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Etiopathogensis of Epistaxis and its Management in a Tertiary Care Centre

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Abstract

Epistaxis is a common clinical problem and is an uncomfortable experience that can cause great apprehension and anxiety in patients. Most nose bleed are benign, spontaneous and self-limiting. Epistaxis can range from minor bleed to profuse bleed that can be life threatening and warrant urgent medical attention. By this means it becomes necessary to study aetiology, age and sex incidence, seasonal variation, site and management of epistaxis.

Aim: This study is to identify the most common cause of epistaxis among all age group and its management methods.

To find out which is the most effective method to manage anterior and posterior epistaxis.

To know the age and gender distribution among epistaxis cases.

To study the various bleeding sites and predisposing causes of epistaxis.

Methodology: Data for this study was collected from the Patients visiting the department of ENT, department of Emergency Medicine and referred from other departments of Ramaiah Medical College hospital, Bengaluru

Study period: The study will be conducted over a period of 18 months-Nov 2019 to April 2021.

Study design: A prospective study

Result: The peak incidence of epistaxis was noted in third and sixth decade of life. Male were more affected than female. Bilateral nasal bleeding was more common than to unilateral nasal bleeding. Anterior nasal bleeding was found to more common than posterior nasal bleeding. Trauma is the most common cause 76.2% of cases needed no active intervention and were managed medically.

Keywords: Epistaxis, Nasal packing, ESPAL, Embolisation, Endoscopic management

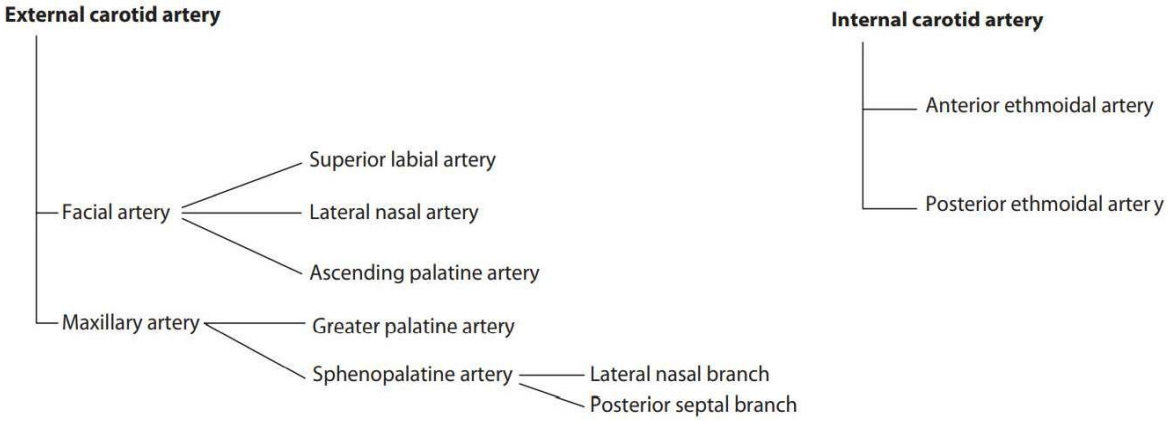
Introduction

It is derived from the word Epistazo -where epi means above and stazo means to fall in drops[1]. The first attempts at arterial ligation were done in 1868 (Bartlett and McKittrick, 1917) when Pilz of Breslau tied the common carotid artery, and it was much later that external carotid ligations were performed for the control of nose bleeds. Seiffert (1928) introduced ligation of the internal maxillary artery via a transantral approach and Goodyear (1937) was the first to ligate the anterior ethmoidal artery[2].

There is a bimodal distribution for peak incidence, with children younger than 10 years of age and adults older than 35 years of age being most commonly afflicted. Furthermore, epistaxis tends to be more common among men, and more visits tend to occur in the winter. A possible explanation in variation between men and women is that estrogen appears to have a protective effect on the nasal vasculature and

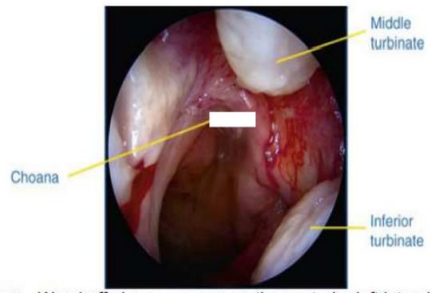
the winter season, especially in less humid geographic reasons, tends to irritate the nasal mucosa and increase the risk of bleeding[3].

The vascular supply to the nose has contributions from both the external and internal carotid systems. The branches of the external carotid artery (ECA) that provide a significant contribution to this vascular supply are the ascending pharyngeal artery, the facial artery, and terminal branches of the internal maxillary artery (IMA).



Kiesselbach plexus as seen on the anterior right nasal septum during nasal endoscopy. (From Chiu AG, Palmer JN, Adappa ND (eds): *Atlas of Endoscopic Sinus and Skull Base Surgery*, ed 2, Philadelphia: Elsevier, 2013.)

Figure 1 - Endoscopic View of Kiesselbach Plexus



Woodruff plexus as seen on the posterior left lateral nasal wall during nasal endoscopy. (From Chiu AG, Palmer JN, Adappa ND (eds): *Atlas of Endoscopic Sinus and Skull Base Surgery*, ed 2, Philadelphia: Elsevier, 2013.)

Figure 2- Endoscopic View of Woodruff Plexus

Etiology:

Local Factors

1-Local factors alter the normal physiologic function of the nose, exposing the vascular network to conditions that when coupled with environmental factors (decreased temperature and humidity) lead to vascular injury with haemorrhage. Changes from a cold outside environment to a warm dry one result in variations of the normal nasal cycle of alternating congestion and decongestion. This in turn leads to sinonasal congestion and infection, engorgement of nasal mucosa and ultimately epistaxis. Patients who suffer from rhinosinusitis of whatever cause are more prone to epistaxis because the nasal mucosa is more inflamed and friable.[5]

2-Trauma is one of the common causes of epistaxis. Any direct force causing of shearing effect or fracture will more than likely be accompanied by haemorrhage. Also, trauma in adjacent regions such as the maxillary sinuses, orbit and middle ear may manifest as nasal haemorrhage. In base of skull fractures with involvement of the anterior sphenoid sinus wall, the nasal septal artery may be interrupted causing severe persistent nasal haemorrhage.[6]

3-Anatomical or structural deformities, congenital or acquired may involve the cartilaginous or bony septum or the nasal turbinate's. These deformities lead to abnormalities in the normal airflow patterns within the nasal cavity, causing certain areas of mucosa to be exposed to the constant turbulent air

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currents, bacteria and environmental irritants. Since the underlying vessels are thin walled and superficial, they are easily exposed to the drying effects of turbulent air currents causing them to rupture with the slightest traumatic insult, such as picking or rubbing the nose.[6]

4-Foreign bodies in nose are usually seen in children or mentally retarded individuals. They present as unilateral foul-smelling nasal discharge varying in colour. Toxic or chemical irritants such as printer's ink, sulphuric acid, phosphorus, ammonia, gasoline and chromates can cause enough irritation to the nasal mucosa to initiate a haemorrhagic event[6].

A variety of other conditions which may present as a mass, ulcer or growth in the nasal cavity can give rise to epistaxis. This may include a nasal polyp, Epistaxis is mild and unusual) rhinosporidiosis (red, friable recurrent nasal mass) juvenile nasopharyngeal angiofibroma (Recurrent severe bleeding in an adolescent boy) neoplasms (Transitional cell papilloma, squamous cell carcinoma).[5]

Systemic or general factors:

1-Arteriosclerosis associated with hypertension is by far the commonest cause, particularly in the geriatric population. The atrophic mucosa that results from the aging process loses, much of its normal physiologic protective properties, drying and cracking down easily. This ultimately leads to the exposure of the already arteriosclerotic vessel, which during a hypertensive episode can easily rupture with resultant haemorrhage posteriorly[6]

2-Hereditary haemorrhagic telangiectasia is a common disease of the vascular structures that leads directly to intermittent epistaxis. This condition is considered an autosomal dominant disease, being transferred from either parent to a child of either sex. Characteristically there is a lack of contractile elements in the vessel walls, affecting both the elastic and muscular tissue elements. As a result of structural deficiencies, arteriovenous fistulae are formed which are noted on histological examinations.[6]

Patients undergoing chronic haemodialysis may encounter prolonged epistaxis. Probably a prostacyclin with platelet anti-aggregatory properties may be responsible for the bleeding. The other blood dyscrasias that deserve mention are the leukaemia's, multiple myeloma and idiopathic thrombocytopenic purpura. Alcohol abuse with poor dietary intake can also lead to vitamin deficiencies. Vitamin C deficiency causes poor wound healing and wound disruption, while a deficiency of vitamin K- leads to a decrease in the production of prothrombin (Factor II). Parenchymal liver damage causes a decrease in fibrinogen and prothrombin production altering the blood clotting mechanism. A decrease in platelet adhesiveness in patients on mega doses of vitamin E has been noted. During pregnancy thrombocytopenia can occur particularly if folic acid deficiency is present.[6]

Some of the drugs that affect the clotting mechanism are, aspirin, anticoagulants, nonsteroidal anti-inflammatory agents, chloramphenicol and carbenicillin. Dipyridamole is a platelet antiaggregating agent appears to inhibit adenosine 13 diphosphate and collagen induced platelet aggregation thereby prolonging the bleeding time.[6]

Systemic toxic agents such as heavy metals (phosphorus, mercury chromium) have been associated with epistaxis as have infectious diseases like scarlet fever, small pox, typhoid fever, rheumatic fever, whooping cough, nasal diphtheria and leprosy. Cardiovascular factors, including congenital heart failure, mitral stenosis, co-arctation of aorta can predispose the patients to increased systemic venous pressures. This pressure is transmitted to the nasal mucosa as well, rupturing the vessels in the Little's area.[6]

Idiopathic epistaxis:

In many cases, bleeding arises from an artery or a vein without any obvious abnormality to account for it. Hence the terms 'spontaneous' or 'idiopathic epistaxis' have been coined to cover this category.

The Pathophysiology of Epistaxis Sources of Bleeding in the Nose:

1. The vast majority of patients who suffer from arterial epistaxis bleed from the nasal septum and chiefly from the area where anastomosis of the sphenopalatine, greater palatine, anterior ethmoidal and septal branch of superior labial arteries takes place.

The reasons are:

a) The vessels are in the mucosa and superficial.
b) Vulnerable to drying by air currents and crusting.

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c) Vulnerable to trauma especially finger nail trauma.

2. The venous bleeding commonly seen in young people is mainly due to the retro columellar vein at the anterior edge of Little's area.
3. Haemorrhage nodules which can occur in any nasal location can also be a source of bleeding. They consist of an aneurysmal dilatation of an unusually sited muscular artery with evidence of hypertensive changes in wall and thrombus and haemorrhage in the adjacent connective tissue.
4. The septal turbinate represents an area of engorged vascular nasal mucosa on the septum. It may be unilateral or bilateral and can be a source of profound epistaxis. Its location may explain why a submucous resection cures some cases of septal epistaxis.
5. Woodruff's plexus can be source of posterior epistaxis[8].

Pathology of arteries:

The medium and smaller nasal arteries of persons dying in middle and old age have shown that these are subject to a progressive replacement of muscle-tissue in tunica media by collagen. This change varies from interstitial fibrosis to almost complete replacement of the muscle by scar tissue. It seems likely that patients with a history of epistaxis exhibit the changes in a more severe form accounting for the lengthy duration of haemorrhages probably due to a failure of vessel to contract in the absence of sufficient muscle in the tunica media. It is proven that larger vessels of the calibre of maxillary artery are prone to calcification (Monckeberg's sclerosis). The resulting lack of elasticity could well contribute to the pathogenesis of small vessel rupture by the creation of a local systolic hypertension.[8]

Management:

1. Sliver nitrate cauterization: Cauterization of the vessel and a 2-to-3 mm circumferential area will effectively interrupt feeding anastomoses[6].
2. Electric cauterization: Bleeding can persist or recur after with silver nitrate. This problem may be managed with packing or electric cauterization. Local anaesthesia will decrease the pain of cautery. Electric coagulation induces a deeper penetration and more tissue destruction than silver nitrate. Repetitive cauterization increases the likelihood of septal perforations. Therefore, precise identification of bleeding site is imperative. Light petrolatum gauze packing impregnated with antibiotic ointment or absorbable packing (e.g., surgical) is useful to cover the area, decrease infection risk, and maintain local moisture.[6]
3. Laser photocoagulation: A study reported a series of patients with hereditary haemorrhagic telangiectasias treated with argon and neodymium: yttrium-aluminium-garnet (Nd: YAG) laser. Nineteen patients were treated one or more times, with follow-up periods ranging from 2 months to over 3 years. Patients with no, occasional, or multiple prior blood transfusions experienced excellent, moderate, or poor control, respectively[6].
4. Nasal packing –
   - ❖ Anterior nasal packing constitute of traditional ribbon gauze packing, prefabricated expandable packs, or intranasal balloons applied to an identified or unidentified bleeding site the traditional anterior pack of petrolatum gauze (0.5 × 72 inch) coated with an antibacterial ointment is firmly packed in a layered fashion toward the posterior choanae after decongestion and local anaesthesia placement. Local anaesthesia, in addition to decreasing discomfort, may decrease the risk of apnoea, bradycardia, and hypotension by blocking the nasal-vagal reflex.
   - ❖ The posterior pack is generally used in conjunction with an anterior pack, because the main purpose of the posterior pack is to stabilize the anterior packing. All patients with a posterior packing should be admitted and monitored in a hospital setting

Surgical Management:

1. Greater Palatine Canal Injection it is a anaesthetic injection technique of the greater palatine foramen/canal that can be used to control posterior nasal bleed involving the sphenopalatine artery.
2. Endoscopic Management- Flexible fibreoptic nasopharyngoscope was initially used to direct cauterization efforts. The flexible scope allowed excellent visualization of the

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posterior nasal cavity but was cumbersome when cauterizing the bleeding site.

3. Endoscopic Sphenopalatine Artery Ligation- Over the years, endoscopic sphenopalatine artery ligation (ESPAL) has gained in prominence as a reliable, safe, and effective way to control epistaxis refractory to conservative measures and as a substitute to nasal packing. The procedure is usually performed under general anaesthesia[3].
4. Endoscopic Maxillary Artery Ligation - One alternative means to circumvent dissection and individual control of all sphenopalatine tributaries is to attain proximal control through maxillary artery ligation. Exposure of this large-caliber vessel involves a maxillary antrostomy with exposure of the posterior wall of the maxillary sinus[3].
5. Intraoral Ligation of the Maxillary Artery- In 1984, Maceri and Makielski described an intraoral approach to ligate the infratemporal portion of the maxillary artery. The procedure is useful in children as an alternative to embolization and external carotid artery ligation for removal of vascular tumours[10].
6. Trans antral Sphenopalatine Artery Ligation- In 1982, Simpson et al. described a modified Caldwell-Luc approach to ligate the sphenopalatine artery while avoiding entrance into the pterygopalatine fossa[10].
7. Ligation of the Anterior and Posterior Ethmoidal Artery-The anterior and posterior ethmoid arteries can be ligated to decrease blood flow to the upper nasal vault from the internal carotid artery system It is generally performed in conjunction with ligation of the maxillary artery or the external carotid artery. Anterior and posterior ethmoid artery anatomy and ligation were first described by Kirchner et al. in 1961[10].
8. Embolization: Cerebral angiography with transarterial embolization by interventional radiologists is an effective option for treatment of recalcitrant epistaxis, with reported success in 75% to 92% of cases. Advantages include avoiding the need for general anesthesia and use in poor surgical candidates. However, inadvertent embolization of nontarget vessels or migration of embolic materials has been associated with blindness (ophthalmic artery), cerebrovascular accident (internal carotid artery), and other complications related to vascular infarction[3].

Methodology

Data for this study was collected from the Patients visiting the department of ENT, department of Emergency Medicine and referred from other departments of Ramaiah Medical College hospital, Bengaluru Total of 122 patients were taken up for the study

Study period: The study will be conducted over a period of 18 months-Nov 2019 to April 2021.

Study design: It was a prospective study

Inclusion criteria: Patients who present to department of ENT, department of Emergency Medicine and referred from other departments will be taken up for study.

Exclusion criteria: Patient presenting with epistaxis as a result of recent septal or paranasal sinus surgery will be excluded from this study.

Statistical analysis:

- All the quantitative variables such as age of the patient were analysed using descriptive statistics such as mean and standard deviation.
- All the qualitative variables such as gender, different aetiology, site of bleeding, treatment etc. were analysed using frequency and percentage
- Chi square test will be used to find out the association.

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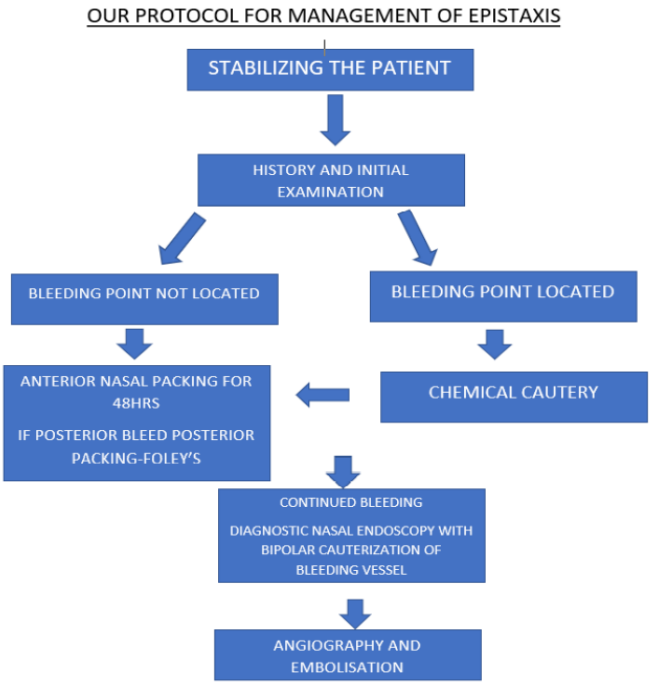

Results:

Table 1: Age in years - Frequency distribution of patients studied

Age in Years	No. of Patients	%
1-10	11	9.0
11-20	9	7.4
21-30	23	18.9
31-40	12	9.8
41-50	10	8.2
51-60	21	17.2
61-70	16	13.1
71-80	18	14.8
81-90	2	1.6
Total	122	100.0

Mean ± SD: 44.38±22.93

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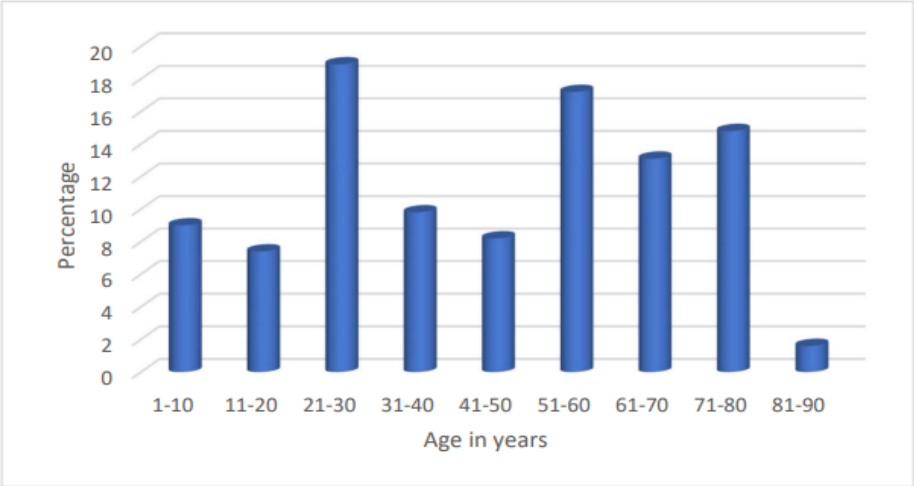


Graph-1: Age in Years

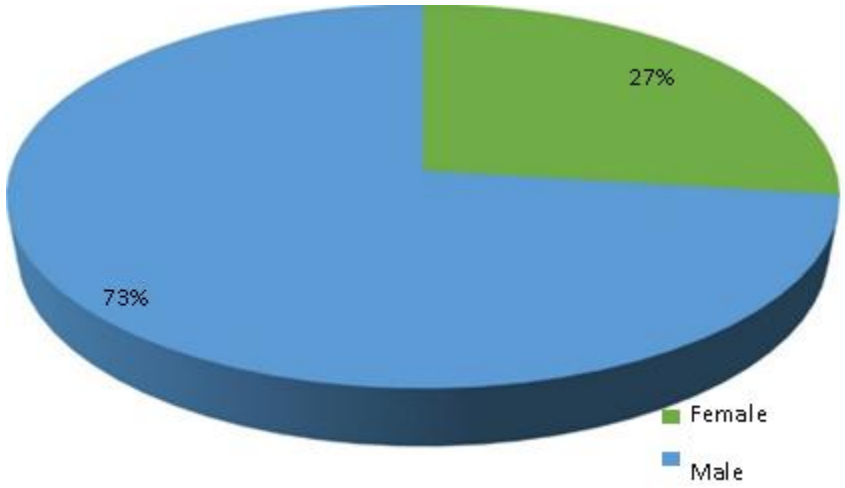
In our study the youngest patient was 1 year and oldest was 85 years.

The peak incidence was noted in third and sixth decade of life, where as incidences in extreme ages was comparatively low.

Table 2: Gender- Frequency distribution of patients studied

Gender	No. of Patients	%
Female	33	27.0
Male	89	73.0
Total	122	100.0

Graph-2: Gender



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In our study male predominance constituting about 73% of the total number of patients, females made up to 27% of study.

Table 3: Nasal Bleed Side - Frequency distribution of patients studied

Nasal Bleed Side	No. of Patients	%
Left	7	5.7
Right	10	8.2
Both	105	86.1
Total	122	100.0

In our study bilateral nasal bleeding was noted more commonly when compared to unilateral nasal bleeding.

Table 4: Site Involved - Frequency distribution of patients studied

Site	No. of Patients	%
Anterior	118	96.7
Posterior	4	3.3
Total	122	100.0

In our study anterior nasal bleeding was found to more common then posterior nasal bleeding.

Table 5: Co-Morbidities and Pre-Disposing Conditions - Frequency distribution of patients studied

Variables	No. of Patients	%
Hypertensive		
• No	74	60.7
• Yes	48	39.3
Diabetic		
• No	105	86.1
• Yes	17	13.9
On anti Coagulants		
• No	90	73.8
• Yes	32	26.2
Total	122	100.0

Out of 122 cases 48 of them had accelerated hypertension/ uncontrolled hypertension, 32 patients were on anticoagulants.

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Table 6: History of trauma and nasal bone fracture

H/O Trauma		
• No	72	59.0
• Yes	50	41.0
Fracture of Nasal bone		
• No	105	86.1
• Yes	17	13.9

Trauma accounted for the highest number of cases of nose bleed-with 41% in the study. This included cases of nose picking, nasal bone fracture, history of RTA. No cases of any nasal mass, foreign body were noted in the study.

Table 7: Active Intervention

Variables	No. of Patients	%
No	93	76.2
Yes	29	23.8
Total	122	100.0

76.2% of cases needed no active intervention and were managed medically with systemic and topical hemostsics, antibiotics, xylomethazoline nasal drops, nasal pressure.

Table 8: Active Intervention

Variables	No. of Patients	%
No	93	76.2
Yes	29	23.8
• IVALON packing	19	15.5
• DNE+ Cauterisation	6	4.9
• Chemical cautery	4	3.3
Total	122	100.0

Out of 122 cases 29 cases required active interventions- such as ivalon nasal packing, chemical cautery(silver nitrarte), and diagnostic nasal endoscopy followed by bipolar cautery under general anesthesia after 48hrs of nasal packing.

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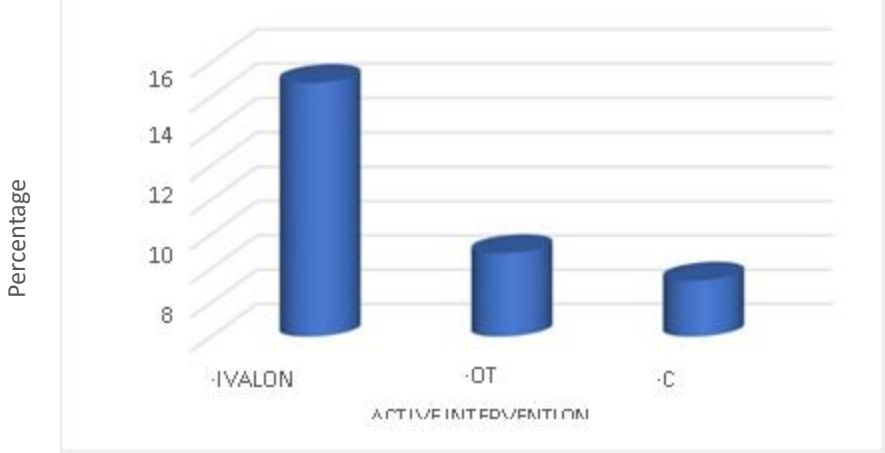

Graph-3: Active Intervention

Table 9: Operated

Operated	No. of Patients	%
No	116	95.08
Yes	6	4.91
Total	122	100.0

6 (4.91%) patients underwent diagnostic nasal endoscopy and cauterisation of bleeding vessel.

Discussion:

In this study as per our data, many patients were treated in out- patient department. The male and female ratio 2.7:1, the male dominance might be due to high cases of trauma. The incidence in males is more as they are more exposed to trauma, assault and other injuries. Another possible explanation in variation between men and women is that estrogen appears to have a protective effect on the nasal vasculature[3]. Proportion of males and females in the present study is comparable to study conducted by Gulshaan Hussain et al[11] and Dr Binod Sinha[12]. Arshad et al., in their study found 76 males and 33 females with male to female ratio of 2.4:1[13]. Chaiyasate S. et al. reviewed 55 cases and mentioned that 41 cases were males and 14 were females[21]. The age wise distribution of the patients shows that majority of patients were found between 3rd and 6th decade. The youngest patient was 1 year old and oldest was 85. The incidence was found to be lower in older age group.

In a study done by Amusa et al[15] incidence was more in 3rd decade. Bilateral nasal bleeding was more common than unilateral nasal bleeding and anterior nasal bleed was more common than posterior nasal bleed. This is comparable to the study by Hussain et al[11].

Etiology- in our study the most common cause of epistaxis is trauma, next common cause was uncontrolled, Accelerated hypertension which contributed to 39.3%. Use of anticoagulants contributed to about 26.2% of total cases.

In majority of the patients nasal bleeding was sudden in onset, may be because the most common cause is trauma.

Recent study by Amusa et al showed traumatic epistaxis in 70.9% of cases[15]. This can be explained on account of higher accident rate due to increase in the number of vehicles and bad roads and also increase in number of assault cases. The other major cause of epistaxis is hypertension which accounts for 39.3% of all the cases. Hypertension was a major etiological factor in studies conducted by Juselius[16] (47.3%), Monjas et al[16] (56%). This may be due to the increase in lifestyle diseases. Nowadays it is said that hypertension is not the cause of epistaxis but it prolongs the bleeding once it starts because in patients with hypertension there is arterial muscle degeneration that leads to defective muscle layer lacking the power to contract resulting in persistence

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rather than initiation of bleeding. However, the causative factor that might be responsible for the rupture of vessel is still unknown[17]. Some of our hypertensive patients with epistaxis were found to have uncontrolled hypertension due to cessation of antihypertensive medications and inadequate drug therapy because of infrequent check-up; hence the need of regular blood pressure check-up and compliance to the antihypertensive medications should be emphasized.

There is also a degree of controversy regarding whether patients with thromboembolic risks presenting with a minor nosebleed or bleeding from an inaccessible site should be treated using local measures or surgical interventions. Further high-quality research will be required to resolve this issue[18,19].

Out of 122 cases 28 of them required active interventions such as ivalon nasal packing, chemical cautery which contributed to 15.5% and 3.3% respectively.

Out of 122 cases 93 of them were managed conservatively with, applying pressure, topical and systemic use of tranexamic acid, decongestants and adequate control of bp and with-holding of anticoagulants for a day or two.

This is in accordance with Phillip et al[20]. Study where 83% of the patients were treated successfully by non-interventional means.

In a study done by Arshad et al., 81.66% patients responded to conservative or nonsurgical treatment. In 18.35% patients some surgical procedures were performed[13]. Out of the 122 cases 19 patients required anterior nasal packing using ivalon nasal pack 6 of them recurrent nasal bleeding after pack removal and they underwent diagnostic nasal endoscopy and cauterisation of bleeding vessel. Numerous advances have been made in the management of epistaxis. Depending upon the suspected underlying cause of epistaxis and the equipment available at the primary care facility, practitioners may choose between conventional methods (e.g., nasal packing) and more sophisticated methods (e.g., electric cauterization and endoscopic devices).

Conclusion:

Epistaxis is a common clinical condition encountered by the otorhinolaryngologist. It is prevalent in the 3rd and 6th decade of life. It is found to be more common in males than females. It occurs frequently in cold and dry climate. Anterior epistaxis is more common than posterior. The common causes epistaxis are trauma, hypertension, septal abnormalities, bleeding disorders and idiopathic. Trauma and infection being more common in children and young adults, and hypertension in the elderly. Majority of cases of epistaxis are manageable by conservative measures and only few require surgical intervention.

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