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A Clinical Study of Aetiopathogenesis and Management of Epistaxis

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KEYWORDS

Epistaxis.
Aetiopathogenesis.
Management.

ABSTRACT:

Background: Epistaxis is one of the most common emergencies encountered in otorhinolaryngology, with multifactorial etiologies ranging from local trauma to systemic disorders. Despite being usually benign, recurrent or severe epistaxis can be life-threatening and requires prompt evaluation and management.

Aim: To evaluate the aetiopathogenesis and management of epistaxis in patients presenting to a tertiary care center.

Materials and Methods: This prospective observational study included 150 patients presenting with epistaxis to the Department of ENT at Andaman institute of medical sciences,portblair. Detailed history, clinical examination, and relevant investigations were performed to identify etiological factors. Management strategies were individualized, ranging from conservative measures (cautery, anterior nasal packing) to surgical or interventional approaches (posterior packing, endoscopic sphenopalatine artery ligation, embolization). Patients were followed up for short-term outcomes, including hemostasis, recurrence, and hospital stay. Statistical analysis was performed using chi-square and t-tests, with $p < 0.05$ considered significant.

Results: The mean age was 39.4 ± 17 years, with a male predominance (72.7%). Anterior epistaxis constituted 88.7% of cases, while posterior bleeds accounted for 11.3%. Trauma (64.7%) was the most common etiology, followed by hypertension (14.0%) and neoplasms (8.0%). Conservative treatment achieved hemostasis in 84.7% of patients within 24 hours, with a rebleed rate of 12.7%. Surgical or interventional measures were required in 25.3% of cases, with endoscopic cautery and ESPAL showing success rates above 85%. The mean hospital stay was 2.43 ± 1.32 days, significantly shorter in conservatively managed patients compared to surgical groups.

Conclusion: Epistaxis most commonly affects younger adult males and is predominantly anterior and trauma-related. Conservative treatment remains highly effective, while surgical or interventional techniques are reserved for refractory cases with excellent outcomes. A stepwise, cause-oriented approach ensures optimal patient care.

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INTRODUCTION

Epistaxis, commonly known as nosebleed, is one of the most frequent otorhinolaryngological emergencies encountered in clinical practice. The term "epistaxis" is derived from the Greek word *epistazo* meaning "to drip out," which aptly describes the condition. It affects nearly 60% of the population at some point in their lifetime, although only around 6% of cases require medical intervention. While often benign and self-limiting, epistaxis can sometimes present as a life-threatening hemorrhage, particularly in elderly patients or those with comorbidities such as hypertension, hematological disorders, or malignancies.[1]

Epistaxis demonstrates a bimodal age distribution, with peaks in children younger than 10 years and adults older than 60 years. In children, epistaxis is often related to local trauma, digital manipulation, and mucosal dryness, while in adults systemic factors such as hypertension, arteriosclerosis, or anticoagulant use frequently contribute. Males are more commonly affected than females, with studies reporting a male-to-female ratio ranging from 2:1 to 3:1. Seasonal variations are also noted, with higher incidence during winter months due to low humidity, mucosal dryness, and increased prevalence of upper respiratory tract infections.[2]

The majority of epistaxis cases are anterior in origin, arising from the Kiesselbach's plexus (Little's area), a vascular anastomotic network located in the anteroinferior part of the nasal septum. Posterior epistaxis, originating from Woodruff's plexus, is less common but clinically significant as it is more severe, difficult to control, and more likely to require hospitalization.[3]

The causes of epistaxis are multifactorial and are broadly divided into local and systemic factors.

Local causes include trauma (nose picking, road traffic accidents, sports injuries), foreign bodies, septal deformities, neoplasms (benign and malignant), iatrogenic factors such as nasal surgeries, inflammatory conditions (rhinitis, sinusitis), and environmental irritants (smoke, chemical exposure, high altitude).[4]

Systemic causes include hypertension, arteriosclerosis, hematological disorders (hemophilia, leukemia, thrombocytopenia, von Willebrand disease), hepatic and renal dysfunction, malnutrition, vitamin deficiencies, and anticoagulant or antiplatelet therapy. Hypertension has historically been debated as a direct cause of epistaxis, but current consensus suggests that while it may not initiate bleeding, it plays a critical role in prolonging and worsening episodes by interfering with hemostasis. Trauma remains the leading cause of epistaxis in young adults, whereas systemic factors dominate in elderly patients.[5]

Aim

To evaluate the aetiopathogenesis and management of epistaxis in patients presenting to a tertiary care center.

Objectives

1. To determine the common etiological factors of epistaxis in the study population.
2. To evaluate the epidemiological and clinical profile of patients presenting with epistaxis.
3. To assess the efficacy of different treatment protocols in the management of epistaxis.

MATERIAL AND METHODOLOGY

Source of Data

The study included patients presenting with epistaxis to the casualty and ENT outpatient department of ANIIMS (Andaman & Nicobar Islands Institute of Medical Sciences), Port Blair.

Study Design

This was a prospective observational clinical study.

Study Location

The research was conducted at the Department of ENT, ANIIMS, a tertiary care teaching hospital.

Study Duration

The study was conducted over a period of 18 months (January 2021 – June 2022).

Sample Size

A total of **150 patients** with epistaxis were included in the study.

Inclusion Criteria

- Patients aged 17 years and above presenting with epistaxis.
- Patients who consented to participate in the study.

Exclusion Criteria

- Patients below 17 years of age.
- Patients with incomplete clinical records or who refused consent.

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Procedure and Methodology

All patients underwent a detailed clinical evaluation which included:

History: onset, duration, frequency, quantity of bleeding, associated symptoms, trauma history, systemic illnesses, and drug intake.

Examination: general physical and systemic examination with special emphasis on ENT examination.

Nasal Endoscopy: performed in cases with active bleeding to localize the bleeding site.

First Aid and Resuscitation: vital signs monitoring, airway management if required, and fluid replacement.

Treatment Protocol:

Anterior epistaxis: chemical cauterization (10% trichloroacetic acid/silver nitrate), Trotter's method, topical hemostatic agents, anterior nasal packing.

Posterior epistaxis: posterior nasal packing with Foley's catheter, surgical interventions if necessary. Correction of underlying systemic causes (hypertension, coagulation disorders, infection).

Investigations

- **Routine**: Complete blood count, coagulation profile (PT, APTT, INR, BT, CT, Platelet count), blood grouping, random blood sugar, liver and renal function tests.
- **Specific**: X-ray nasal bones, CT PNS, CECT skull base to mediastinum when indicated.

Sample Processing

All clinical and laboratory data were entered into a predesigned proforma sheet. Cases requiring surgery were followed up for postoperative outcomes.

Statistical Methods

Descriptive statistics: mean, standard deviation, frequency, percentage.

Chi-square test: applied for categorical variables.

Crosstab analysis: used for association between clinical variables.

p-value <0.05 was considered statistically significant.

Data was recorded in MS Excel and analyzed using SPSS version 20.0.

Data Collection

Data was systematically collected for each patient from admission to follow-up at 1 week, 1 month, and 6 months. Clinical outcomes, recurrence rates, and complications were documented.

OBSERVATION AND RESULTS

Table 1: To evaluate the aetiopathogenesis and management of epistaxis in patients presenting to a tertiary care center (n = 150)

Variable	n(%) or Mean (SD)	95% CI	Test (vs comparator)	P
Age (years)	39.4 (17.0)	36.68–42.12	t = −0.43 vs 40	0.666
Male	109 (72.7%)	65.5–79.8%	z = 5.55 vs 50%	<0.001
Anterior epistaxis	133 (88.7%)	83.6–93.7%	z = 9.47 vs 50%	<0.001
Posterior epistaxis	17 (11.3%)	6.3–16.4%	z = −9.47 vs 50%	<0.001
Single episode	103 (68.7%)	61.1–76.3%	z = 4.33 vs 50%	<0.001
Multiple episodes	47 (31.3%)	23.7–38.9%	z = −4.33 vs 50%	<0.001
Conservative management	112 (74.7%)	67.4–82.0%	z = 5.02 vs 50%	<0.001
Surgical/interventional	38 (25.3%)	18.0–32.6%	z = −5.02 vs 50%	<0.001
Hemostasis ≤24 h	127 (84.7%)	78.9–90.4%	z = 8.49 vs 50%	<0.001
Rebleed within 7 d	19 (12.7%)	7.3–18.0%	z = −9.14 vs 50%	<0.001
SBP ≥140 mmHg at presentation	28 (18.7%)	12.4–24.9%	z = −7.68 vs 50%	<0.001
Length of stay (days)	2.43 (1.32)	2.22–2.64	t = 3.99 vs 2.0	<0.001

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In this study of 150 patients, the mean age was 39.4 ± 17.0 years, with a confidence interval (CI) of 36.7–42.1, showing no significant deviation from the expected mean of 40 years ($p = 0.666$). Males predominated (72.7%), significantly higher than females ($p < 0.001$). Anterior epistaxis (88.7%) was the most frequent presentation, with posterior bleeds accounting for only 11.3% (both highly significant, $p < 0.001$). Most patients experienced a single episode (68.7%) compared to recurrent bleeds (31.3%), and this difference was statistically significant ($p < 0.001$). Management was largely conservative (74.7%), while 25.3% required surgical or interventional approaches, again showing a significant predominance of non-surgical management ($p < 0.001$). Hemostasis was successfully achieved within 24 hours in 84.7% of patients ($p < 0.001$), while rebleeding within 7 days was documented in 12.7%, significantly lower than expected ($p < 0.001$). At presentation, 18.7% had systolic blood pressure ≥140 mmHg, showing an important systemic association ($p < 0.001$). The mean hospital stay was 2.43 ± 1.32 days, which was significantly longer than the reference of 2 days ($p < 0.001$). Overall, the findings indicate that anterior epistaxis and conservative management are most common, with good short-term control and limited rebleeding.

Table 2: To determine the common etiological factors of epistaxis in the study population (n = 150)

Etiology	n(%)	95% CI	Test (vs 50%)	P
Trauma	97 (64.7%)	57.0–72.3%	z = 3.59	<0.001
Hypertension	21 (14.0%)	8.4–19.6%	z = −8.82	<0.001
Neoplasm (incl. inverted papilloma, sinonasal malignancy)	12 (8.0%)	3.7–12.3%	z = −10.29	<0.001
Septal spur	8 (5.3%)	1.7–8.9%	z = −10.94	<0.001
Acute rhinosinusitis	4 (2.7%)	0.3–5.2%	z = −11.58	<0.001
Coagulation disorder	4 (2.7%)	0.3–5.2%	z = −11.58	<0.001
HHT / Osler–Weber–Rendu	2 (1.3%)	0.0–3.2%	z = −11.92	<0.001
Iatrogenic (post-FESS/Caldwell–Luc)	1 (0.7%)	0.0–2.0%	z = −12.08	<0.001
Idiopathic	1 (0.7%)	0.0–2.0%	z = −12.08	<0.001

Trauma emerged as the leading etiological factor, accounting for 64.7% of cases (CI 57.0–72.3, $p < 0.001$). Hypertension contributed to 14.0%, while neoplasms such as sinonasal malignancies and inverted papilloma accounted for 8.0%. Septal spur (5.3%), acute rhinosinusitis (2.7%), and coagulation disorders (2.7%) were less common but clinically relevant. Rare causes included hereditary hemorrhagic telangiectasia (1.3%), iatrogenic causes following sinus surgery (0.7%), and idiopathic cases (0.7%). All these proportions were statistically significant compared to 50% ($p < 0.001$), indicating that trauma was the dominant etiology, while systemic and rare causes contributed a small but important fraction of cases.

Table 3: To evaluate the epidemiological and clinical profile of patients presenting with epistaxis (n = 150)

Variable	n(%) or Mean (SD)	95% CI	Test (vs comparator)	P
Age group: 17–20 y	22 (14.7%)	9.0–20.3%	z = −8.65 vs 50%	<0.001
Age group: 21–30 y	39 (26.0%)	19.0–33.0%	z = −5.88 vs 50%	<0.001
Age group: 31–40 y	31 (20.7%)	14.2–27.1%	z = −7.19 vs 50%	<0.001
Age group: 41–50 y	19 (12.7%)	7.3–18.0%	z = −9.14 vs 50%	<0.001
Age group: 51–60 y	18 (12.0%)	6.8–17.2%	z = −9.31 vs 50%	<0.001
Age group: 61–70 y	13 (8.7%)	4.2–13.2%	z = −10.12 vs 50%	<0.001

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Age group: 71–85 y	8 (5.3%)	1.7–8.9%	z = −10.94 vs 50%	<0.001
Sex: Male	109 (72.7%)	65.5–79.8%	z = 5.55 vs 50%	<0.001
Sex: Female	41 (27.3%)	20.2–34.5%	z = −5.55 vs 50%	<0.001
Site: Anterior	133 (88.7%)	83.6–93.7%	z = 9.47 vs 50%	<0.001
Site: Posterior	17 (11.3%)	6.3–16.4%	z = −9.47 vs 50%	<0.001
Severity: Minimal	37 (24.7%)	17.9–31.6%	z = −6.13 vs 50%	<0.001
Severity: Moderate	84 (56.0%)	48.1–64.0%	z = 1.20 vs 50%	0.231
Severity: Profuse	29 (19.3%)	13.2–25.4%	z = −8.08 vs 50%	<0.001
Comorbidity: Hypertension	28 (18.7%)	12.4–24.9%	z = −7.68 vs 50%	<0.001
Comorbidity: Diabetes mellitus	21 (14.0%)	8.4–19.6%	z = −8.82 vs 50%	<0.001
Comorbidity: Anticoagulant/antiplatelet use	19 (12.7%)	7.3–18.0%	z = −9.14 vs 50%	<0.001
Comorbidity: Chronic liver disease	6 (4.0%)	0.9–7.1%	z = −11.41 vs 50%	<0.001
Comorbidity: Chronic kidney disease	7 (4.7%)	1.3–8.1%	z = −11.25 vs 50%	<0.001
Systolic BP (mmHg)	136.00 (18.00)	133.12–138.88	t = 4.08 vs 130	<0.001
Hemoglobin (g/dL)	12.60 (1.80)	12.31–12.89	t = −2.72 vs 13.0	0.007
Platelet count (×10³/µL)	245.00 (78.00)	232.52–257.48	t = −0.79 vs 250	0.432
INR	1.09 (0.21)	1.056–1.124	t = 5.25 vs 1.00	<0.001
Random blood sugar (mg/dL)	122.00 (36.00)	116.24–127.76	t = 4.08 vs 110	<0.001

The age distribution revealed that the majority of cases clustered between 21–40 years (46.7%), with smaller proportions in older age groups. The youngest group (17–20 years) constituted 14.7%, while patients older than 70 years formed only 5.3%. All age group proportions significantly differed from 50% ($p < 0.001$), confirming the younger age predominance. Males represented 72.7% of cases, again significantly higher than females ($p < 0.001$). Anterior bleeding was observed in 88.7% of patients, while posterior bleeding accounted for 11.3%, both highly significant compared with expected proportions ($p < 0.001$). In terms of severity, moderate bleeding (56.0%) was most common, minimal (24.7%) and profuse (19.3%) bleeds were less frequent, with the moderate group showing no significant deviation from 50% ($p = 0.231$).

Regarding comorbidities, hypertension (18.7%), diabetes mellitus (14.0%), anticoagulant use (12.7%), chronic liver disease (4.0%), and chronic kidney disease (4.7%) were present, all significantly lower than 50% ($p < 0.001$). Clinical parameters showed a mean systolic blood pressure of 136 mmHg ($p < 0.001$ vs 130), hemoglobin of 12.6 g/dL (slightly but significantly lower than 13 g/dL, $p = 0.007$), platelet count of 245 ×10³/µL (not significantly different from 250, $p = 0.432$), INR of 1.09 (significantly elevated, $p < 0.001$), and random blood sugar of 122 mg/dL (significantly higher than 110, $p < 0.001$). These results emphasize that epistaxis affects predominantly younger adult males with anterior, moderate bleeding, and systemic comorbidities such as hypertension and diabetes play contributory roles.

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Table 4: To assess the efficacy of different treatment protocols in the management of epistaxis (n = 150)

A. Conservative vs Surgical outcomes

Outcome	Conservative (n=112)	Surgical (n=38)	Effect (95% CI)	Test	P
Hemostasis ≤24 h	98/112 (87.5%)	29/38 (76.3%)	**Diff = 11.2%** (−3.7 to 26.0)	z = 1.65	0.098
Rebleed within 7 d	12/112 (10.7%)	7/38 (18.4%)	**Diff = −7.7%** (−21.3 to 5.9)	z = −1.23	0.217
Length of stay (days)	2.10 ± 1.00	3.40 ± 1.60	**Mean diff = −1.30** (−1.84 to −0.76)	t = −4.71	<0.001

B. Per-protocol hemostasis success (one-sample test vs 80% target)

Protocol	n	Success n(%)	95% CI	Test (vs 80%)	P
Endoscopic/chemical cautery	56	52 (92.9%)	86.1–99.6%	z = 2.41	0.016
Anterior nasal packing	34	30 (88.2%)	77.4–99.1%	z = 1.20	0.230
Posterior packing (Foley)	22	16 (72.7%)	54.1–91.3%	z = −0.85	0.394
ESPAL/arterial ligation or embolization	16	14 (87.5%)	71.3–100.0%	z = 0.75	0.453

When comparing conservative (n = 112) and surgical (n = 38) management, hemostasis within 24 hours was achieved in 87.5% versus 76.3% respectively, with an absolute difference of 11.2%, though this did not reach statistical significance (p = 0.098). Rebleeding within 7 days was less frequent in the conservative group (10.7%) compared to the surgical group (18.4%), but again not statistically significant (p = 0.217). However, length of hospital stay was significantly shorter in conservative management (2.10 ± 1.00 days) than surgical interventions (3.40 ± 1.60 days), with a mean difference of −1.30 days (p < 0.001).

Per-protocol analysis showed that endoscopic or chemical cautery achieved the highest success rate (92.9%, p = 0.016 vs 80% target). Anterior nasal packing was also effective (88.2%) but not significantly different from the 80% benchmark (p = 0.230). Posterior packing had lower success (72.7%) and was not superior to the 80% target (p = 0.394). Endoscopic sphenopalatine artery ligation or embolization yielded 87.5% success, also not significantly different from the reference (p = 0.453). These results suggest that conservative modalities, particularly endoscopic or chemical cautery and anterior nasal packing, are highly effective with shorter hospital stay, while surgical or posterior interventions are reserved for refractory cases.

DISCUSSION

Table 1: Aetiopathogenesis & overall management profile (n=150): Cohort skews young–middle aged (mean 39.4 ± 17.0 y) with a male preponderance (72.7%) and a heavy tilt toward anterior bleeds (88.7%). This pattern mirrors classic and contemporary series: large epidemiologic cohorts consistently report male predominance and anterior epistaxis as the dominant presentation, particularly in younger adults, while posterior bleeds cluster in older patients. A recent narrative review likewise notes higher occurrence in the 1st–3rd decades, male excess, seasonality, and anterior site predominance. Clinically, single-episode events (68.7%) outnumber recurrences, and conservative care is the mainstay (74.7%), with rapid control (hemostasis ≤24 h: 84.7%) and low early rebleed (12.7%) all consistent with stepwise management algorithms that prioritize compression/vasoconstrictors, cautery, and anterior packing before posterior measures or surgery/IR. Contemporary reviews emphasize that structured pathways reduce admissions and complications while achieving high early control rates. Yanting SL *et al.*(2016)[6]

Only 11.3% were posterior bleeds and 25.3% required surgical/interventional therapy, aligning with the literature where a minority require escalation (endoscopic sphenopalatine artery ligation [ESPAL] or embolization). SBP ≥140 mmHg in 18.7% illustrates the common coexistence of hypertension; importantly,

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multiple studies show hypertension seldom *initiates* epistaxis but can impede control, matching observation that most cases still settled conservatively within 24 h. The mean LOS of 2.43 days is modest; trials of less invasive strategies (e.g., hot-water irrigation for selected posterior bleeds) demonstrate shorter stays and less pain than tamponade, supporting finding that conservative-first strategies can limit hospitalization. Shahid R *et al.*(2024)[7]

Table 2: Etiological spectrum: etiology profile is trauma-dominant (64.7%), followed by hypertension (14.0%), then neoplasms (8.0%), septal spur (5.3%), rhinosinusitis/coagulopathy (~3% each), with rare HHT/iatrogenic/idiopathic causes. Indian and global series commonly place local trauma (digital trauma, minor nasal injury) at the top, with systemic contributors (hypertension, coagulopathy, antiplatelet/anticoagulant use) forming smaller fractions very similar to mix. Small but present neoplastic burden is also consistent with tertiary-center cohorts where sinonasal tumors or inverted papilloma occasionally manifest with bleeding. Khudhair AM *et al.*(2023)[8]

Table 3: Epidemiological & clinical profile Age-banding shows a bulk between 21–40 y (46.7%), tailing off at older ages; this younger skew with male 72.7% echoes large admission datasets and hospital series.[2,11] Anterior site 88.7% vs posterior 11.3% is within the commonly quoted range (anterior ≈ 80–90%).[4] Severity clustering around moderate (56%) with fewer profuse bleeds (19.3%) fits the observation that most presentations are controllable with local measures. Comorbidities in sample hypertension 18.7%, diabetes 14.0%, anticoagulant/antiplatelet 12.7% mirror modern case-mix where cardio-metabolic disease and antithrombotic therapies are frequent background factors. The laboratory profile (slightly elevated INR mean 1.09, modest Hb 12.6 g/dL, RBS 122 mg/dL) is typical of a mixed emergency cohort and underlines why protocolized assessment of hemodynamics and coagulation expedites safe cautery/packing or definitive endoscopic therapy. Aryal K *et al.*(2021)[9]

Table 4: Effectiveness of treatment pathways In head-to-head outcomes, conservative group achieved numerically higher 24 h hemostasis and lower 7-day rebleed than the surgical group (non-significant), but had a significantly shorter LOS (−1.30 days). This tracks with stepwise care principles: most anterior bleeds settle with cautery or anterior packing; escalation is reserved for refractory or posterior sources, which often carry longer LOS. ESPAL/ESPAC and related endoscopic techniques typically report high success (≈85–95%) with low morbidity. 87.5–92.9% sits squarely in this band. Posterior packing shows lower control and greater discomfort/LOS compared with definitive endoscopic options or targeted embolization, paralleling 72.7% success. Endovascular embolization remains a reliable rescue with immediate control ≈90–96% in modern series, used selectively in refractory posterior epistaxis consistent with where 'surgical/interventional' bucket would map when escalation is needed. Weller JM *et al.*(20)[10]

CONCLUSION

The present clinical study on 150 patients established that epistaxis is a common otorhinolaryngological emergency, predominantly affecting young and middle-aged males, with anterior nasal bleeding being the most frequent presentation. Local trauma emerged as the leading etiological factor, followed by systemic contributors such as hypertension and diabetes. Conservative treatment methods, including chemical cautery and anterior nasal packing, proved effective in the majority of cases, achieving rapid hemostasis with minimal recurrence and shorter hospital stays. Surgical and interventional approaches were required only in a minority of refractory cases, where endoscopic sphenopalatine artery ligation and embolization provided reliable outcomes.

LIMITATIONS OF THE STUDY

1. The study was conducted at a single tertiary care center, which may limit the generalizability of findings to wider populations.
2. The relatively modest sample size of 150 patients restricted subgroup analyses for rarer causes of epistaxis such as neoplasms and hereditary hemorrhagic telangiectasia.
3. Seasonal and geographic variations in epistaxis incidence could not be comprehensively evaluated due to the study's limited duration and location-specific recruitment.
4. Long-term follow-up beyond six months was not performed, which limited assessment of late recurrences or complications.
5. Some systemic factors (anticoagulant use, liver and renal dysfunction) were underrepresented, reducing the power to evaluate their independent contribution.

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