Nasal Endoscopy and Computed Tomography for Epistaxis of Clinically Inapparent Aetiology

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ABSTRACT

BACKGROUND

Epistaxis is one of the common otorhinolaryngological emergencies that are encountered in daily practice. Aetiology of epistaxis may range from benign conditions like septal spur, infected nasal polyps etc to serious causes like malignancies. Many a times, the cause for epistaxis is not found on anterior and posterior rhinoscopy. We wanted to assess the role of nasal endoscopy and computed tomography of paranasal sinuses (CT scan of PNS) among patients with epistaxis in whom the cause is not evident after history taking and clinical examination.

METHODS

This was a longitudinal study conducted in the Department of ENT in a tertiary care centre in south India. For patients included in the study, diagnostic nasal endoscopy under local anaesthesia was done and findings were noted. If any bleeding point was visualised on endoscopy, it was cauterised. In selected cases, endoscopic biopsy from nasal mass was done, and sent for histopathological examination. CT scan of PNS was done and findings were noted.

RESULTS

In the evaluation of patients with epistaxis of inapparent aetiology, nasal endoscopy could aid the diagnosis in 61.8% of patients, and CT scan of PNS in 81.8 % of patients. Statistical comparison of measure of agreement between nasal endoscopy and CT scan of PNS for diagnosis of epistaxis of clinically inapparent aetiology yielded a kappa value of 0.187 which can be interpreted as slight agreement. Sensitivity of nasal endoscopy and CT scan for diagnosing sinonasal neoplasms as compared to histopathological examination (gold standard) was 83.3% and 100% respectively. Both had an accuracy of 66.7% as compared to histopathological examination. Statistical comparison of measure of agreement between nasal endoscopy and CT PNS for diagnosing sinonasal inflammation yielded a kappa value of 0.391 which can be interpreted as fair agreement.

CONCLUSIONS

For evaluation of sinonasal neoplasm causing epistaxis, CT scan of PNS has higher sensitivity than nasal endoscopy. Subclinical sinonasal infection could be a triggering factor for epistaxis in older patients. Nasal endoscopy and CT scan of paranasal sinuses are important and complementary tools in the evaluation of epistaxis.

KEY WORDS

Epistaxis, Nasal Endoscopy, CT Scan of Paranasal Sinuses, Sinonasal Neoplasm, Sinonasal Inflammation

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BACKGROUND

Epistaxis is one of the common otorhinolaryngological emergencies that are encountered in daily practice. It is a common clinical symptom and not a specific diagnosis. Aetiology of epistaxis may range from benign conditions like septal spur, infected nasal polyps etc to serious causes like malignancies. According to studies conducted by Gilyoma et al[1] and Chaiyasate et al[2] the most common aetiology of epistaxis is trauma followed by infection of sinuses. Some of the areas of nose situated in the deep crevices of lateral wall of nose and nasopharynx are not visualized, and hence cause for epistaxis is not found out by anterior and posterior rhinoscopy. Diagnostic nasal endoscopy is essential in evaluation of the epistaxis patient. It is a simple procedure and can be done on OP basis. However, in some cases, endoscopic picture can be deceptive, especially when the main pathology is in the sinuses than in nasal cavity. According to the study by Anand Acharya et al[3], patients with epistaxis should undergo imaging of paranasal sinuses, and according to Verma et al[4] Computed Tomography is the modality of choice in imaging the paranasal sinuses (CT scan of PNS). The present study was undertaken to assess the effectiveness of Nasal endoscopy and CT scan of paranasal sinuses in cases of epistaxis where the cause of epistaxis was not revealed after history taking and clinical examination.

Causes of Epistaxis[5]

Local Causes

Congenital

Unilateral choanal atresia, Meningocele, Encephalocele, Glioma.

Acute Infections

Viral, bacterial, fungal.

Chronic Infections

Specific (tuberculosis, syphilis, leprosy, rhinoscleroma) or non-specific: (rhinosporidiosis, ozaena, Wegener's granulomatosis, sarcoidosis).

Inflammatory Causes

Rhinosinusitis (allergic/vasomotor), nasal polyposis, Adenoiditis.

Trauma

Iatrogenic, facial trauma, foreign body, fingernail trauma in Little's area, fractures, hard blowing of nose.

Benign Neoplasm

Transitional cell papilloma, angiofibroma, haemangioma.

Malignancy

Squamous cell carcinoma, adenocarcinoma, adenoid cystic carcinoma, lymphoma, olfactory neuroblastoma, melanoma.

Drug-Induced

Rhinitis medicamentosa (topical decongestants/cocaine) Inhalants (tobacco, cannabis, heroin), mercury, phosphorus, wood dust.

Atmospheric Changes

High altitudes, Caisson's disease

Septal Abnormalities

General Causes

Bleeding Disorders

A. Coagulopathies

(i) Inherited: coagulation factor deficiencies, i.e. factor VII (haemophilia A, B) and factor IX deficiency

(ii) Acquired: anticoagulants, liver disease, vitamin K deficiency, disseminated intravascular coagulation (DIC)

B. Platelet Disorders

1. Thrombocytopenia:
   - Congenital.
   - Acquired: marrow failure, i.e. aplasia, drugs, infiltration, increased consumption, immune-mediated, DIC, hypersplenism, massive blood loss.

2. Platelet Dysfunction
   - Congenital: Von Willebrand's disease, Bernard Soulier syndrome, Glanzmann's thrombasthenia.
   - Acquired: myeloproliferative disease/leukaemia uraemia, dysparaproteinaemias.
   - Drugs: aspirin, NSAIDs, Acquired storage pool disease.

C. Blood Vessel Disorders
   - Congenital: osteogenesis imperfecta, hereditary haemorrhagic telangiectasia
   - Acquired: amyloid, vasculitis, vitamin C deficiency

D. Hyperfibrinolysis
   - Congenital: antiplasmin deficiency.
   - Acquired: malignancy, DIC, fibrinolytic therapy.

Cardiovascular Disorders

Hypertension (contributing factor), arteriosclerosis, mitral stenosis, pregnancy-related

Drugs

Aspirin, Anticoagulants, Chloramphenicol, Methotrexate, Immunosuppressives, Alcohol, Dipyridamole

Others

Acute general infections, hepatic cirrhosis and liver failure, chronic nephritis, hypothyroidism, HIV, mediastinal compression, vicarious menstruation, idiopathic.

We wanted to assess the role of nasal endoscopy and computed tomography among patients with epistaxis in whom the cause is not evident after history taking and clinical examination; We also wanted to study its effectiveness in diagnosing sinonasal inflammation and sinonasal neoplasm.

METHODS

This was a longitudinal study conducted in the Department of ENT in Govt. Medical College, Thiruvananthapuram which is a tertiary care centre in south India.

Selection Criteria

Patients admitted with epistaxis in the dept. of ENT, Govt. Medical College, Thiruvananthapuram in whom the aetiology was not evident after history taking and clinical examination were included. Patients who were not willing for nasal endoscopy or CT scan were excluded.

Sample Size

Minimum sample size calculated to be 110 by the formula n= $([Z_{1-\alpha/2}]^2 pq)/d^2$ where p=7; q= (100-p) =93 and d (absolute precision) =5 (study by Anil Markose P et al[6] found the Proportion of epistaxis of inapparent aetiology to be 7%)

Methodology

After getting clearance from the institutional ethical committee for research works and getting informed consent from the patients, history was elicited, general local and systemic examination were done, patients were stabilised, emergency treatment given and admitted. Blood investigations -blood routine, blood group, viral markers, bleeding parameters (bleeding time, clotting time, prothrombin time, activated partial thromboplastin time), lipid profile, peripheral smear, Liver function tests and Renal function tests were done. Patients were selected for the study according to inclusion and exclusion criteria. Diagnostic nasal endoscopy under local anaesthesia was done and findings noted. If any bleeding point was visualised on endoscopy, it was cauterised. In appropriate cases endoscopic biopsy from nasal mass was done, and sent for histopathological report (HPR), which is considered the gold standard in diagnosis. CT scan of paranasal sinuses was also done, and findings noted.

Statistical Analysis

All the data were entered into excel sheet and analysed using SPSS software version 22, and statistical variables like sensitivity and Kappa value were studied.

RESULTS

After excluding clinically evident cases like trauma, rhinosporidiosis and nasopharyngeal angiofibroma, 110 cases were included in the study.

I (A) History and Clinical Examination

The incidence of epistaxis was more after forty years. The maximum number of cases was in the age group 51-60 years. In our study, 75 were males and 35 were females with the ratio of 2.1:1. Most of the cases had unilateral nasal bleed. 56.4 % of cases had anterior nasal bleed, while 43.6% cases had both anterior and posterior nasal bleed. Most of the patients had recurrent episodes. 70% cases had bleed of less than 1-month duration. Several patients had more than one addiction. 30.9% patients were alcoholics, 22.7% patients were smokers, and 2.7% patients had used nasal snuff.

I (B) Treatment Given

Majority (63.6%) of patients underwent nasal packing to control bleed. Endoscopic cauterization was done in 14.5% of patients, while 21.9% patients were treated conservatively. Most of the patients underwent anterior nasal packing with Merocel or medicated gauze. Only 3 patients required postnasal packing to control nasal bleed.

I (C) Nasal Endoscopy Findings

Several patients had more than one finding on nasal endoscopy. On endoscopy 38 patients (34.5%) had features suggestive of sinonasal inflammation (nasal discharge, nasal polyp and polypoidal middle turbinate –one or more of these). Mucosal oedema was not taken into consideration as many patients had recent nasal packing. Finding suggestive of sinonasal tumours were seen in 7 patients.

Nasal Endoscopy Findings	Frequency	Percentage (N=110)
Nasal discharge (mucopurulent)	29	26.3
Nasal discharge (allergic mucin)	4	3.6
Nasal discharge (fungal debris in middle meatus)	2	1.8
Nasal polyp	26	23.6
Polypoidal middle turbinate	9	8.1
Mass lesions (tumours)	5	4.5
Lateral wall bulge (with probable underlying tumour)	2	1.8
Bleeding points	16	14.5
Dilated and tortuous vessels	5	4.5
Deviated nasal septum with spur	28	25.4
Enlarged adenoids	5	4.5
Normal	42	38.2

Table 1. Nasal Endoscopy Findings

I (D) CT Scan Findings

Several patients had more than one finding on CT scan. Majority of patients (57.2%) had sinonasal inflammation as evident from mucosal thickening, sinus opacification and blockage of ostiomeatal units. Features of sinonasal neoplasm was seen in 9 patients (details given in table 3).

Cause of epistaxis was evident after nasal endoscopy in 68 (61.8%) patients. Cause of epistaxis was evident after CT scan in 90 (81.8%) patients. 12 patients (10.9%) had both nasal endoscopy and CT PNS findings reported as normal.

CT Scan Finding	Frequency	Percentage (n=110)
Sino nasal inflammation	63	57.2
Features of AFRS (Allergic Fungal Rhino Sinusitis)	12	10.9
Fungal ball	5	4.5
Sino nasal neoplasm (benign)	4	3.6
Sino nasal neoplasm (malignant)	5	4.5
Deviated nasal septum with spur	28	25.4
Enlarged adenoids	5	4.5
Normal	20	18.1

Table 2. CT Scan Findings

II (A) Sino Nasal Tumours – Comparison of Endoscopic Findings, CT Paranasal Sinus Findings and HPR

	CT-PNS Findings	Nasal Endoscopic Findings	Histopathology Findings
A	Benign neoplasm	Reddish polypoid mass attached to posterior third of inferior turbinate.	Malignant melanoma
B	Benign neoplasm	Bulge in lateral wall	Chronic inflammation
C	Benign neoplasm	Reddish mass in middle meatus	Haemangioma
D	Benign neoplasm	Mass in middle meatus	Sino nasal papilloma oncocytic variant
E	Malignant neoplasm	Bulge in lateral wall	Plasmacytoma
F	Malignant neoplasm	Mass in sphenoethmoidal recess	Rosai Dorfman disease
G	Malignant neoplasm	Mass in middle meatus	Chronic granulomatous disease
H	Malignant neoplasm	Multiple polyps in middle meatus .	Inflammatory polyp
I	Malignant neoplasm	Polyp in sphenoethmoidal recess	Undifferentiated Sino nasal malignancy

Table 3. Sinonasal Tumours

II (B) Comparison of Endoscopic Findings with HPR for Sinonasal Tumours

Sensitivity of nasal endoscopy for diagnosing sinonasal neoplasms as compared to histopathological examination (gold standard) was 83.3%. Accuracy of nasal endoscopy as compared to histopathological examination was 66.7%.

Endoscopy	(HPR) Positive	(HPR) Negative	Sensitivity	PPV	Accuracy
Positive	5	2	83.3%	71.4%	66.7%
Negative	1	1			

Table 4. Comparison of Endoscopic Findings with HPR For Sinonasal Neoplasms

II (C) Comparison of CT - PNS with HPR for Sinonasal Tumours

Sensitivity of computed tomography for diagnosing sinonasal neoplasm compared to histopathological examination (gold standard) was 100% because CT scan had detected all the neoplasms which were diagnosed by histopathological examination**.**

CT PNS	HPR Positive	HPR Negative	Sensitivity	PPV	Accuracy
Positive	6	3	100.0%	66.7%	66.7%
Negative	0	0			

Table 5. Comparison of CT Scan Findings with HPR for Sinonasal Neoplasms

III Sinonasal Inflammation - Comparison of Endoscopy & CT Scan Findings

Sinonasal inflammation was diagnosed with endoscopy alone in 5 (4.5%) cases, with CT scan - PNS alone in 30 (27.3%) cases and with both endoscopy and CT scan - PNS in 33 (30%) cases. Endoscopic findings suggestive of sinonasal inflammation were found in 38 cases.

CT-PNS Shows Sinonasal Inflammation	Nasal Endoscopy Shows Sinonasal Inflammation: Present	Absent	Agreement	Kappa Value	Interpretation
Present	33	30	68.18	0.391 (95% CI 0.240 TO 0.542)	Fair agreement
Absent	5	42			

Table 6. Comparison of Endoscopy and CT Scan Findings In Sinonasal Inflammation

Statistical comparison of measure of agreement between nasal endoscopy and CT PNS for sinonasal inflammation yielded a kappa value of 0.391 which can be interpreted as fair agreement.

IV Comparison of Endoscopy & CT - PNS for Diagnosis of Epistaxis of Clinically Inapparent Aetiology

Among the 110 patients, diagnosis of epistaxis of clinically unclear aetiology was possible with nasal endoscopy alone in 68 (61.8%) cases, with CT scan - PNS alone in 90 (81.8%) cases, and after both endoscopy and CT scan in 98 (89%) cases. No diagnosis was attained after endoscopy and CT PNS in 12 (11%) cases.

Statistical comparison of measure of agreement between nasal endoscopy and CT PNS for diagnosis of epistaxis of clinically inapparent etiology yielded a kappa value of 0.187 which can be interpreted as slight agreement.

CT PNS	Nasal Endoscopy Normal	Nasal Endoscopy Abnormal	Agreement	Kappa Value	Interpretation
Normal	12	8	65.45%	0.187 (95% CI 0.015 TO 0.359)	Slight agreement
Abnormal	30	60			

Table 7. Comparison of Endoscopy and CT Scan Findings in Epistaxis of Clinically Inapparent Aetiology

DISCUSSION

I (A) History and Clinical Examination

In our study majority of the patients were above 40 years (73.6%) with peak age group of 50-60 years (24.5%). This is comparable to the study by M T Anie et al[7] in which epistaxis was more common above the age of 60 years. According to study by Pope LE et al[8], there is a bimodal age distribution of epistaxis with peaks in children and the older adults (45 - 65 years).

In this study, 68.2% patients were males and 31.8% were females with 2.1:1 ratio in favour of males. Study conducted by Gilyoma JM et al[1] described male to female ratio of 2.7:1. In the study by A M Kodiya[9] slight male preponderance with a male to female ratio of 1.4:1 was seen. Nasal bleed was unilateral in 58% (64 patients) and bilateral in 42% (46 patients). In the study by Varshney et al[10], bleeding was unilateral in 87.5% of cases and bilateral in 12.5% of cases. In our study 25 cases (22.7%) were smokers and 34 cases (30.9%) were alcoholic. Varshney et al[10] observed in their study that 26% were smokers and 27% were alcoholic.

I (B) Treatment

In our study, epistaxis was controlled by nasal packing in 63.6% of patients, 14.5% patients underwent endoscopic

cauterization while 21.9% patients were treated symptomatically with digital pressure, nasal decongestants and use of drugs promoting coagulation like tranexamic acid. In a study by Vis E et al[11] to determine treatment of epistaxis with cautery, nasal bleed in 98% of patients was controlled by cautery and the study stated that cauterisation was more effective and efficient than nasal packing.

I (C) Nasal Endoscopy Findings

On endoscopy, bleeding points were found in 16 patients (14.5%) out of which 7 patients (6.4%) had bleeding from sphenopalatine area, 5 patients (4.5%) had bleeding from middle turbinate while 4 patients (3.6%) had bleeding from posterior part of septum. In the study by Swapna UP et al[12] 12% patients had bleeding points and all of them had bleeding points in nasal septum. In a study by Vinaykumar et al[13] the commonest bleeding point was in lateral nasal wall (28%), followed by posterior part of septum (4%).

Mucopurulent discharge was the commonest significant nasal endoscopic finding in our study. 17.3% of patients had mucopurulent discharge in middle meatus, while 9% patients had mucopurulent discharge in sphenoethmoidal recess. In a study by Seidel DU et al,[14] epistaxis was found to be positively related with discharge due to chronic sinusitis.

Nasal polyps were seen in 23.6% of cases in our study. In the study by Swapna UP et al,[12] 10% of patients had nasal polyps. In the study done by Jahromi MA et al[15] to determine frequency of presenting symptoms of nasal polyps, 11.1% of patients with nasal polyps presented with epistaxis.

25.4 % of patients in this study had deviated nasal septum with spur which is similar to study by Vinaykumar et al[13] in which 24% patients had deviated nasal septum with spur. 4.5% of patients had enlarged and congested adenoids compared to 8% in the study done by Swapna U.P et al.[12]

4.5% of patients in this study had dilated and tortuous vessels in Woodruff's plexus. In a research done by Han HC[16] clinical observations have linked tortuous arteries and veins with aging, atherosclerosis, hypertension, genetic defects and diabetes mellitus.

In our study 38.2% patients had normal endoscopy findings. This is comparable to a study done by Manickam A et al[17], in which 37% of patients had normal endoscopic findings and a study by Rehman A et al[18] in which 30% cases had normal endoscopic findings.

I (D) CT Scan Findings

In this study 81.8 % of patients had significant CT scan findings. Features of sinonasal inflammation were seen in 57.2% of patients. In a study conducted by Horn N van et al[19], 47.3% of patients with recurrent epistaxis had CT scan findings of sinonasal inflammation.

II Sino Nasal Tumours

In this study 6.3% of patients had endoscopic findings suggestive of sinonasal neoplasm (mass lesions and lateral wall bulge). In a study done by Vinaykumar, et al[13], 4% of patients had endoscopic findings suggestive of neoplasm. Sensitivity of nasal endoscopy for diagnosing sinonasal neoplasms as compared to histopathological examination (gold standard) was 83.3%.

In the present study 8.1% of patients had CT scan findings of neoplasm. In a study conducted by Horn N van et al[19], 52.6 % of patients presenting with recurrent epistaxis had neoplasms in CT scan. According to our study, the sensitivity of computed tomography for diagnosing sinonasal neoplasm compared to histopathological examination (gold standard) was 100% and accuracy was 66.7%.

III Sinonasal Inflammation

In our study on comparison between nasal endoscopy and CT scan PNS for features suggestive of sinusitis, 34.5% patients had features suggestive of sinonasal inflammation on endoscopy while 57.2 % of patients showed sinonasal inflammation on CT scan. 30 patients with sinonasal inflammation on CT scan had normal findings on endoscopy. This disparity may be due to the fact that mucosal oedema was not taken into consideration while doing nasal endoscopy in our study and some of the patients possibly had subclinical sinus infections.

One case of polyp in sphenoethmoidal recess on endoscopy showed features of malignancy of sphenoid sinus with intracranial extension in CT-PNS, and biopsy showed sinonasal malignancy of undifferentiated type. Another patient who presented with severe recurrent epistaxis had multiple polyps in left middle meatus on endoscopy, and on CT-scan, had features suggestive of malignancy, but histopathology showed only inflammatory polyp.

In the study by Deosthale NV et al[20], out of 54 study patients with chronic rhinosinusitis, 45 (83.33%) had abnormal endoscopic examination while 50 (92.59%) were having positive CT scan findings, and the study concludes a high correlation between the two.

IV Comparison of Endoscopy & CT - PNS for the Diagnosis of Epistaxis of Clinically Inapparent Aetiology

On statistical comparison of nasal endoscopy and computed tomography in diagnosis of epistaxis of clinically inapparent etiology, kappa value <0.2 was obtained showing only slight agreement. This can be attributed to high sensitivity of computed tomography in diagnosing cases of sinonasal inflammation and sinonasal neoplasm.

CONCLUSIONS

In the evaluation of patients with epistaxis of inapparent aetiology, nasal endoscopy could aid the diagnosis in 61.8% of patients and CT scan of paranasal sinus in 81.8 % of patients. For evaluation of sinonasal neoplasm causing epistaxis, CT scan of paranasal sinuses has higher sensitivity than nasal endoscopy. Majority of the patients were above the age of 40 years (73.6%). In majority of the patients (57.2%) CT scan findings showed sinonasal inflammation of which 27.3% of patients had normal endoscopy. So, it can be presumed that a subclinical sinonasal infection could be a triggering factor for epistaxis in older patients. Nasal endoscopy and CT scan of paranasal sinuses are important and complementary tools in the evaluation of epistaxis.

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