Epistaxis Diagnosis and Treatment Update: A Review

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Abstract
Epistaxis is a nose hemorrhage of a very variable severity. This entity is the most frequent chief complaint in the emergency room involving the Otolaryngology Department. It is categorized into anterior and posterior epistaxis depending on the affected area. Anterior bleedings are easier to treat and luckily they account to the 80% of cases. The correct identification of the bleeding site and its etiology is vitally important for a successful treatment. Visualization of the bleeding site is usually achieved by rhinoscopy, but in some cases nasal endoscopy is needed. The first measure that needs to be taken is local pressure. If the bleeding persists, the correct identification of the site and chemical cauterization with silver nitrate should be performed. Electrical cauterization is indicated if the previous treatment fails. Surgical intervention is recommended if bleedings are refractory to conservative treatment. There is a variety of surgical approaches with specific indications and different success rates described in the manuscript.

INTRODUCTION
Epistaxis or nasal bleeding may be manifested as an isolated emergency, as a chronic disorder by recurrent bleeding events, or as a symptom of a generalized pathology. Nose bleedings are the most common chief complaint in the emergency room referred to otolaryngologists. They account to 1 in 200 visits to the emergency department.

Literature states that 60% of the population will suffer from epistaxis at least one time in their lifetime, and only 6% of them will require medical attention to stop the bleeding. The incidence of the event increases from age 20 and its highest rates peaks in the elderly [1].

The nasal bleedings are more common in winter than in other seasons. Meteorological variations such as barometric pressure, humidity and temperature changes affect the nasal vessels and may explain the seasonal fluctuations [2].

When epistaxis presents as severe, recurrent bleedings, the physician must suspect an underlying cause, such as Hereditary Haemorragic Telangiectasia or Juvenile Nasal Angiofibroma, in teenage boys [3].

The whole entity is divided into two main groups: anterior and posterior epistaxis, depending on its anatomical site of origin. Anterior epistaxis commonly develops from the Kiesselbach’s plexus on the lower anterior portion of the nasal septum, also known as little area. Anterior epistaxis is the most common presentation with a frequency of 80%. Posterior epistaxis arises from the posterior nasal septal artery, which is a branch of the sphenopalatine artery [4].

Keywords
• Epistaxis
• Endoscopic surgery
• Artery ligation
• Cauterization

Relevant Anatomy
Septum is irrigated by two mayor artery compounds: the internal and external carotid arteries. Both compounds communicate with each other forming an artery plexus. Internal carotid artery is implicated in the septum irrigation by arising the posterior and anterior ethmoidal arteries. The external carotid artery is involved in this anatomical site by giving the maxillary and facial arteries.

External Carotid compound
Facial Artery. It arises from the anterior surface of the external carotid, it gives rise to eight branches, and ends in the angular artery which is the terminal artery. One of the vessels that arises from the facial artery is the lateral nasal branch which runs by the nasogenian fold and irrigates the nasal ala and nasal lobe. Also, the subseptal artery arises from the anastomosis of the left and right superior labial arteries, and it is involved in the irrigation of the anteroinferior septal wall [5].

Maxillary Artery. This vessel runs from the infratemporal region to the sphenopalatine foramen and it gives rise to four groups of arteries in a total of 16 branches. The fourth group is the one implicated in epistaxis. One of the branches of this group is the palatine artery, which irrigates the soft palate and the palate vault, runs through the greater palatine foramen becoming the greater palatine artery. The terminal branch of the maxillary artery is the sphenopalatine artery. It goes through the sphenopalatine foramen and divides into the posterolateral nasal artery and the posterior septal artery. The first one gives rise to three branches which irrigate the turbinate region and
the middle and inferior meatus. The second one gives a branch that irrigates the superior turbinate and then runs through the nasal septum until it anastomoses with the terminal branch of the major palatine artery [5–7].

**Internal Carotid compound**

Ethmoidal Arteries. The ophthalmic artery, branch of the internal carotid, gives rise to the anterior and posterior ethmoidal arteries. The first one rises from the anterior ethmoidal foramen and irrigates the frontal and anterior ethmoidal sinuses. Then it gives rise to branches which irrigate the superior portion of the septum and the lateral nasal wall. The second one is implicated in the irrigation of the posterior region of the lamina cribosa [7].

**Kiesselbach Area**

This area is also called Little’s area and it is irrigated by branches of the sphenopalatine artery, greater palatine artery and facial artery. This area is composed of potentially vulnerable thin large vessels. It’s a site of great relevance, being the most affected portion in anterior Epistaxis [8].

**SIGNS AND SYMPTOMS**

The clinical appearance of a patient with an epistaxis event will depend on the etiology of the underlying pathology. However, patients may be emotionally altered due to the evident blood loss they are observing. This anxiety may cause an increase in blood pressure and tachycardia.

**DIAGNOSIS**

Clinical diagnosis is commonly evident and presents no challenge for physicians to identify. Usually, a headlight and a rhinoscope may be enough to identify the bleeding area. However, the etiological diagnosis may be complicated in some cases due to the wide variety of pathological entities that predisposes epistaxis events.

The etiological diagnoses in nose bleedings are classified into two major factors: local and systemic. However, in more than half of the events the specific etiology is not found [9].

**Local Factors**

These factors commonly produce nose bleeding by altering the normal physiology of the nasal mucosa and its vessels. Facial trauma including nose picking is most relevant during infancy. Foreign bodies and insertion of medical materials such as nasogastric tube or nasoatraqueal intubation are also a cause of epistaxis. Infectious and inflammatory entities such as sinusitis, rhinitis and allergies; and topical decongestants and drugs like cocaine are also local factors contributing to nose bleeding events [9].

**Systemic Factors**

These causes are associated with epistaxis, and the most common systemic factors include pathologies that increase the blood pressure, cardiovascular disease, factors that alter the coagulation processes, and inherited or acquired blood dyscrasias [10].

The theory that states that hypertension is the cause of epistaxis is still in debate. There is plenty of evidence that supports the association of high blood pressure in Epistaxis [11,12]. Some authors, as Moriyuki, have found that systolic blood pressure is significantly higher in patients with Epistaxis [13]. However, in one study, the author measured the blood pressure of patients during the bleeding event and it showed no difference to the one measured on routine situations [14].

Cardiovascular factors are associated with the risk of epistaxis events due to the volume overload and increased pressure in venous vessels, triggering rupture of the thin arteries in the Kiesselbach area. This factors include congenital heart failure, mitral stenosis, coarctation of the aorta, and superior vena cava obstruction.

Coagulation dysfunctions are usually developed by medication such as non-steroidal anti-inflammatory drugs, clopidogrel and warfarin. Lymphoproliferative diseases, chronic alcohol intake, renal and liver dysfunction are also related to platelet/coagulation dysfunction [15].

One third of patients with recurrent epistaxis have and underlying hemostatic disorder, such as coagulation factor deficiencies, Von Willebrand disease, and several rare inherited platelet function disorders. [16]

**TREATMENT**

[Anterior epistaxis are simpler and easier to treat. Since the 80% of nasal bleedings are anterior, the most part of this events are solved with conservative treatment.]

**Medical therapy**

Usually, non-severe epistaxes are stopped by applying local pressure in the affected area. However, if this approach does not solve the hemorrhage, the first line of treatment is chemical cauterization with silver nitrate. As stated by the Guidelines of the French Society of Otolaryngology, this initial treatment is less aggressive for the mucosa. In case of failure, electric cauterization should be performed [17].

There is controversy when it comes to decide whether to use chemical/electrical cauterization or nasal packing with vasoconstrictor agents. Some authors claim that when a single site of anterior bleeding is identified, a phenylephrine or oxymetazoline solution are effective examples of vasoconstrictor drugs, and re inspection must be done after at least five minutes of direct pressure to the nasal septum with cotton pledges soaked in vasoconstrictor agents, previously placed in the anterior portion of the septum [18].

On the other hand, a newer study work showed evidence that suggest the effectiveness of electro cauterization. It showed better results over the nasal packing, which presented more bleeding recurrences. It stated that electrocautery must be the first-choice treatment in all sites of bleeding, and nasal packing should be inadvisable for posterior bleedings due to the pain [19].

If nasal packing is decided, topical antibiotic should be placed in the pack. It should not be left more than five days to prevent infections, and the most serious complication: toxic shock. Also, oral antibiotics should be prescribed for as long as the packs remain in the nose [20].
Surgical

Conservative medical treatment should be the first choice, surgical and interventional treatments are only indicated when epistaxis could not be controlled by the first mentioned [21].

Endoscopic cauterization

A number of studies show that endoscopic cauterization for posterior bleedings are a very effective non radical approach. A recent study published in 2016, concludes that endoscopic monopolar cauterization is a non-invasive, well-tolerated, effective and reliable procedure to perform for control in intractable Epistaxis [22]. Success rates of this approach round from 80 to 90% [23].

Artery Ligation

Maxillary artery ligation is frequently performed by the Caldwell-Luc approach. Complications: upper teeth pain, intraorbital neuralgia, oroantral fistula, sinusitis, damage to the sphenopalatine ganglion, and blindness is rare. Prevalence of complications is 28% [25].

Anterior ethmoid artery ligation was first made by an external approach, though a Lynch incision. With the advances in endoscopic technology, the endoscopic anterior ethmoidal artery ligation is a very effective surgical treatment. Authors researching this technique suggest to perform this surgical approach only when the anterior ethmoidal artery is clearly visible. If not, an external approach should be offered. However, there this artery was correctly identified in 98.5% of cases in a study published in 2011 [26].

The surgeon should be familiarized with the anatomy of this artery to avoid complications such as Cerebro Spinal Fluid leak. Other complications of this surgical approach are scarring, edema, and facial ecchymosis [27].

Endoscopic sphenopalatine artery ligation is also another approach for posterior epistaxis, with evidence that show good results in its use. It is performed by an incision in the dorsally to posterior portion of the attachment of the middle turbinate. A mucosal flap is elevated and the sphenopalatine artery is exposed, dipped, and ligated [28].

However, there is a study published in 2014 that compared endoscopic techniques. Authors of this work conclude that both techniques are very effective. The study also showed that anterior ethmoid artery ligation is more effective than sphenopalatine artery ligation [29].

DISCUSSION & CONCLUSION

After extensive research, we conclude that epistaxis is a pathological entity with countless implications, being the most common otolaryngological emergency. There is no standard classification for the severity of the hemorrhage and it may vary from patient to patient. Specific treatment will depend of the artery that its involved. The most fundamental action for an effective treatment is the correct identification of the bleeding artery. We suggest more and deeper studies to continue to expand the knowledge of these hemorrhagic events.

REFERENCES


