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Review Article

## CAUSES AND MANAGEMENT OF EPISTAXIS

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### Abstract:

**Introduction:** Epistaxis is the occurrence of an active nasal bleeding. Epistaxis is estimated to occur at least once during lifetime for more than 60% of the general population, with varying seriousness. The etiology behind epistaxis varies from local, systemic, and environmental causes. Primary care physicians should be educated on how to deal with an epistaxis case acutely and when to refer a patient to ENT for further evaluation. Thus, a review of the current management modalities is imperative for both primary care and otolaryngology physicians. **Aim of the work:** we tried to understand the causes, classification, diagnosis, and management of epistaxis. **Methodology:** we conducted this review using a comprehensive search of MEDLINE, PubMed and EMBASE from January 2001 to March 2017. The following search terms were used: epistaxis, causes of epistaxis, classification of epistaxis, management of epistaxis. **Conclusion:** Epistaxis is considered to be one of the common presentations encountered in the emergency department and it can sometimes be serious or even fatal. Many etiologies can cause epistaxis. Management of epistaxis mainly centers on stopping bleeding locally and treating the cause if non local or local. Some cases will have to be referent to ENT for better outcomes. New treatment modalities for complicated cases are being developed.

**Keywords:** epistaxis, nose bleed, bleeding disorder

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**INTRODUCTION:**

The definition of epistaxis is the occurrence of an active nasal bleeding. Epistaxis is estimated to occur at least once during lifetime for more than 60% of the general population, with varying seriousness. However, less than 6% of these patients will need to seek medical attention and undergo evaluation and treatment. Other causes are usually self-limited. Epistaxis can result from mechanical or traumatic injuries, where in these cases; it can last for a relatively long time, become uncontrolled. These cases will definitely require medical help to stop the bleeding and prevent significant blood loss [1].

Several etiologies can lead to the development of epistaxis. These include athletics, assault, and trauma during intubation, surgeries for tumors, orthognathic surgery, dyscrasias, drugs, arteriovenous malformations, and foreign bodies. In cases with long bleeding, the most important step is to decrease the amounts of lost blood to reduce risks of complications and mortality [2].

Conservative measures are able to sufficiently control bleeding in most epistaxis cases. These are called uncomplicated epistaxis episode. These conservative measures include the use of electrocautery, vasoconstrictive agents, and packing [3].

On the other hand, when conservative measures fail to control the hemorrhage, more invasive interventions are required, and the case is refereed to as an intractable epistaxis episode. Posterior packing, endoscopic surgery, interventional radiology and embolization, and vessel ligation are examples for invasive measures to control refractory bleeding and intractable epistaxis [3].

**METHODOLOGY**

- **Data Sources and Search terms**

We conducted this review using a comprehensive search of MEDLINE, PubMed and EMBASE, from January 2001 to March 2017. The following search terms were used: epistaxis, causes of epistaxis, classification of epistaxis, management of epistaxis

- **Data Extraction**

Two reviewers have independently reviewed the studies, abstracted data and disagreements were resolved by consensus. Studies were evaluated for quality and a review protocol was followed throughout.

**Anatomy**

Generally, epistaxis does more commonly originate from the anterior blood supply of the nose than the posterior supply. Actually, less than 10% of epistaxis

cases originate from the posterior blood supply system [7]. The other 90% cases, which originate from the anterior supply system, occur more commonly in what is known Little' area. Little's area is the place of the Kiesselbach plexus, which is made from the septal branch of the anterior ethmoid artery, the nasal branch of the anterior ethmoid artery, and the septal branch of the superior labial artery [4].

Epistaxis cases which originate from the posterior blood supply system are generally more challenging to assess and manage, as the access route to the posterior nares is difficult and harder than the anterior nares. The posterior blood supply system consists of the steriolateral branches of the sphenopalatine artery. Some cases of posterior nose epistaxis are a result of cancers, aneurysms of the internal carotid artery, or severe trauma [4].

**Causes**

As we previously mentioned, there are numerous causes for epistaxis. For simplicity, these causes can be categorized into idiopathic (in most cases), systemic, local, drugs, or environmental. Up to 14% of adults will experience at least one attack of epistaxis throughout their adulthood. To help determine the cause, a thorough medical history should be obtained along with a complete physical examination. A properly taken history will significantly help determine the etiology and plan the management [5].

**Local**

Causes of epistaxis that are classified as 'local' include tumors, trauma, and abnormalities in the nasal septum, inflammations, and iatrogenic causes. Generally, trauma is more common in young children. However, it is crucial to rule out serious causes like tumors and malignancies. Therefore, a thorough examination is important to notice red flags (in case of their presence), which include: pain in the face, headaches, swelling of the face, deformities of the face, the unilateral blockage of the nose, deep otalgia, Asian origins, and loose teeth [6].

**Systemic**

On the other hand, the cause of epistaxis could be systemic rather than local, and these include high blood pressure, alcohol abuse, extremities of age, and bleeding diathesis. Generally, epistaxis can occur in all ages. However, it is predominant in two specific age groups, those who are very young or those who are very old. When a young adult or an adolescent develop epistaxis, this should raise concerns for the presence of some underlying pathology like nasopharyngeal angiofibroma, or the presence of

substance abuse like cocaine abuse. Juvenile nasopharyngeal angiofibroma is known to be a benign neoplasia that have the liability to extensively bleed. The presence of bleeding along with headaches, obstruction of the nose, anosmia, or rhinorrhea are highly suggestive of Juvenile nasopharyngeal angiofibroma and require further evaluation [7].

Other systemic causes that can present with refractory intractable epistaxis include an underlying hemorrhagic telangiectasia, which is a hereditary disease. Von Willebrand's disease, along with other bleeding disorders and coagulopathies can also lead to the development of recurrent epistaxis episodes. Whenever there is a suspicion of any bleeding diathesis, further assessments and investigations must be performed [8].

The relationship between high blood pressure and epistaxis attacks are not well-understood with many misconceptions about it. High blood pressure can only rarely directly cause epistaxis, and in these cases, one hypothesis is that epistaxis could be a result of vasculopathy. Other hypotheses link high blood pressure to anxiety, which will lead to epistaxis, but no solid evidence, is present to support this [7].

Some other factors have been found to increase the risk of developing epistaxis, and these include alcohol abuse and other substance abuse. In fact, a published study has found that individuals who present to the emergency department with epistaxis have a high probability of having consumed alcohol within the last day prior to developing epistaxis. This is hypothesized to be a result of dysfunction of platelets caused by alcohol [9].

#### **Environmental**

Epistaxis cases have been found to be more in winter months, especially when the weather is dry. Alterations in humidity and temperature have also been found to be associated with higher risk of epistaxis. Circadian rhythm has also been suggested to correlate with epistaxis risk, with more risk of epistaxis in the morning or in the late afternoon [7].

#### **Medications**

Several pharmacological agents are used to impact clotting, including clopidogrel, warfarin, and oral inhibitors of factor X. Therefore, history of any drug intake should be known when a patient presents with epistaxis. Moreover, some alternative medicine materials have been found to interact with the body and lead to bleeding [9].

Previously, many thought that NSAIDs, including aspirin, were associated with high risk of epistaxis. However, current evidence suggests that no significant correlation is present between NSAIDs use and developing epistaxis. Studies on aspirin have been controversial and led to non-conclusive results. More studies on this issue are needed to reach a solid conclusion regarding aspirin use and risk of epistaxis [9].

#### **Classification**

Epistaxis can be categorized according to the anatomical location into posterior epistaxis and anterior epistaxis. It is estimated that anterior epistaxis cases consist more than 90% of epistaxis cases. These occur on the anterior septum on the nose, which receives its blood supply from the Kiesselbach's plexus. The Kiesselbach's plexus is known to be the anastomotic network of vessels that is present in the anterior cartilaginous part of the nasal septum. It receives supply from the external carotid artery and the internal carotid artery [7].

On the other hand, less than ten percent of epistaxis episodes originate from the posterior blood supply system of the nose. These epistaxis cases are more likely to be arterial and to cause compromises in the airway. Moreover, they can cause aspiration and are more challenging in control and management [7].

Another classification of epistaxis is according to the etiology and is primary versus secondary epistaxis. More than eighty five percent of epistaxis episodes are thought to be primary. These are described as spontaneous idiopathic epistaxis attacks with no apparent predisposing factor or underlying etiology. On the other hand, whenever a cause of the bleeding can be detected (trauma, tumor, surgical... etc), this is called secondary epistaxis [10].

#### **Management by Primary Care or Emergency Physicians**

When managing a case of epistaxis, it is important to initially compress continuously the two sides of the nose for at least twenty minutes using a nose clip (or two fingers). During this, patient must be sitting upright with slightly leaning forward, which is important to avoid the running of blood to the pharynx. It could also be beneficial to locally apply ice at the neck back, as this can stimulate nasal blood vessels to vasoconstrict. However, no solid evidence is present in the current literature to support this practice [11].

In patients with epistaxis and high blood pressure at presentation, it is also recommended by the European

Society of Hypertension to administrate drugs to control this high blood pressure, while managing epistaxis. These drugs should aim at a slow decline of blood pressure over the next one or two days [12].

The application of the previously mentioned steps along with using some decongestant like oxymetazoline-based nasal spray is estimated to stop the bleeding in up to 75% of patients. If bleeding does not stop despite applying all measures, or if there is any hemodynamic instability, consultation of an otorhinolaryngologist is required. The presence of recurrent epistaxis or the suspicion of an underlying tumor should also warrant otorhinolaryngologist consultation [3].

### **Management by Otolaryngologists**

#### **Evaluation**

The first step in assessing a patient who presented with an epistaxis episode is to establish the presence of patent airways and to assess hemodynamic stability. In cases where the patient has severe hemorrhage or hemodynamic instability, it is necessary to immediately administrate intravenous fluids. It is also essential to perform a complete blood count and determine the blood type. This is to prepare the patient for any needed blood transfusion [13].

In some cases, epistaxis can occur from the two nostrils. In these cases, it is important to determine the nostril from which the epistaxis started. It is also important to determine the exact time of bleeding initiation and an estimate of blood loss. A history of previous epistaxis attacks should also be obtained to determine the presence of a chronic or a recurrent disease. The presence of hemoptysis or hematemesis could be an indicator of posterior bleeding. Posterior bleeding in general are larger in volume than anterior bleedings [2].

Medical history should be thorough to detect any possible cause of the bleeding, and should include asking about any tumor in the head or neck, pharmacological agents that could cause bleeding (like warfarin and steroids), primary coagulopathies, abuse of substance associated with bleeding and epistaxis (cocaine and alcohol), trauma, a history of a prior surgery in the nose or any of the sinuses, and a history of HIV, as HIV will lead to platelets dysfunctions. The presence of an existing pulmonary or cardiovascular disease can also be complicated with epistaxis. Therefore, it is reasonable to ask about sweating, dyspnea, chest pain, pain in the left arm, pain in the jaw, and/or syncope [7].

Another crucial point that should be performed by the physician before initiation of the physical examination is wearing protective equipment like gown, goggles, facemask, and gloves. The side of bleeding is usually known from the history of the patient. However, this history may not be accurate sometimes, or they may be bilateral bleeding. Therefore, it is important to confirm the source of bleeding using a nasal speculum [14].

Some severe cases may require using a moistened pledget that is covered with an anesthetic and a vasoconstrictive agent. The placement of this pledget for a few minutes followed by its removal will lead to improved visualization of the nose. After anesthetizing the patient, the patient should be put in a 30 degrees position, in a place with good light. A nasal speculum is then used to examine the anterior nasal mucosa, the Kiesselbach plexus, and Little's area. Some patients may have some small clots leading to poor visualization. These clots can be removed either by the patient or using a suction catheter [14].

#### ***Anterior rhinoscopy***

An anterior rhinoscopy is the best choice that is used to locate bleeding source. It is usually used with a headlight and a speculum. It gives the ability to inspect the whole cavity of the nose including Kiesselbach area, from which most bleedings originate. A better view can also be achieved by the prior use of a cotton tuft that is covered with an anesthetic and a vasoconstrictor [15].

#### ***Endoscopy***

In cases of a posterior bleeding, it is more challenging to detect the source of bleeding using an anterior rhinoscopy. In these cases, it is recommended to use a rigid endoscope to detect the posterior source of bleeding. However, this procedure must be only done by an experienced practitioner. Studies have found that the source of bleeding can be detected with endoscope in up to 94% of cases [16].

#### **Cauterization**

As we previously mentioned, most epistaxis cases originate from the anterior blood supply system which can be easily visualized. These cases can be cauterized, and the bleeding will stop. It is important, however, to apply adequate anesthesia and vasoconstriction before initiation the procedure [15].

Cauterization using electrocoagulation has been shown to improve success rates of the procedure when it was compared to cauterization using chemical coagulation (like silver nitrate). Moreover,

rates of recurrence of the epistaxis within the first two years have also been shown to be less following cauterization with electrocoagulation. However, cauterization with chemical coagulation remains to be common due to its wide availability, low costs, and simple use [15].

Cauterization procedures can be associated with several complications including infections, perforation of the nasal septum, and rhinorrhea. Moreover, a bilateral cautery procedure on the septum is associated with significantly high risk of septal perforation, and should thus be avoided, unless necessary [3].

#### **Hemostatic gauze**

It is possible to use gauzes that are made from regenerated cellulose locally to help the cautery procedure. This will provide significant aid to the normal hemostasis due to its hemostyptic effects. This gauze is of special importance when dealing with cases where there is a diffuse bleeding of the mucosa [17].

#### **Nasal packing**

In cases where cautery fails to manage and stop the bleeding, the next step in management is the use of packing. Packing has different types depending on the bleeding being anterior or posterior. Unilateral nasal packing causes lower pressure in the nose than bilateral packing. Therefore, bilateral packing is more preferred by practitioners. However, no solid evidence is present to support this. Types of common nasal packings include [18]:

- **Rubber-coated sponge tampons:**

These are sponges that are covered with one layer with rubber. This rubber layer will help prevent bacterial and viral colonization. They are also beneficial to achieve hemostasis. In addition, it is simply used with no associated discomfort or complications [17].

- **Expandable nasal packs:**

These are produced using polyvinyl acetal which allows them to expand when exposed to liquids like blood. This form of packs is associated with relatively less trauma and discomfort than other types of packing [17].

- **Cotton ribbon gauze:**

The advantages of these packings include the easy placement in the exact location needed. However, they are relatively painful during both placement and removal, and they are associated with significant discomfort when they are in place. Moreover, their removal could be

associated with severe bleeding [18].

- **Balloon packing:**

This type of packing is used in cases where there is severe bleeding originating from the posterior blood supply of the nose. However, it must always be used together with an additional anterior packing. A possible alternative for the nasal balloon is a Foley catheter which can also be used and expanded within the nasopharynx.

The use of balloon packing should always be applied with extreme caution due to the association of this procedure with significant necrosis [17].

#### *Complications of nasal packing*

Posterior dislocation of the packing is considered to be the most concerning complication following nasal packing. In some cases, this dislocation may lead to a fatal aspiration. Cotton gauzes and sponge tampons have a higher risk of dislocation than other types of packings [17].

Posterior dislocation could be prevented with the strong fixation of the pack to the face of the patient, which is achieved by placing a plaster. In addition, the threads of the pack could also be attached together [19].

Other complications of nasal packings include mucosal necrosis, allergy against the packings, tubal dysfunctions, paraffinoma formation, and sleep apnea. Discomfort, pain, and reduced smell can also happen, but these, however, are mild and subside following the removal of the packing [19].

In some cases, bilateral packing of the nose has been associated with impairments in the equalization of the pressure within the auditory tube, leading to the development of a negative pressure and more discomfort [17].

Toxic shock syndrome from a staphylococcal infection is a rare but potentially fatal complication. It manifests with diarrhea, vomiting, fever, myalgia, erythema, and septic shock. Measurements of treatment should include removing the packing immediately, administering intravenous antibiotics, and the transfer to the intensive care unit until the patient becomes hemodynamically stable [17].

#### **Surgical treatment**

Achievement of hemostasis with surgery is required in cases where conservative measurements fail. A previous retrospective observational study has concluded that surgical management in cases of

posterior epistaxis can lead to significantly improved outcomes when compared to nasal packing. Endoscopic clipping of the sphenopalatine artery was found to be the surgical modality associated with best outcomes. This superiority of sphenopalatine artery endoscopic clipping was proven in another study that found it able to control bleeding in more than 98% epistaxis cases [20].

Complications associated with surgical treatment of epistaxis include epistaxis recurrence, dryness of the nose, formation of crust within the nose, impaired sensitivity of the nose and palate, synechiae formation within the nasal cavity, development of chronic epiphora, and perforation of the nasal septum. However, the rate of developing all of these complications is relatively low [21].

### **Embolization**

Percutaneous embolization is considered to be another possible modality of treatment in patients with severe epistaxis. This modality is associated with up to 93% success rate. However, this technique must only be performed by specialized and experienced neuroradiologist. Moreover, it is associated with serious complications, limiting its use to only severe cases where all other measures have failed [22].

### **CONCLUSION:**

Epistaxis is considered to be one of the common presentations encountered in the emergency department and it can sometimes be serious or even fatal. Many etiologies can cause epistaxis. However, most causes are considered idiopathic. Most cases of epistaxis are mild and spontaneously resolve. The management of all patients with epistaxis must start with ensuring patent airways and a hemodynamic stability. More measures are applied in more severe cases and include nasal packing. Surgery and embolization are limited to severe refractory epistaxis cases that do not respond to other treatment modalities.

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