spinal injuries. *Eur Spine J*. 2010;19(11):1815-1823. [CrossRef]
4. Kucik CJ, Clenney T. Management of epistaxis. *Am Fam Phys*. 2005;71(2):305-311.
5. Cohen O, Shoffel-Havakuk H, Warman M, et al. Early and late recurrent epistaxis admissions: patterns of incidence and risk factors. *Otolaryngol Head Neck Surg*. 2017;157(3):424-431. [CrossRef]
6. Douglas CM, Tikka T, Broadbent B, Calder N, Montgomery J. Patterns of hospital admission in 54 501 patients with epistaxis over a 20-year period in Scotland, UK. *Clin Otolaryngol*. 2018;43(6):1465-1470. [CrossRef]
7. Corr MJ, Tikka T, Douglas CM, Marshall J. One-year all-cause mortality for 338 patients admitted with epistaxis in a large tertiary ENT centre. *J Laryngol Otol*. 2019;133(6):487-493. [CrossRef]
8. Kallenbach M, Dittberner A, Boeger D, et al. Hospitalization for epistaxis: a population-based healthcare research study in Thuringia, Germany. *Eur Arch Otorhinolaryngol*. 2020;277(6):1659-1666. [CrossRef]
9. Marin E, Watelet JB, Gevaert P, Van Zele T. Severe spontaneous epistaxis: retrospective study in a tertiary ENT centre. *Eur Arch Otorhinolaryngol*. 2019;276(6):1693-1699. [CrossRef]
10. Kaygusuz I, Karlidağ T, Keleş E, Yalçin Ş, Alpay HC, Sakallioğlu Ö. Retrospective analysis of 68 hospitalized patients with epistaxis. *Fırat Tıp Derg*. 2004;9(3):82-85.

11. Reis LR, Correia F, Castelhano L, Escada P. Epidemiology of epistaxis in the emergency department of a southern European tertiary care hospital. *Acta Otorrinolaringol (Engl)*. 2018;69(6):331-338. [CrossRef]
12. Seidel DU, Sesterhenn AM, Kostev K. Seasonal variation of epistaxis in Germany. *J Craniofac Surg*. 2018;29(4):e365-e367. [CrossRef]
13. Sowerby LJ, DeSerres JJ, Rudmik L, Wright ED. Role of season, temperature and humidity on the incidence of epistaxis in Alberta, Canada. *J Otolaryngol Head Neck Surg*. 2014;43(1):10. [CrossRef]
14. Chaaban MR, Zhang D, Resto V, Goodwin JS. Demographic, seasonal, and geographic differences in emergency department visits for epistaxis. *Otolaryngol Head Neck Surg*. 2017;156(1):81-86. [CrossRef]
15. Purkey MR, Seeskin Z, Chandra R. Seasonal variation and predictors of epistaxis. *Laryngoscope*. 2014;124(9):2028-2033. [CrossRef]
16. Tan LKS, Calhoun KH. Epistaxis. *Med Clin North Am*. 1999;83(1):43-56. [CrossRef]
17. Shargorodsky J, Bleier BS, Holbrook EH, et al. Outcomes analysis in epistaxis management: development of a therapeutic algorithm. *Otolaryngol Head Neck Surg*. 2013;149(3):390-398. [CrossRef]
18. McMullin B, Atkinson P, Larivée N, Chin CJ. Examining seasonal variation in epistaxis in a maritime climate. *J Otolaryngol Head Neck Surg*. 2019;48(1):74. [CrossRef]
19. Yaniv D, Zavdy O, Sapir E, Levi L, Soudry E. The impact of traditional anticoagulants, novel anticoagulants, and antiplatelets on epistaxis. *Laryngoscope*. 2021;131(9):1946-1951. [CrossRef]
20. Hardman J, Milinis K, Swords C. Nasal packs for epistaxis: predictors of success. *Clin Otolaryngol*. 2020;45(5):659-666. [CrossRef]