Review Article

EPISTAXIS: PATHOPHYSIOLOGY AND ITS MANAGEMENT

ABSTRACT

Epistaxis means bleeding from the nose and is the most common emergency complaint. It is reported in all groups of age. It may generally be spontaneous in nature or be induced by either nose picking or by trauma to the inner tissue lining of the nose. It may also be benign and self-limiting whereas some can be recurrent as well. Most of the times, epistaxis is a minor problem and can be treated easily but sometimes it can lead to a life-threatening haemorrhage. Environmental factors can affect the frequency of epistaxis that is, it increases in the winters as compared to other seasons. It is because of decreased humidity during the winters which ultimately leads to reduced humidification of the nose.

Based on origin, epistaxis can be of two types- Anterior epistaxis and Posterior epistaxis. Anterior epistaxis originates from the Kiesselbach plexus situated in the frontal part of the nose whereas, posterior epistaxis originates from Woodruff plexus lying in the posterior or superior nasal cavity. It can be caused by various local and systemic factors. Local factors that contribute to nose bleed are trauma which either be localised (nose picking) or facial trauma, anatomical abnormalities, inflammatory causes etc. Systemic conditions which increase the risk of epistaxis are high blood pressure, cardiovascular diseases, vascular and bleeding disorders. Most often, epistaxis can be managed at home or by a primary care general physician. But in cases where it is recurrent or the bleeding is non-stop, the patient should immediately go to the hospital and take proper treatment.

KEYWORDS: Epistaxis; ENT emergency; Kiesselbach plexus; Woodruff plexus; trauma; Anterior ethmoidal artery

INTRODUCTION:

Epistaxis is derived from a word of Greek origin called as “epistazein” which describes “nose bleeding”, which is comprised of two words: epi meaning “upon, in addition” and stazein meaning “to drip”. Epistaxis (nose bleeding) is one of the most common ear, nose and throat (ENT) emergencies that present to the emergency room (1). Although it can present itself in all age groups yet, it is more commonly seen in children (ages 2-10) and older adults (50-80). Bleeding of the nose is very common because our nose is a very accessible area for any kind of physical trauma as it is situated in the centre part of our face and poking out as well, in addition to this the vessels in the lining of our nose are very near to the surface making them very prone to be affected by the trauma and rupture. Epistaxis can be of two types depending on its origin: anterior epistaxis and posterior epistaxis.

Anterior epistaxis refers to a nosebleed originating from the Kiesselbach plexus (commonly known as Little’s area) which is network of vessels found in the nasal septum. This plexus is composed of five arteries: Anterior ethmoidal artery, Posterior ethmoidal artery, Sphenopalatine artery, Greater palatine artery and Superior labial artery. These arteries can be injured easily as they are subjected to all the environmental changes occurring outside. It is the most common type of epistaxis (90%) with little to no repercussions and can be treated at home by sitting up, tilting your head forwards and slightly lean forwards. Or you could even pinch the tip of your nose for 15-20 minutes with any two fingers and hopefully the bleeding stops. If the bleeding persists, hospital care is advised to prevent further complications.

Posterior epistaxis is generally a bit more on the serious side as compared to the anterior epistaxis as it involves larger blood vessels. It originates from the woodruff plexus which lies behind the inferior turbinate on the lateral wall of the nasal cavity. As the blood vessels causing this nosebleed lie posteriorly and near the throat, blood can flow backwards and get swallowed or coughed up. This cannot be treated at home and immediate medical attention is required. Nose bleeds are also seen in women during their pregnancy, the cause of this is that during pregnancy the vessels in the nose get enlarged and much nearer to the surface which makes them more prone to being ruptured.

Although seeing blood coming out of your noise can be alarming, most nosebleeds are not

serious and can be managed at home. Some, however, should be checked by your doctor. For instance, if you have frequent nosebleeds, see your doctor. This could be an early sign of

other medical problems that needs to be investigated. A few nosebleeds start in the back of the nose. These nosebleeds usually involve large blood vessels, result in heavy bleeding and can be dangerous. You will need medical attention for this type of bleed, especially if the bleeding occurs after an injury and the bleeding hasn't stopped after 20 minutes of applying direct pressure to your nose. (Read on to learn the steps for how to stop a nosebleed.) (2)

Some studies have shown that, up to 60% of the general population experiences epistaxis and only 6% of the seek medical attention for it (3).

OBJECTIVES:

A. To understand the aetiology/causes of epistaxis.

B. To know the related epidemiology of epistaxis.

C. To know the pathophysiology of epistaxis

D. How to perform examination to single out the source and cause of bleeding

E. To know about the available treatment options for epistaxis.

F. How to manage a patient in an emergency

G. Complications caused as a result of epistaxis

AETIOLOGY:

Epistaxis can have multiple causes which can be broadly divided into four categories:

i. LOCAL CAUSES

-In children, it is most commonly caused by trauma (nose picking)

-In adults, it is mostly of idiopathic origin.

- Infections can also be one of the causes.

- Tumours are rarely the causative factor but when a patient (young adults and elder patients) comes with a recurrent type of epistaxis, should be investigated for a tumour.

Comment [DMMC1]: The application of nasal probes should be considered, although it is mentioned later, it would be worth adding it here

ii. SYSTEMIC CAUSES

It can either be caused by primary haemostasis defect or secondary haemostasis defect.

Comment [DMMC2]: It would be worth adding craniofacial trauma, long-standing hypertension, and chronic kidney disease.

PRIMARY HAEMOSTASIS DEFECT:

- Thrombocytopenia caused due to decreased production (leukaemia, myelodysplastic syndrome) or due to increased destruction (Immune thrombocytopenic purpura, splenomegaly)

- Von Willebrand disease

SECONDARY HAEMOSTASIS DEFECT

It is due to decrease in the number of clotting factors in diseases like-

-liver diseases

-chronic alcoholism

-haemophilia

iii. ENVIRONMENTAL CAUSES

- Allergic reactions are the most common environmental factors that contribute to epistaxis.

-Environmental dryness during the winter season. (1)

iv. MEDICATION INDUCED

- NSAIDS – (ibuprofen, aspirin, naproxen)

- anticoagulants (warfarin)

- extensive use of nasal sprays

- clopidogrel

- supplement medication like vitamin E

- illicit drugs like cocaine

Epidemiology

Only four out of every 2.4 million deaths in United States are caused by nosebleeds, hence these are rarely fatal. About 60% of people have had a nosebleed at some point (4), yet only 10% of nosebleeds are serious enough to require treatment or some medical intervention. They are most common in youngsters aged 2 to 10 years old, as well as the elderly aged 50 to 80 years old (bimodal distribution).

PATHOPHYSIOLOGY

Blood arteries rupturing within the nasal cavity are the reason causing nose bleeding. Ruptures may occur spontaneously, as a result of trauma or due to the use of certain drugs, or because of the result of various systemic causes as mentioned earlier or different type of cancers. The length of the episode can be lengthened if the patient's blood pressure keeps on rising. The population taking an anticoagulant drug or suffering from bleeding disorders can also lengthen the time it takes for you to bleed. The majority of nose bleeds happen in the frontal area of the nose (Little's area) and the cause of bleeding can be acknowledged by careful nasal examination.

As we stated earlier, anterior bleeds from the Kiesselbach plexus is the most probable cause for the otolaryngologic emergency that we know as epistaxis. Generally, epistaxis occurs spontaneously but can also have traumatic causes. Trauma can be due to any of the following: habit of nose picking

unconsciously leading to recurrent bleeding; barotrauma; various fractures such as naso-orbito-ethmoidal fracture which is the most common as it injures the anterior ethmoidal artery.

Posterior bleeding on the other hand has usually two points of origin: the Woodruff plexus and the sphenopalatine artery. Woodruff plexus is located posterior and inferiorly to the

middle turbinate whereas the sphenopalatine artery is the terminal branch of the external carotid artery (5-12).

In patients who are under critical care supervision, epistaxis is caused in the patients who are fed through nasogastric route using tubes, coagulopathic disorders, uninterrupted positive airway pressure etc. Managing these patients is more burdensome as compared to the general population.

Posterior bleeding may also occur non-traumatically because of the sphenopalatine foramen out of which the sphenopalatine artery exits itself. This foramen is found posterior to middle turbinate and is the acknowledged area for the bleeding.

MEASURES BEFORE EXAMINATION:

Firstly, the ENT instruments which include nasal speculum, bayonet forceps, headlamp, suction catheter, silver nitrate swabs, cotton, topical anaesthetics and vasoconstrictor should be properly sterilized before being used.

Secondly, the physician should be wearing a proper personal protective equipment (PPE) before performing the physical examination

Thirdly, the patient should be made to sit in the examination chair comfortably and with enough suction to begin with.

EXAMINATION:

To find out the source of bleeding in the anterior region, speculum is introduced into the nasal cavity carefully.

For better visibility and handsfree flexibility, the headlamp is wore before using the speculum.

Sometimes the clot may form a barrier in the route of the bleed making it invisible to examiner and so, it has to be suctioned out and then examined.

Comment [DMMC3]: It is important to mention that Woodruff plexus is formed by branches of the sphenopalatine artery that includes the posterior septal artery, a frequent cause of posterior expistaxis.

For posterior bleed, the source cannot be identified by this simple examination so the nasal endoscopy is performed.

Various other diagnostic tests are also done for evaluation of systemic causes like liver function test (LFT), coagulation tests, complete blood count (CBC) and CT sinus.\

MANAGEMENT:

i. External pressure should be applied by pinching the nose to block the nares completely for ten minutes. This is known as trotter's method. The patient should be sitting in a bending forward position over a sink or bowl. Release the pressure after ten minutes to check if the bleeding has stopped.

Sometimes oxymetazoline may also be used for its haemostatic effect in addition to the manual pressure.

ii. Source of the bleeding should be found out by performing anterior rhinoscopy.

iii. IV is also given to the patient.

iv. When the source of bleed is large, local cautery like silver nitrate (AgNO3).

v. Sometimes due to inadequate care, bleeding may not stop even after using all the above measures, nasal packing is done (6). Nasal packing can be anterior nasal packing and posterior nasal packing. Anterior nasal packing is done using gauge or a merocele pack. And posterior nasal packing is done by Foley's catheter inflated with air. It is a highly efficacious method and packing should be placed for at least 1-3 days to refrain from bleeding again.

Comment [DMMC4]: Nasal packing is an emergency measure to stop bleeding immediately, but it is recommended to remove it in the shortest possible time (first 24 hours) and proceed with endoscopic ligation to avoid revascularization.

vi. Bleeding which is not controlled with nasal packing for that ligation of the responsible artery is done.

Arteries that can be ligated are sphenopalatine artery at sphenopalatine foramen, anterior ethmoidal artery, maxillary artery and external carotid artery.

Internal carotid artery should never be ligated.

Ligation of sphenopalatine artery nowadays gives a 100% result because of endoscopy.

Comment [DMMC5]: is currently the treatment of choice

Pinch the nose and make the patient sit bending forward (Hippocratic/Trotter's method)

Also get IV access

Local Cautery (AgNO3)

Anterior nasal packing (Foley's catheter inflated with air)

Ligation

Sphenopalatine artery at sphenopalatine foramen

Anterior Ethmoidal Artery

Maxillary artery- Caldwell Luc approach

External carotid artery

Comment [DMMC6]: It is worth explaining that external carotid artery ligation is only used in cases of severe facial trauma that prevent the endoscopic approach and the use of nasal packing due to possible intracranial complications.

DRUGS-

Treatment of epistaxis is restricted to the following medications-

Oxymetazoline HCl 0.05% – spray one or two times in both nostrils every 12 hours.

Phenylephrine 1% - spray one or two times in both nostrils every 4 hours.

BUT WHAT DO WE DO IN AN EMERGENCY SITUATON?

In an emergency case, nasal packing is done without any delay and should be done with number one priority. It can also be done using commercially available products which are not cumbersome to use.

This packing is not useful in the case of posterior bleeding so posterior packing is done.

In this procedure, a tampon or something like a gauze is routed up towards the part to suck the blood in and put pressure on the affected area which is also done seen in a simple wound or cut in our day to day lives.

This nasal packing generally is not infective or harmful and very rarely may complicate things further, in any case the complication still remains very local and can be treated pretty simply with antibiotics and removal of the nasal pack.

when anterior bleeding is continuous and non-stop the patient might need to undergo cauterization in which a swab of silver nitrate is used but used only in one side of nostril so that nasal perforation does not occur.

COMPLICATIONS OF EPISTAXIS:

Complications can rarely occur following epistaxis but when they occur, it may be sometimes be severe in nature. Complications can be as follows-

Sinusitis- rhinosinusitis can happen but it is treated easily by a small antibiotic course and on withdrawal of nasal packing.

Septal hematoma

External nasal deformity

Balloon migration

Haemorrhagic shock

Aspiration

Syncope

Mucosal pressure necrosis

Cerebellar abscess

Toxic Shock Syndrome (TSS)- cured by instant withdrawal of packing in the nasal area and culture of the necrosis affected group of tissues as well.

MATERIALS AND METHODS

PubMed and google search engine were used to search the following key terms-

“epistaxis”, “anterior epistaxis”, “posterior epistaxis”, “trauma”, “drug induced” epistaxis”, “Kiesselbach plexus”, “woodruff plexus”, “epidemiology of epistaxis”, “causes of nosebleed”

and from the result of these searches, articles were selected and used for writing this review. Tools from Microsoft word were used to create flowcharts and other illustrations.

CONCLUSION

To conclude, epistaxis is a very common otolaryngologic emergent situation with a bimodal age distribution (in children and elderly) yet also can be treated at home with conservative care. It is rarely fatal.

As we mentioned earlier, epistaxis can be due to rupturing of vessels in anterior region (Kiesselbach plexus) as well as the posterior region (Woodruff plexus) in the nasal antrum. Bleeding from the anterior region is generally more common (90%). It may generally be spontaneous in nature or be induced by either nose picking or by trauma to the inner tissue lining of the nose. It increases in the winters as compared to other seasons. It is because of decreased humidity during the winters which ultimately leads to reduced humidification of the nose.

Normally, epistaxis can have four of the following causes – local factors, systemic factors, environmental and medication induced epistaxis. Sometimes, there can be tumour which may compress the vessels in the nasal antrum and cause bleeding.

Local factors that contribute to nose bleed are trauma which either be localised (nose picking) or facial trauma, anatomical abnormalities, inflammatory causes etc. Systemic conditions which increase the risk of epistaxis are high blood pressure, cardiovascular diseases, vascular and bleeding disorders.

Trauma can be due to any of the following: habit of nose picking unconsciously leading to recurrent bleeding; barotrauma; various fractures such as naso-orbito- ethmoidal fracture which is the most common as it injures the anterior ethmoidal artery.

other less common causes of nose bleeding are given as follows:

Alcohol use.

Bleeding disorders, such as haemophilia or von Willebrand disease or leukaemia.

High blood pressure.

Atherosclerosis.

Facial and nasal surgery.

Nasal tumours.

Nasal polyps

Immune thrombocytopenia

Leukaemia.

Hereditary haemorrhagic telangiectasia (2)

In patients who are under critical care supervision, epistaxis is caused in the patients who are fed through nasogastric route using tubes, coagulopathic disorders, uninterrupted positive airway pressure etc. Managing these patients is more burdensome as compared to the general population.

Posterior bleeding may also occur non-traumatically because of the sphenopalatine foramen out of which the sphenopalatine artery exits itself. This foramen is found posterior to middle turbinate and is the acknowledged area for the bleeding.

In conclusion to this review article, epistaxis while being an emergency situation is a minor problem which 60% of the people have suffered sometime in their life and can be treated by conservative precautions.

Turns out nose bleeding may be something we have dealt with so easily in our past and yet on reading about it in detail it seems complicated. On bleeding around 250 ml in 2-3 minutes is found normal but more than that may require some medical attention.

We read about Epistaxis under various headings given above on how the word was coined, why It is so common, easy to occur, what are the types and causes of nose bleeding. Further we read about the management- both at home and in the hospital setting as well. The complications that are very rare but may occur and be life threatening.

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