

Literature review

Epistaxis

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Epistaxis is a common problem encountered in clinical practice, particularly among pediatric patients. In some cases, epistaxis may be more severe than usual, leading to significant blood loss and potential complications. Thorough history taking and physical examination to determine the anatomical origin of bleeding within the nasal cavity are essential, as they enable physicians to plan appropriate and effective management strategies for hemostasis. In addition, recognizing conditions that require timely referral to an otolaryngologist is important for ensuring specialized management.

Incidence and epidemiology

Epistaxis most commonly occurs among young children and older adults, with the highest incidence reported in children younger than 10 years¹ and in individuals older than 70 years.² In the United States, epistaxis accounts for approximately 1 in 260 emergency department visits among patients younger than 19 years.¹ The likelihood of severe epistaxis requiring medical attention increases with advancing age. Epistaxis is more frequently reported among males.² Recurrent epistaxis is particularly associated with patients over 70 years, higher multimorbidity and the use of combination antithrombotic therapy.²

In Thailand, a study by Chaiyasate, et al. found that epistaxis occurs more frequently among males than females, with affected individuals ranging in age from 12 to 87 years.³ The incidence was highest between January and April, corresponding to the transition from the cool season to the hot season. During this period, Thailand experiences lower relative humidity, resulting in drier air that predisposes individuals to epistaxis. These findings are consistent with an international study by

Uhler, et al., which also reported a higher prevalence among males and identified a peak incidence among individuals older than 70 years compared with other age groups.²

International data indicate that epistaxis affects up to 60% of the population, based on surveys conducted in the United States⁴. Among these individuals, approximately 6% seek medical consultation, while only 0.16% require therapeutic intervention.⁴

Sites of epistaxis

The sites of epistaxis can be classified into two major categories as described below.

1. Anterior epistaxis

Anterior epistaxis accounts for more than 90% of all cases of epistaxis. It is most commonly observed among pediatric and adolescent patients, particularly those with a history of habitual nose picking or nasal mucosal inflammation. Bleeding most frequently originates from the anterior portion of the nasal septum, where a dense vascular network known as Kiesselbach's plexus or Little's area is located.⁵ This region can be easily visualized during anterior rhinoscopic examination.

2. Posterior epistaxis

Posterior epistaxis is less common but tends to be more severe. It is usually encountered among patients with underlying systemic conditions, such as hypertension or those with tumors of the nasopharynx. Bleeding typically arises from the posterior nasal cavity near a vascular network known as the nasopharyngeal plexus or Woodruff's plexus.⁵ This site is more difficult to identify during routine examination and usually requires detailed nasal endoscopy performed by an otolaryngologist.

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Etiology of epistaxis

The causes of epistaxis can be broadly classified into two main categories: local causes and systemic causes.

1. Local causes

1.1 Mechanical irritation or trauma

Local irritation or trauma to the nasal cavity is a common cause of epistaxis. Habitual nose picking often results in dry crust formation, leading to mucosal abrasion and chronic ulceration, especially in the anterior nasal septum. Other causes include nasal trauma (with or without nasal bone fracture), nasal or sinus surgery (e.g., turbinate surgery, septoplasty or sinus surgery), nasotracheal intubation, prolonged use of topical nasal steroids, chronic intranasal cocaine use, forceful nose blowing and sudden changes in atmospheric pressure (e.g., during air travel or diving). These factors cause mucosal tearing, resulting in mild to moderate bleeding that is usually self-limited but may recur during the healing phase.^{4, 6}

Severe head and facial trauma may cause profuse nasal bleeding in the acute phase. However, delayed-onset epistaxis occurring weeks after trauma should raise suspicion for traumatic pseudoaneurysm. In addition, cold climates and low humidity can dry the nasal mucosa, increasing its susceptibility to irritation and bleeding.

1.2 Inflammatory conditions

Inflammatory processes within the nasal cavity, such as viral infections, allergic rhinitis, rhinosinusitis, intranasal foreign bodies and exposure to irritants (including intranasal cocaine use), may predispose patients to epistaxis. The use of nasal continuous positive airway pressure (CPAP) therapy or dry supplemental oxygen is also associated with an increased risk. These conditions lead to mucosal congestion and hyperemia, rendering blood vessels more fragile and prone to rupture. Bleeding is often mixed with nasal discharge; however, severe inflammation or forceful nose blowing may result in significant hemorrhage.⁷

1.3 Anatomical abnormalities

Structural abnormalities, such as septal deviation, septal spurs or septal perforation, can disrupt normal airflow dynamics.⁷ Epistaxis typically occurs on the narrowed side of a deviated septum, where airflow velocity is increased, leading to mucosal dryness, crusting and fragility. Bleeding commonly originates from the anterior aspect of the deviated septum or protruding area.

1.4 Neoplasms

Both benign and malignant tumors of the nasal cavity, paranasal sinuses or nasopharynx may cause epistaxis. These include highly vascular benign tumors as well as malignant lesions such as hemangioma, nasal papilloma, rhabdomyosarcoma, malignant lymphoma and esthesioneuroblastoma. Patients presenting with recurrent or profuse epistaxis should undergo nasal endoscopy and appropriate imaging studies to exclude neoplastic causes.

1.5 Vascular abnormalities

Vascular lesions involving the blood vessels supplying the nasal cavity, such as traumatic pseudoaneurysms or arteriovenous malformations, may also result in epistaxis.

2. Systemic causes

2.1 Vascular disorders

Systemic vascular diseases, including hereditary hemorrhagic telangiectasia (HHT) and atherosclerotic changes commonly associated with hypertension, may predispose patients to epistaxis.

2.2 Hematologic disorders

Hematologic causes can be classified into abnormalities of primary hemostasis and secondary hemostasis.

Epistaxis associated with systemic bleeding disorders is predominantly attributable to defects in primary hemostasis. Approximately 10% of patients with mild epistaxis and nearly 60% of those with severe epistaxis exhibit defects in primary hemostasis, whereas disorders of secondary hemostasis constitute a much smaller

proportion, estimated at 5-15% among patients with epistaxis.⁸ This distribution reflects the fundamentally mucocutaneous nature of epistaxis, which is characteristic of platelet-mediated bleeding rather than coagulation factor deficiency. Disorders of primary hemostasis such as thrombocytopenia, qualitative platelet dysfunction and von Willebrand disease classically present with recurrent epistaxis, gingival bleeding, petechiae and menorrhagia. Epistaxis is a core symptom incorporated into validated bleeding assessment tools, including the International Society on Thrombosis and Haemostasis Bleeding Assessment Tool.⁹ In contrast, defects of secondary hemostatic defects usually manifest as deep tissue bleeding, hemarthroses, muscle hematomas or delayed postoperative hemorrhage with isolated epistaxis being uncommon. Clinical studies evaluating epistaxis in hospitalized and emergency populations have demonstrated that abnormal coagulation profiles are detected in fewer than 10% of cases, most often related to anticoagulant therapy or advanced liver disease rather than inherited coagulation factor deficiencies. These findings support the relatively minor contribution of secondary hemostatic disorders to the overall burden of epistaxis.

Severity assessment of pediatric epistaxis

Currently, no standardized severity scoring system for pediatric epistaxis has been formally adopted in Thailand. However, two commonly used Epistaxis Severity Scoring Systems (ESS) are available for initial assessment.^{10,11}

1. Epistaxis Severity Score

This system evaluates six historical parameters over a three-month period:

Frequency: How often do nosebleeds occur? (coefficient 0.14)

- 0: Less than monthly
- 1: Once per month
- 2: Once per week
- 3: Several per week
- 4: Once per day
- 5: Several per day

Duration: How long do the nosebleeds last? (coefficient 0.25)

- 0: <1 minute
- 1: 1-5 minutes
- 2: 6-15 minutes
- 3: 16-30 minutes
- 4: >30 minutes

Intensity: How heavy the bleeding is? (coefficient 0.25)

- 0: No
- 1: Yes

Medical Attention: Is medical intervention needed? (coefficient 0.30)

- 0: No
- 1: Yes

Anemia: Is anemia present as a result of blood loss? (coefficient 0.20)

- 0: No
- 1: Yes

Transfusions: Is a dependence on blood transfusions observed? (coefficient 0.31)

- 0: No
- 1: Yes

Calculation of the raw and normalized epistaxis severity score

Responses to each of the six questions are assigned a weighted values, which are multiplied by their respective coefficients. The resulting values are summed to obtain the raw score. The raw score is then normalized by dividing it by the maximum possible score (2.71) and multiplying the result by 10 to generate the normalized ESS.¹²

$$\text{Normalized HHT-ESS} = \left[\frac{\text{Raw score}}{\text{Denominator (2.71)}} \right] \times 10$$

In 2015, Yin, et al. conducted a study to determine the smallest change in a person's Epistaxis Severity Score that could be considered clinically significant. This value known as the minimal important difference (MID), was determined to be 0.71.¹³ The MID is useful for monitoring disease progression in patients with hereditary

hemorrhagic telangiectasia and for guiding treatment decisions. An increase in the ESS of at least 0.71 indicates a clinically significant worsening of nosebleed severity and may suggest that the current treatment is ineffective. Conversely, a decrease in the ESS of at least 0.71 indicates a clinically significant improvement in epistaxis severity and may suggest that the current treatment is effective and should be continued.

2. World Health Organization (WHO) Bleeding Score

This system categorizes severity into four grades as described below.

Grade 1: Total bleeding duration < 30 minutes within a 24-hour period.

Grade 2: Total bleeding duration > 30 minutes within a 24-hour period without anemia requiring blood transfusion. An otolaryngology (ENT) consultation is recommended, and outpatient management may be sufficient.

Grade 3: Severe bleeding requiring blood transfusion. Inpatient management is recommended

Grade 4: Massive bleeding causing hemodynamic instability, and requiring intensive monitoring and management

Management of anterior epistaxis

When a single bleeding point is identified, initial management includes firm compression of both nasal alae for at least 5 minutes while the patient leans forward to prevent posterior blood flow and aspiration. If bleeding persists, gauze or cotton soaked with a topical vasoconstrictor (e.g., oxymetazoline or phenylephrine) may be applied.

Persistent bleeding may require cauterization of the bleeding vessel using chemical agents such as 20% silver nitrate or 50% trichloroacetic acid for approximately 30 seconds. Larger vessels may require electrocauterization, which provides superior hemostasis but must be performed cautiously to avoid tissue damage. Common complications include infection and septal perforation.

Post-procedural application of topical antibiotic ointment (e.g., chloramphenicol) for 7-10 days is recommended. Toner, et al.¹⁴ found no significant difference in septal perforation rates between chemical cauterization and electrocauterization.

Adjunctive treatments include absorbable hemostatic materials such as gelatin foam (Gelfoam) or oxidized cellulose (Surgicel), particularly among patients with bleeding disorders. If local measures fail, an ENT consultation for anterior nasal packing using petroleum jelly-impregnated or polymyxin B-soaked gauze may be required. Potential complications include sinus obstruction, sinusitis, nasolacrimal duct obstruction, septal perforation and hypoxia, particularly among patients with obstructive sleep apnea.

Management of posterior epistaxis

Posterior epistaxis is less common but typically more severe and usually requires otolaryngologic intervention. Management may involve posterior nasal packing using balloon devices or petroleum jelly-impregnated gauze following local or general anesthesia. In the absence of commercial balloon devices, a Foley catheter (10-14 French) inflated with 10 mL of saline can be used.¹⁵⁻¹⁸ Patients should be hospitalized, positioned with head elevation (30-40°), administered oxygen, analgesics and antibiotics and monitored closely. Packing is typically removed within 48-72 hours. Potential complications include aspiration, dysphagia, Eustachian tube dysfunction and pressure necrosis of adjacent structures.^{16,17}

Refractory cases may require endoscopic identification and cauterization of the bleeding source. If unsuccessful, arterial embolization performed by an interventional radiologist may be indicated. This technique allows precise localization and occlusion of bleeding vessels using materials such as polyvinyl alcohol or Gelfoam and is particularly effective in vascular anomalies or highly vascular tumors. However, the procedure is costly and requires specialized expertise and facilities.^{10,15-17}

Post-treatment patient instructions

After discharge, patients should be advised as follows:^{10,17}

1. Rest for at least 12-24 hours
2. Avoid hot food and beverages for at least 24 hours
3. Avoid nose picking or forceful nose blowing for at least 12 hours
4. Avoid strenuous exercise or heavy lifting for at least 7 days
5. Treat constipation and avoid prolonged straining
6. Avoid medications that increase the risk of bleeding (e.g., aspirin and NSAIDs) unless advised otherwise by a physician
7. Use nasal moisturizers (e.g., petroleum jelly or saline spray), particularly among patients with nasal dryness

Conclusion

Effective management of epistaxis requires comprehensive knowledge of nasal anatomy to promptly identify bleeding sites and achieve hemostasis. Thorough history taking and physical examination after bleeding control—especially in cases of recurrent or unusually severe epistaxis—are essential for identifying underlying hematologic or otolaryngologic disorders. Addressing the underlying cause and providing appropriate patient education for home care are critical for preventing recurrence and ensuring optimal outcomes.

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