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Effects of adenoid and nasal pathologies in pediatric epistaxis

Adenoid ve Nazal Patolojilerin Pediatrik Epistaksisteki Etkileri

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ABSTRACT

Aim: The aim of this study was to investigate the effects of adenoid and nasal pathologies in paediatric patients with recurrent epistaxis.
Methods: A total of 100 (61 boys, 39 girls) individuals aged 2–17 years (mean age: 8.9 ± 3.6 years) were included in this study. Anterior rhinoscopy and flexible nasal endoscopy were used to examine all the patients. The epistaxis duration, treatment in active epistaxis by parents, medical history, medical treatment and interventions were recorded. The location of the epistaxis site, nasal mucosa type, the presence of nasal vestibulitis, nasal septum deviation location and type, adenoid size and the degree of inferior turbinate hypertrophy were recorded.
Results: The deviation was present in 31 (62%) patients with recurrent epistaxis and in 14 (28%) patients without epistaxis. The presence of deviation was significantly higher in the epistaxis group than in the control group ($p < 0.05$). The nasal mucosa type was friable mucosa in 37 (74%) patients, vascularised mucosa in 11 (22%) patients and friable-vascularised mucosa in 2 (4%) patients in recurrent epistaxis group. A significant relationship was detected between nasal mucosa type and age, the presence of the deviation, deviation location, the Mladina type in epistaxis group ($p < 0.05$, $p < 0.05$, $p < 0.05$, $p < 0.05$).
Conclusion: Nasal septum deviation, inferior turbinate hypertrophy and nasal mucosa type are associated with paediatric recurrent epistaxis.

Keywords: Paediatric, Epistaxis, Nasal Septum Deviation, Treatment

ÖZ

Amaç: Bu çalışmanın amacı, tekrarlayan epistaksisi olan çocuk hastalarda adenoid ve nazal patolojilerin etkilerini araştırmaktır.
Yöntemler: Bu çalışmaya 2-17 yaşları arasında (ortalama yaş: 8.9 ± 3.6 yıl) 100 (61 erkek, 39 kız) birey dahil edildi. Tüm hastaların muayenesinde anterior rinoskopi ve fleksibl nazal endoskopi kullanıldı. Hastanın tıbbi öyküsü, epistaksis süresi, aktif epistaksiste ebeveynler tarafından uygulanan tedavi yöntemi, tıbbi tedavi ve müdahaleler kaydedildi. Epistaksisin yeri, nazal mukoza tipi, nazal vestibülit varlığı, nazal septum deviasyonu yeri ve tipi, adenoid dokunun boyutu ve alt konka hipertrofisi derecesi kaydedildi.
Bulgular: Tekrarlayan epistaksisi olan 31 (%62) hastada ve epistaksisi olmayan 14 (%28) hastada deviasyon mevcuttu. Epistaksis grubunda deviasyon varlığı kontrol grubuna göre anlamlı derecede yüksekti ($p < 0.05$). Epistaksis grubunda; 37 (%74) hastada nazal mukoza frajil mukoza, 11 (%22) hastada vaskülarize mukoza ve 2 (%4) hastada frajil – vaskülarize mukoza mevcuttu. Epistaksis grubunda burun mukozasının tipi ile yaş, deviasyon varlığı, deviasyon yeri, Mladina tipi arasında anlamlı bir ilişki saptandı ($p < 0.05$, $p < 0.05$, $p < 0.05$, $p < 0.05$).
Sonuç: Nazal septum deviasyonu, alt konka hipertrofisi ve nazal mukoza tipi pediatrik tekrarlayan epistaksis ile ilişkilidir.

Anahtar Kelimeler: Pediatrik, Epistaksis, Nazal Septum Deviasyonu, Tedavi

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INTRODUCTION

Paediatric epistaxis is a very common disease primarily encountered by the emergency department, paediatricians, family physicians and otorhinolaryngologists [1]. Recurrent epistaxis affects approximately 9% of children [2]. Until the age of 10, 60% of children will suffer from epistaxis at least once, although in childhood it rarely requires nasal packing or hospitalisation [3]. Paediatric epistaxis is more common in 3 to 8 years-old children. Epistaxis is rarely seen in children younger than 2 years. In this situation, severe diseases such as trauma and acute leukaemia must be suspected [3-4].

There are several risk factors for epistaxis such as viral and bacterial rhinosinusitis, allergic rhinitis, physical and chemical irritation, facial injury, temperature and humidity and nasal tumours [5-6]. Mild anterior epistaxis is more common in children [7-8]. Most of the epistaxis originates from the anterior septum [9-10] and this area is commonly susceptible to damage, such as nasal secretions and trauma-related injury [9].

Epistaxis usually originates from the anterior part of the septum and spontaneously bleeds and is generally self-limiting [3]. Moistening and antibiotic ointments are commonly prescribed in the treatment of paediatric epistaxis [9]. In the majority of children, nasal ointments and saline solution are sufficient for treatment, whereas some patients may require additional interventions such as cautery [10]. In addition to these risk factors, nasal septum deviations have often been blamed, although the cause or causes of recurrent epistaxis have not been identified yet [5]. The aim of this study was to investigate the effects of adenoid and nasal pathologies in paediatric patients with epistaxis.

MATERIALS AND METHODS

This study was conducted retrospectively. It received approval from the ethics committee of our hospital (Approval number: 2011-KAEK-25 2019/05-19) and was prepared in accordance with the Helsinki Declaration Principles. Informed consent was obtained from all of our patients' mothers to participate in this study.

Subjects

A total of fifty (29 boys, 21 girls) patients with recurrent epistaxis aged between 3 and 17 years (mean age: 9.0 ± 3.1 years) and fifty (32 boys, 18 girls) patients without epistaxis aged between 2 and 16 years (mean age 8.8 ± 4.0 year) were included in this study. A case form was designed to record the recurrent epistaxis history of all patients. Those with a history of more than one intermittent epistaxis were included in the recurrent epistaxis group. The patients included in the control group consisted of patients who applied to our clinic with other complaints.

Patients with post-operative epistaxis and those with intranasal mass, foreign body or major nasal trauma were excluded. Furthermore, patients who had a systemic disease (renal or hepatic insufficiency and hereditary haemorrhagic telangiectasia, a bleeding disorder) were also excluded from the study. The epistaxis duration, treatment in active epistaxis by parents, medical history, medical treatment and interventions were recorded. Treatment in active epistaxis by parents was classified as nothing was done, pressure was applied onto the nasal ala and anterior packing.

Rhinological Examination

The epistaxis side was classified as left or right epistaxis. In the anterior rhinoscopic examination, the location of the epistaxis site, nasal mucosa type and the presence of nasal vestibulitis were recorded.

The deviation location was classified into three classes as anterior, posterior or antero-posterior. The deviation side was classified as left or right. Nasal septum deviation was classified into seven types, according to the Mladina [11] classification. Posterior deviations and non-deviated nasal septums were noted as Mladina class 0. For each patient, the degree of inferior turbinate hypertrophy was classified into the following four classes: normal, mild, moderate and serious.

Adenoid sizes were classified as 0%–25% in the Group 1, 26%–50% in the Group 2, 51%–75% in the Group 3 and 76%–100% in the Group 4, according to the endoscopic nasopharynx examination [12 13].

The nasal mucosa type was classified as normal mucosa, friable mucosa, vascularised (visible vessel) mucosa or friable – vascularised mucosa. The interventions were classified as medication (antibiotherapy and antiseptic cream), silver nitrate cautery or anterior nasal packing.

Statistical Analysis

The Shapiro-Wilk test, Mann-Whitney U test and Student t-test were used. Categorical variables were compared using Fisher's exact test and Pearson's chi-squared test. In the multivariate analysis to determine the factors associated with the frequency and epistaxis duration, location of the epistaxis site, nasal mucosa type, treatment in active epistaxis by parents and treatment outcomes, logistic regression (backward logistic regression) was used. A p value of <0.05 was considered to indicate statistical significance. All statistical analyses were performed with the IBM SPSS ver. 23.0.

RESULTS

The deviation was present in 31 (62%) patients in recurrent epistaxis group and in 14 (28%) patients in control group. The anterior deviation was in 22 (44%) patients, the posterior deviation was in 1 (2%) patient and the antero-posterior deviation was in 8 (16%) patients in the recurrent epistaxis group. The anterior deviation was in 3 (6%) patients, the posterior deviation was in 9 (17%) patients and the antero-posterior deviation was in 2 (4%) patients in the control group.

In the Mladina classification, Type 0 was in 20 (40%) patients, Type 1 was in 7 (14%) patients, Type 2 was in 3 (6%) patients, Type 3 was in 5 (10%) patients, Type 4 was in 1 (2%) patient, Type 5 was in 12 (24%) patients and Type 6 was in 2 (4%) patients in the recurrent epistaxis group. In the Mladina classification, Type 0 was in 45 (90%) patients, Type 1 was in 1 (2%) patient, Type 2 was in 0 (0%) patients, Type 3 was in 2 (4%) patients, Type 4 was in no (0%) patients, Type 5 was in 2 (4%) patients and Type 6 was in 0 (0%) patients in the control group.

Recurrent epistaxis was present on the right side in 17 (34%) patients, on the left side in 17 (34%) patients and on both sides in 16 (32%) patients. Nothing was done in 32 (64%) patients, pressure was applied onto the nasal ala in 10 (20%) patients and nasal packing was applied in 8 (16%) patients with active bleeding.

The nasal mucosa type was friable mucosa in 37 (74%) patients, vascularised mucosa in 11 (22%) patients and friable – vascularised mucosa in 2 (4%) patients in the epistaxis group (Figure-1). Regarding the interventions, it was medical therapy in 44 (88%) patients, silver nitrate cautery in 6 (12%) patients and nasal packing in no (0%) patients in the recurrent epistaxis group.

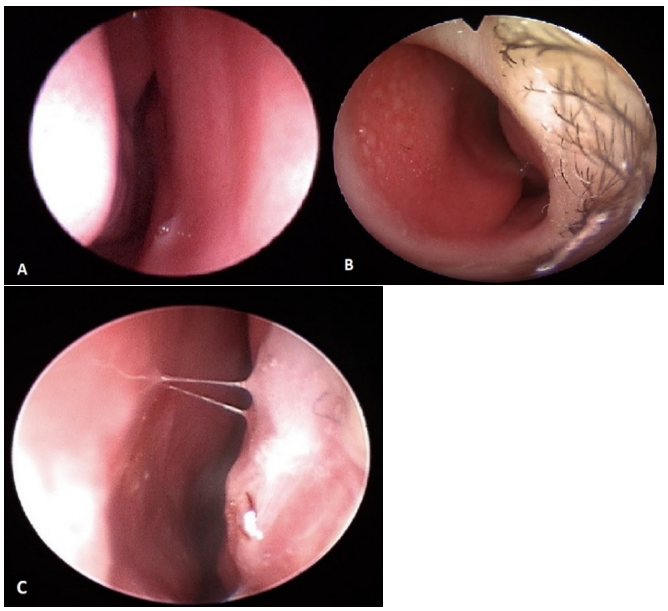

Figure 1 shows examples of friable-vascularized, friable and normal mucosa types (Figures are from our own archive.) 1A: Normal mucosa. 1B: Friable mucosa and septum deviation. 1C: Friable-vascularized mucosa.

The nasal mucosa type was friable mucosa in 4 (8%) patients, vascularised mucosa in no (0%) patients and friable – vascularised mucosa in no (0%) patients in the control group. Regarding the interventions, it was medical therapy in 4 (8%) patients, silver nitrate cautery in no (0%) patients and nasal packing in no (0%) patients in the control group.

The adenoid size classification results revealed Group 1 in 4 (8%) patients, Group 2 in 8 (16%) patients and Group 3 in 6 (12%) patients in recurrent epistaxis group. The adenoid size classification results revealed Group 1 in 6 (12%) patients, Group 2 in 10 (20%) patients, Group 3 in 3 (6%) patients and Group 4 in 2 (4%) patients in control group (Table 1).

Table 1. Ratio of Epistaxis duration, nasal mucosa type, treatment in active epistaxis by parents, gender, applied treatment, adenoid size, presence of nasal septum deviation, deviation location.

		Epistaxis Group		Control Group	
		n	%	n	%
Age (Mean ± Standard Deviation)		9.00±3.17	3-17	8.8±4.0	2-16
Epistaxis duration		4.74±4.70	0-20		
Epistaxis duration	Under 5 minutes	28	56.0%		
	Over 5 minutes	22	44.0%		
Nasal Mucosa Type	Friable Mucosa	37	74.0%	4	8.0%
	Vascularized Mucosa	11	22.0%	0	0%
	Friable -Vascularized Mucosa	2	4.0%	0	0%
Treatment in active epistaxis by parents	Nothing was done	32	64.0%		
	Pressure was applied on to nasal ala	10	20.0%		
	Anterior packing	8	16.0%		
Gender	Male	29	58.0%	32	64.0%
	Female	21	42.0%	18	36.0%
Applied treatment	Medication (antibiotherapy and antiseptic cream)	44	88.0%	4	8.0%
	Silver nitrate cautery	6	12.0%	0	0%
	Anterior nasal packing	0	0.0%	0	0%
Adenoid Size	0	32	64.0%	29	58.0%
	Group 1	4	8.0%	6	12.0%
	Group 2	8	16.0%	10	20.0%
	Group 3	6	12.0%	3	6.0%
	Group 4	0	0.0%	2	4.0%
Presence of nasal septum deviation	Absent	19	38.0%	36	72.0%
	Present	31	62.0%	14	28.0%
Deviation location	Absent	19	38.0%	36	72.0%
	Anterior	22	44.0%	3	6.0%
	Posterior	1	2.0%	9	18.0%
	Antero-posterior	8	16.0%	2	4.0%

Epistaxis Group

Logistic regression (backward logistic regression) was used in the multivariate analysis to determine the factors associated with the epistaxis duration, location of the epistaxis site, nasal mucosa type, treatment in active epistaxis by parents and treatment outcomes, however no relationship was found. There was a statistically significant relationship between the nasal mucosa type and age ($p < 0.05$). The age of patients who have vascularized epistaxis site (13 (7 - 17)) was higher than the age of patients who have friable epistaxis site (8 (3 - 13)). There was no statistically significant relationship between the ages of patients treated with medical therapy (8.5 (3-14)) and the ages of patients (13 (7 - 17)) applied silver nitrate cautery ($p > 0.05$).

There was a statistically significant relationship between nasal mucosa type and presence of deviation, deviation location and the Mladina classification (Table 2). There was a statistically significant relationship between nasal mucosa type and presence of deviation ($p < 0.05$). While nasal septum deviation was observed in all patients with vascularized nasal mucosa type, the rate of nasal septum deviation was lower in friable or friable-vascularized epistaxis site. In addition, the ratio of vascularized epistaxis site in patients with anterior nasal septum deviation was 72.7%. When the nasal mucosa type was evaluated according to the Mladina classification, it was seen that vascularized epistaxis site is not significantly observed in patients without nasal septum deviation. However, a vascularized epistaxis site was observed more frequently in Type 3 deviations.

There was no statistically significant relationship between epistaxis duration and deviation location, Mladina class, the degree of inferior turbinate

Table 2: Comparison of nasal mucosa type and presence of nasal septum deviation, deviation location, Mladina class in epistaxis group.

		Nasal Mucosa Type						P
		Friable		Vascularized		Friable Vascularized		
		n	%	n	%	n	%	
Presence of nasal septum deviation	Absent	18	48.6	0	0.0	1	50.0	0.004
	Present	19	51.4	11	100.0	1	50.0	
Deviation Location	Absent	18	48.6	0	0.0	1	50.0	0.008
	Anterior	13	35.1	8	72.7	1	50.0	
	Posterior	0	0.0	1	9.1	0	0.0	
	Antero-posterior	6	16.2	2	18.2	0	0.0	
Mladina Class	0	18	48.6	0	0.0	1	50.0	0.015
	1	6	16.2	1	9.1	0	0.0	
	2	2	5.4	1	9.1	0	0.0	
	3	2	5.4	4	36.4	0	0.0	
	4	1	2.7	0	0.0	0	0.0	
	5	7	18.9	4	36.4	1	50.0	
		1	2.7	1	9.1	0	0.0	

hypertrophy or adenoid size. There was no statistically significant relationship between treatment in active epistaxis by parents and the presence of deviation, deviation location, the Mladina class or nasal mucosa type. There was no statistically significant relationship between recurrent epistaxis and the presence of adenoid tissue and the degree of inferior turbinate hypertrophy ($p > 0.05$, $p > 0.05$).

Epistaxis and control group analysis

In the recurrent epistaxis group, the friable, vascularized and friable-vascularized types were seen statistically higher in the nasal mucosa compared to the control group ($p<0.001$). The presence of nasal vestibulitis was significantly higher in the recurrent epistaxis group than in the control group ($p<0.001$). There was no statistically significant difference about the presence of adenoid tissue between the recurrent epistaxis group and the control group ($p > 0.05$).

The presence of deviation was significantly higher in the recurrent epistaxis group than the control group ($p < 0.05$). Anterior and antero-posterior deviations were seen significantly higher in the epistaxis group then the control group ($p < 0.00$). The mild degree of inferior turbinate hypertrophy was significantly higher in the recurrent epistaxis group than the control group ($p < 0.05$) (Table 3).

Logistic regression was used in the univariate analysis to determine the factors associated with presence of deviation, deviation location, Mladina class, adenoid size, nasal mucosa type and the presence of vestibulitis. Multivariate regression analysis results were not significant.

There was a statistically significant relationship between epistaxis and presence of deviation ($p < 0.05$), presence of vestibulitis ($p < 0.001$), Mladina class 1 ($p < 0.05$), anterior deviation ($p < 0.001$), posterior deviation ($p < 0.05$) and antero-posterior deviation ($p < 0.05$). There was no statistically significant relationship between epistaxis and the presence of adenoid tissue, adenoid size ($p > 0.050$).

DISCUSSION

Spontaneous epistaxis is a significant complaint in the emergency department [8-14]. Paediatric epistaxis is a common condition in otorhinolaryngology practice. Recurrent epistaxis can be distressing and worrying for both parents and children [3]. In an earlier study, Shay et al. found that 57.4% of boys had epistaxis, which was slightly more frequent than that found in girls [1]. Similarly, we found 58% boys predominance in our study.

Paediatric epistaxis occurs as recurrent, non-life-threatening bleeding. The factors that induce bleeding include local inflammation, mucosal dryness and local trauma such as that caused

Table 3: Comparison of groups and deviation location, nasal mucosa type, Mladina class, adenoid size, the degree of inferior turbinate hypertrophy.

		Epistaxis		Control		P
		n	%	n	%	
Deviation Location	Absent	19	38.0	36	72.0	<0.001a
	Anterior	22	44.0	3	6.0	
	Posterior	1	2	9	18.0	
	Antero-posterior	8	16.0	2	4.0	
Nasal Mucosa Type	Normal	0	0.0	46	92.0	<0.001b
	Friable	37	74.0	4	8.0	
	Vascularized	11	22.0	0	0.0	
	Friable-Vascularized	2	4.0	0	0.0	
Mladina Class	0	20	40.0	45	90.0	0.004b
	1	7	14.0	1	2.0	
	2	3	6.0	0	0.0	
	3	5	10.0	2	4.0	
	4	1	2.0	0	0.0	
	5	12	24.0	2	4.0	
	6	2	4.0	0	0.0	
Adenoid Size	Absent	32	64.0	28	58.0	0.508b
	Group 1	4	8.0	6	12.0	
	Group 2	8	16.0	10	20.0	
	Group 3	6	12.0	3	6.0	
	Group 4	0	0.0	2	4.0	
The degree of inferior turbinate hypertrophy	Absent	14	28.0	19	38.0	0.001b
	Mild	28	56.0	10	20.0	
	Moderate	7	14.0	20	40.0	
		1	2.0	1	2.0	

[a] Pearson Chi-Square tests [b] Fisher-Freeman-Halton test

by nose picking. In rare cases, epistaxis can be originated from systemic factors, such as bleeding disorders or from local factors such as tumours. Epistaxis is rare in children below 2 years of age. If there is a clinical suspicion, it should be investigated for bleeding disorders or local tumours [6-15]. Bleeding may also be originated from the lateral nasal wall. Posterior bleeding may result from the posterior branches of the sphenopalatine artery [16]. However, posterior nosebleeds are extremely rare in children [2]. Posterior bleeding was not observed in our study groups.

It is recommended that the clinician perform a careful evaluation of the patient's age, symptoms and findings of the anterior rhinoscopic examination, for determining the cause of the epistaxis. Furthermore, nasal endoscopy should be included in the examination for a child with continuous bleeding with no obvious source of bleeding on anterior rhinoscopy [10]. As the majority of nosebleeds originate from the anterior part of the septum, significant vascularisation in the anterior nasal septum or dry raw crusty areas or a bent nasal septum requires careful inspection during examination. Nasal vestibulitis is also common secondary to infection [2]. Bleeding may occur when this area is exposed to dryness or minor trauma [10]. In addition, approximately half of the children with epistaxis experience significant vascularisation of the nasal septum [17].

Montague et al. [17] described the occurrence of paediatric epistaxis. First, they indicated that Staphylococcus aureus colonised the nose of children. S. aureus colonisation causes nasal crusting and irritation and low-grade inflammation. At this stage, inflammation and trauma increase nasal vascularisation. Nosebleeds occur due to the damage caused by the separation of the crusts from their places by digital trauma. With prolonged inflammation, inflammatory mediators are released that can lead to the growth of visible, prominent new vessels. Continuous inflammation due to digital trauma can ultimately lead to squamous metaplasia [17].

In the majority of cases, nasal bleeding stops spontaneously after a few minutes, or short-term pressure applied on the nostrils is generally sufficient to stop it [2]. For the treatment of significant or recurrent epistaxis, vasoconstrictor drops, cauterisation with silver nitrate in office conditions and topical creams should be applied. Nasal packing is rarely required in children [3]. Histological examination reveals inflammatory infiltrate findings surrounding the vessels. This provides evidence that nasal staphylococci can be aggressively eliminated using antiseptic creams [17]. Cauterisation is applied in the operating room conditions in cases of persistent epistaxis [9]. In this study, nasal vestibulitis was seen in the majority of patients in epistaxis group in anterior rhinoscopic examination. In addition, with increasing age, there was an increase in vascularisation in the epistaxis site and consequently an increase in the severity of bleeding. This situation increases the necessity of medical interventions such as cauterisation and nasal packing for bleeding control. The presence of vestibulitis in the nose is a factor that determines the severity of the effect of bleeding in the site. In paediatric epistaxis, posterior haemorrhage is less common and less severe. However, we observed that anterior bleeding may be more serious and may require more serious medical interventions such as cauterisation and nasal packing in extreme cases.

Other causes of epistaxis include infections, allergic rhinitis, bleeding disorders and trauma [3]. Besides these risk factors, several factors have been identified, but the relationship with epistaxis has not been clarified. Nasal septum anomalies have often been reported to be the cause, but the relationship remains to be clarified [5-6]. Epistaxis tends to be present on the deviation side in patients with nasal septum deviation [18]. Fuller et al. reported that functional septorhinoplasty can perform safely in select paediatric patients with significant nasal obstruction [19].

In paediatric patients with nasal septum deviation, vascularisation in the epistaxis site was increased when the Mladina Class 3 in our study. As a result, the requirement for cauterisation was increased in these patients, rather than medical treatment in paediatric patients with nasal septum deviation. Vascularization in the epistaxis site increases due to chronic vestibulitis and nasal septum deviation with age. In addition, it was observed that inferior turbinate hypertrophy was effective in the presence of recurrent epistaxis. Nasal septum deviation and inferior turbinate hypertrophy narrow the nasal airflow passage. This may lead to vascular increase in the deviated part by thinning the nasal mucosa with nasal vestibulitis. This situation may result to the need for further epistaxis treatments. In the Mladina Class 1 deviations, nasal septal deviation and nasal vestibulitis cause thinning of the nasal mucosa. Since there is no vascularization in such epistaxis, it can be intervened more easily.

The nasal septum deviation and inferior turbinate hypertrophy, which are closely associated with recurrent epistaxis and epistaxis treatment, are not well known by the emergency department doctors, paediatricians, family physicians, especially in paediatric patients. Therefore, patients are treated temporarily and inappropriately, on an outpatient basis. Patients with paediatric epistaxis must be referred to the otorhinolaryngologist by the emergency department for the evaluation of possible nasal pathologies. Recurrent epistaxis will thus be prevented, with adequate treatment.

Our study had some limitations. In the etiology of epistaxis development, many risk factors such as viral and bacterial rhinosinusitis, allergic rhinitis, physical and chemical irritation, facial injury, temperature and humidity, nasal tumours are important. A well designed study should include large numbers of cases to eliminate the relative the risks associated with these factors.

CONCLUSION

The nasal septum deviation, inferior turbinate hypertrophy and vascularisation are related to each other in paediatric recurrent epistaxis. With increasing age, there is an increase in vascularisation in the epistaxis site and consequently, an increase in the severity of bleeding. In epistaxis patients, the presence of deviation, inferior turbinate hypertrophy and/or vestibulitis, vascularisation can be identified correctly through nasal examination by an ENT specialist and a permanent treatment can be provided.

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conflict of interest related to this article.

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