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Risk factors for recurrent epistaxis: Importance of initial treatment

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ABSTRACT

Objective: A retrospective study of risk factors for recurrent epistaxis and initial treatment for refractory posterior bleeding was performed. Based on the results, proposals for appropriate initial treatment for epistaxis by otolaryngologists are presented.
Methods: The data of 299 patients with idiopathic epistaxis treated during 2008–2009 were analyzed by multivariate logistic regression analysis. Treatment data for 101 cases of posterior bleeding were analyzed using the chi-square test.
Results: Recurrent epistaxis occurred in 32 cases (10.7%). Unidentified bleeding point (adjusted odds ratio (OR) 5.67, 95% confidence interval (CI) 1.83–17.55, $p = 0.003$) was predictive of an increased risk of recurrent epistaxis, and electrocautery (adjusted odds ratio (OR) 0.07, 95% confidence interval (CI) 0.03–0.17, $p = 0.000$) was predictive of a decreased risk of recurrent epistaxis. In terms of initial treatment for posterior bleeding, the rate of recurrent epistaxis was significantly lower for patients who underwent electrocautery as initial treatment compared with those who did not (6.4% vs. 40.7%, $p < 0.01$), and it was significantly higher for those who underwent endoscopic gauze packing compared with those who did not (39.5% vs. 15.9%, $p < 0.01$).
Conclusion: In the present study, the risk factors for recurrent epistaxis were unidentified bleeding point. Thus, it is important to identify and cauterize a bleeding point to prevent recurrent epistaxis. The present results also suggest the effectiveness of electrocautery and the higher rate of recurrent epistaxis for patients who underwent gauze packing as initial treatment for posterior bleeding. Electrocautery should be the first-choice treatment of otolaryngologists for all bleeding points of epistaxis, and painful gauze packing may be inadvisable for posterior bleeding. More cases of posterior bleeding are needed for future studies involving multivariate analyses and appropriate analyses of factors related to hospitalization, surgery, and embolization.

1. Introduction

Epistaxis is one of the commonest otolaryngological emergencies, occurring in 60% of adults over their lifetimes, but treatment is required in only 10% of cases [1]. Although surgical intervention is rarely necessary, refractory recurrent epistaxis may occur in some cases, and epistaxis is a common cause of hospitalization in departments of otolaryngology [2]. There have been many studies of epistaxis, with constant debate as to whether factors such as hypertension and antithrombotic agent use constitute risk factors, but to the best of our knowledge, there have been few reports addressing risk factors for recurrent epistaxis, and it is remarkable that no studies that have used statistical analyses for their investigation.

Hemostasis is particularly difficult for posterior bleeding compared with anterior bleeding, and treatment fails in many cases, with recurrent epistaxis occurring frequently. However, cotton packing, balloon catheters, Foley catheters, and other such methods are still the main forms of treatment, rather than pinpointing the bleeding point and achieving hemostasis.

In this study, a retrospective study of risk factors for recurrent epistaxis was carried out in 299 patients. Posterior bleeding was treated with either endoscopic electrocautery after endoscopic identification of the bleeding point insofar as this was possible or endoscopic gauze packing, and their efficacies were compared.

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2. Patients and methods

2.1. Patients

A total of 346 patients visited The Jikei Daisan Hospital because of epistaxis between June 2008 and May 2009. Of these patients, 24 children who were 15 years old and under were excluded, because, unlike in adults, the cause of epistaxis in children is usually from picking, rubbing, and hitting their nose, as well as an infection [3,4]. A further 10 patients with traumatic epistaxis, 6 with bleeding from the nasal cavity and paranasal sinus tumors, 4 with postoperative epistaxis, and 3 with hereditary hemorrhagic telangiectasia were excluded because the methods to stop such bleeding differ from those for idiopathic epistaxis. Thus, 299 patients with idiopathic epistaxis were studied.

2.2. Methods

2.2.1. Medical examination

First, to identify the risk factors for recurrent epistaxis, the following patient characteristics were examined at their first visit to the hospital: age, sex, antithrombotic agent use (i.e., aspirin, warfarin, etc.), past history (hypertension, hematologic disease, allergic rhinitis, chronic sinusitis, nasal and/or paranasal surgery, benign or malignant tumor, trauma), and deviated nasal septum.

Next, at the time of their second visit (1 week later), the patients were interviewed about the incidence of recurrent epistaxis after their first treatment. Furthermore, tampons were removed if they had undergone gauze packing, and whether the bleeding in their nose had stopped was checked.

If epistaxis recurred within a week, the patients were told to come back to the hospital so that the recurrent bleeding point could be identified and treated.

2.2.2. Bleeding point identification

Visible bleeding points, such as Kiesselbach's plexus (Little's area), were initially identified with a nasal speculum, and cotton was inserted into the posterior nasal cavity to prevent blood from running down the pharynx.

If a bleeding point could not be identified, the patient's nose was examined in detail using a flexible endoscope and a rigid endoscope with zero degrees of view. Because blood flows from top to bottom when the patient is seated, the search for a bleeding point with an endoscope was performed in the following order: upper olfactory cleft, upper middle meatus, lower olfactory cleft, lower middle meatus, common meatus, and inferior meatus. If it was difficult to locate a bleeding point even with this method, a rigid endoscope with 70° of view was used to examine the lateral wall of the nasal cavity, for example, the posterior middle meatus.

When a very swollen blood vessel was found, it was checked for bleeding by rubbing it and by applying suction.

In this way, each patient's bleeding point was identified as follows: *Kiesselbach's plexus*, *olfactory cleft*, *middle meatus*, *inferior meatus*, *other regions*, and *unidentified bleeding point*.

2.2.3. Treatment

The treatment used to stop the bleeding was classified into three groups.

The first group, the *hemostatic material* group, included patients with a very small amount of bleeding and those in whom oxidized cellulose (SURGICEL Absorbable Hemostat®, Ethicon Inc., Somerville, NJ, USA) was inserted into the nose.

The second group was the electrocautery group. Electrocautery was considered the first-choice treatment for a certain amount of bleeding. A bleeding point was cauterized initially using straight or curved bipolar forceps under direct vision with the naked eye, and then with endoscopy secondarily. A monopolar electrode, as effective as bipolar forceps, however, causes stronger heating damage [5,6], was used only if it was difficult to cauterize the bleeding point with bipolar forceps.

The third group was the *endoscopic gauze packing* group. Gauze packing was selected for treatment of epistaxis only when the bleeding point was unidentified or electrocautery was difficult, for example, in patients with a narrow space in the nasal cavity. Gauze was packed intensively into all possible bleeding space with an endoscope.

Balloon catheters (e.g., the Epistat™, Medtronic Inc., Jacksonville, Florida, and Storz T-3100, KARL STORZ GmbH & Co. KG, Tuttlingen, Germany) and Foley catheters were not used as first-choice treatments in this study.

2.2.4. Statistical analysis

First, baseline characteristics stratified by the incidence of recurrent epistaxis, including patient characteristics, bleeding points, and treatments, were analyzed. Student's t-test and the χ^2 test were used to evaluate differences in these characteristics between patients with and without recurrent epistaxis.

Next, logistic regression analysis was performed, defining recurrent epistaxis as the dependent variable, and patient characteristics, all of the bleeding points, and medical treatment as the independent variables. Of these risk factors, patients were classified by age into those aged 45–65 years, which has been identified in the literature as an age group at risk of epistaxis, and others [7].

Finally, the relationship between recurrent epistaxis due to 'posterior bleeding' and treatments was examined using the χ^2 test. 'Posterior bleeding' was defined as bleeding points other than those from Kiesselbach's plexus, because all anterior bleeding in this study arose only from Kiesselbach's plexus.

All statistical analyses were performed by SPSS 11.0J for Windows (International Business Machines Corporation,, Armonk, NY, USA). A value of $p < 0.05$ was considered significant.

3. Results

3.1. Characteristics and recurrent epistaxis

The baseline characteristics of the patients (126 women, 173 men; mean age ± SD, 64.8 ± 14.5 years), stratified by the incidence of recurrent epistaxis, are shown in Table 1. Recurrent epistaxis occurred in 32 cases (10.7%). Overall, 94 patients (31.4% of all) had taken an antithrombotic agent. Their principal past history included hypertension (155 patients, 51.8%) and allergic rhinitis (61 patients, 20.4%). A deviated nasal septum on the bleeding side was seen in 149 cases (49.8%). However, there were no significant differences in these factors between patients with and without recurrent epistaxis. On the other hand, Kiesselbach's plexus (198 cases, 66.2%), unidentified bleeding point (31 cases, 10.4%), and each category of treatment (i.e., hemostatic material (27 cases, 9.0%), electrocautery (234 cases, 78.3%), endoscopic gauze packing (38 cases, 12.7%)) were significantly different between patients with and without recurrent epistaxis ($p < 0.05$).

3.2. Risk factors for recurrent epistaxis

The results of the univariate and multivariate analyses for recurrent epistaxis according to each factor are presented in Table 2.

On univariate analysis, unidentified bleeding point (unadjusted odds ratio [OR] 20.48, 95% confidence interval [CI] 8.51–49.30, $p = 0.000$), hemostatic material (unadjusted OR 4.35, 95% CI 1.72–10.99, $p = 0.002$), and endoscopic gauze packing (unadjusted OR

Table 1
Baseline characteristics stratified by the incidence of recurrent epistaxis.

Variable	Cases (n = 299)		p-Value
	No recurrent epistaxis (n = 267)	Recurrent epistaxis (n = 32)	
Mean age (SD), years	65.0 (14.6)	63.3 (13.3)	NS**
Sex			
Male	150	23	NS*
Female	117	9	NS*
Antithrombotic agent	81	13	NS*
Past histories			
Hypertension	138	16	NS*
Hematologic disease	3	0	NS*
Allergic rhinitis	57	4	NS*
Chronic sinusitis	4	1	NS*
Surgery	18	2	NS*
Deviated nasal septum	130	19	NS*
Bleeding points			
Kiesselbach's plexus	191	7	.000*
Olfactory cleft	19	3	NS*
Middle meatus	17	3	NS*
Inferior meatus	20	2	NS*
Other regions	6	0	NS*
Unidentified bleeding point	14	17	.000*
Treatments			
Hemostatic material	19	8	.001*
Electrocautery	225	9	.000*
Endoscopic gauze packing	23	15	.000*

Abbreviations: SD, standard deviation and NS, not significant.
* χ^2 test.
** Student's t-test.

9.36, 95% CI 4.14–21.15, p = 0.000) were predictive of an increased risk of recurrent epistaxis, whereas Kiesselbach's plexus (unadjusted OR 0.11, 95% CI 0.05–0.27, p = 0.000) and electrocautery (unadjusted OR 0.17, 95% CI 0.06–0.56, p = 0.002) were predictive of a decreased risk of recurrent epistaxis.

On multivariate analysis, after adjustment for potential confounders, unidentified bleeding point (adjusted OR 5.67, 95% CI 1.83–17.55, p = 0.003) was predictive of an increased risk of recurrent epistaxis, and electrocautery (adjusted OR 0.07, 95% CI 0.03–0.17, p = 0.000) was predictive of a decreased risk of recurrent epistaxis.

No other factors previously described as risk factors for epistaxis (age, male, antithrombotic agent use, hypertension, chronic sinusitis, etc.) were identified in this analysis.

Table 3
Comparison of hemostatic effectiveness of hemostatic material for posterior bleeding.

	No hemostatic material	Hemostatic material	Total
No recurrent epistaxis	67 (78.8%)	9 (56.3%)	76 (75.2%)
Recurrent epistaxis	18 (21.2%)	7 (43.8%)	25 (24.8%)
Total	85 (100%)	16 (100%)	101 (100%)

χ^2 = 3.68, p = 0.055.

Table 4
Comparison of hemostatic effectiveness of electrocautery for posterior bleeding.

	No electrocautery	Electrocautery	Total
No recurrent epistaxis	32 (59.3%)	44 (93.6%)	76 (75.2%)
Recurrent epistaxis	22 (40.7%)	3 (6.4%)	25 (24.8%)
Total	54 (100%)	47 (100%)	101 (100%)

χ^2 = 15.93, p = 0.000.

3.3. Hemostatic efficacy of each treatment for posterior bleeding

As described above, in this study, all anterior bleeding originated in Kiesselbach's plexus, and "posterior bleeding" was defined as bleeding from any point other than Kiesselbach's plexus. Posterior bleeding occurred in 101 patients (33.8%).

Tables 3–5 show the results of analyses of the efficacy of each type of treatment for posterior bleeding. There was no significant difference in the rate of recurrent epistaxis between patients who were treated with hemostatic material and those who were not (χ^2 = 3.68, df = 1, p = 0.055), but the rate of recurrent epistaxis was significantly lower for patients who underwent electrocautery compared with those who did not (6.4% vs. 40.7%, $p < 0.01$), and it

Table 2
Unadjusted and adjusted odds ratios for recurrent epistaxis according to each factor.

Variable	Unadjusted odds ratios			Adjusted odds ratios		
	OR	95% CI	p Value	OR	95% CI	p Value
Age between 45 and 65 years	1.43	0.68–2.98	NS			
Male sex	1.99	0.89–4.47	NS			
Antithrombotic agent	1.57	0.74–3.33	NS			
Past histories						
Hypertension	0.94	0.45–1.95	NS			
Hematologic disease	0.01	0.00–6.4E+15	NS			
Allergic rhinitis	0.53	0.18–1.56	NS			
Chronic sinusitis	2.12	0.23–19.58	NS			
Surgery	0.92	0.20–4.17	NS			
Deviated nasal septum	1.54	0.73–3.25	NS			
Bleeding points						
Kiesselbach's plexus	0.11	0.05–0.27	.000			
Olfactory cleft	1.35	0.38–4.84	NS			
Middle meatus	1.52	0.42–5.50	NS			
Inferior meatus	0.82	0.18–3.70	NS			
Other regions	0.01	0.00–3.3E+10	NS			
Unidentified bleeding point	20.48	8.51–49.30	.000	5.67	1.83–17.55	.003
Treatments						
Hemostatic material	4.35	1.72–10.99	.002			
Electrocautery	0.07	0.03–0.17	.000	0.17	0.06–0.56	.002
Endoscopic Gauze packing	9.36	4.14–21.15	.000			

Abbreviation: NS, not significant.

Table 5
Comparison of hemostatic effectiveness of endoscopic gauze packing for posterior bleeding.

	No endoscopic gauze packing	Endoscopic gauze packing	Total
No recurrent epistaxis	53 (84.1%)	23 (60.5%)	76 (75.2%)
Recurrent epistaxis	10 (15.9%)	15 (39.5%)	25 (24.8%)
Total	63 (100%)	38 (100%)	101 (100%)

$\chi^2 = 7.09$, $p = 0.008$.

was significantly higher for those who underwent endoscopic gauze packing compared with those who did not (39.5% vs. 15.9%, $p < 0.01$).

4. Discussion

Epistaxis can be easily treated in the majority of cases, but refractory epistaxis with repeated recurrent bleeding can be a problem. In this study, risk factors for recurrent epistaxis and refractory posterior bleeding were investigated with the objective of reviewing initial treatment methods for epistaxis.

In the present study, multivariate analysis showed that unidentified bleeding point was predictive of an increased risk of recurrent epistaxis, whereas electrocautery was predictive of a decreased risk of recurrent epistaxis. These results suggest that the rate of recurrent epistaxis was lower for patients who underwent electrocautery and higher for those in whom a gauze tampon was inserted to treat posterior bleeding, even if this was performed intensively with an endoscope.

Many risk factors for adult epistaxis have been reported, but most of them are generally controversial. In terms of age, as mentioned above, epistaxis is believed to occur more frequently in the age range of 45–65 years [7]. In terms of sex ratio, it is more common among men up to the age of 49 years, but after that, it occurs at the same frequency among men and women, suggesting that estrogen may be involved [8,9]. The use of antithrombotic agents (mainly warfarin) is believed to be a high-risk factor for epistaxis, but whether its discontinuation is necessary is controversial. Although one report stated that discontinuing antithrombotic agents was unnecessary in people with epistaxis [10], another found that 25% of patients taking antithrombotic agents experienced epistaxis ever year [11]. There is no definitive evidence as to whether aspirin is a risk factor for epistaxis [12]. In one study of habitual nose bleeders, the recalled rate of aspirin use did not differ from that of controls [13]. In contrast, another case control study found a positive correlation between aspirin use and epistaxis (RR 2.17 or 2.75, depending on whether a community or hospital control group was used) [14]. The relationship between hypertension and epistaxis is also unconfirmed. Although some studies have found a correlation between hypertension and epistaxis [2,15–18], others have ruled it out [9,10,19–21]. Another report identified longstanding hypertension as increasing the risk of epistaxis [20]. One expert claims that although hypertension does not cause epistaxis, it results in protracted bleeding [22].

On the other hand, to the best of our knowledge, few articles about the risk factors for 'recurrent' epistaxis have appeared. Jackson et al. examined factors associated with active, refractory epistaxis. They showed that hypertension, aspirin, and alcohol abuse were patient characteristics related to such epistaxis, posterior floor of the nasal cavity and posterior to Kiesselbach's plexus were the bleeding points related to such bleeding, and septal deviation, spurring, and mucosal abnormality were anatomical factors [23]. Tay et al. indicated that patients who had been prescribed aspirin had a relative risk of hospital admission for epistaxis of between 2.17 and 2.75, depending on the control group used [14]. Denholm et al. showed that patients anticoagulated with warfarin spent significantly longer in hospital than controls [24]. On the other hand, Srinivasan et al. demonstrated that there was no significant difference in the mean hospital stay between the warfarin and non-warfarin groups, and warfarin can be continued

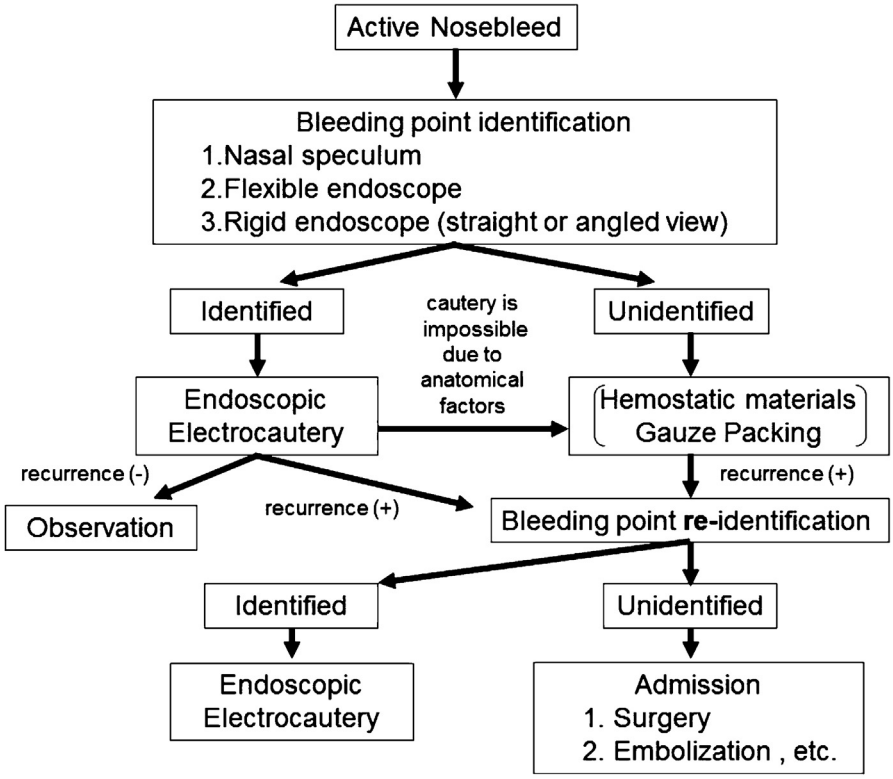

Fig. 1. Flow diagram for primary management of epistaxis by otolaryngologists.

safely in patients with epistaxis, in appropriate circumstances [25]. In the present study, multivariate analysis did not identify even a single patient characteristic as a risk factor for recurrent epistaxis. No previous report has used multivariate analysis.

Moving to a discussion of electrocautery, some articles describe management of epistaxis and the importance of endoscopic electrocautery, which was effective in the present study. They showed that traditional strategies like nasal packing have been supplemented by endoscopic electrocautery [2,26–28]. This treatment was first reported by Wurman et al. [29], and it has become the primary treatment used in recent years, because it is less invasive than traditional strategies and has nearly equivalent failure rates compared with other approaches (20–33%) [30]. Elwany et al. used suction cautery under endoscopic vision for 38 patients with posterior epistaxis, and they succeeded in stopping bleeding in 30 cases. Temporary palatal numbness in three patients was the only complication [31]. Police et al. performed a retrospective study of 249 patients hospitalized due to epistaxis, and they found that all 30 endoscopic cauterizations successfully stopped the epistaxis, demonstrating the usefulness of this technique [32]. In the present study, electrocautery was found to be the first-choice treatment, with recurrent epistaxis seen in 32 patients (10.7%). It was also effective in treating posterior bleeding.

With respect to unidentified bleeding point, Chiu et al. carried out a prospective study of idiopathic adult posterior epistaxis and demonstrated that 94% of bleeding sites was identifiable [33]. In the present study, the bleeding point was not identified in 31 cases (10.4%). The rate of recurrent epistaxis was high when the bleeding point was not identified (17 of 31 cases, 54.8%), and multivariate analysis showed that unidentified bleeding point was a risk factor for recurrent epistaxis. If the bleeding point cannot be identified, electrocautery is of course impossible, and as the rate of recurrent epistaxis was higher for patients who underwent gauze packing (39.5%), hospitalization, arterial embolization, and surgery may be required should epistaxis recur.

In light of the foregoing discussion, Fig. 1 shows a flow chart for initial treatment of epistaxis by otolaryngologists. Although this is only a proposal, gauze packing is regarded as inadvisable treatment in light of the results of the present analysis and the pain it causes patients.

The number of patients in the present study was insufficient to carry out multivariate analysis of bleeding points other than Kiesselbach's plexus, where hemostasis can easily be performed; this should be carried out and risk factors identified in future studies. Analysis should also cover factors indicating the need for hospitalization, surgery, or embolization.

5. Conclusion

In the present study, the risk factors for recurrent epistaxis were unidentified bleeding point. Thus, it is important to identify and cauterize a bleeding point to prevent recurrent epistaxis. The present results also suggest the effectiveness of electrocautery and the higher rate of recurrent epistaxis for patients who underwent gauze packing as initial treatment for posterior bleeding. Electrocautery should be the first-choice treatment of otolaryngologists for all bleeding points of epistaxis, and painful gauze packing may be inadvisable for posterior bleeding.

Conflict of interest

None.

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