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Histopathological Lesions of Nose and Paranasal Sinuses at a Tertiary Care Centre: A Ten Months Study

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Abstract: ***Introduction: The nasal cavity and paranasal sinuses are exposed to many environmental pollutants and pathogens. Exposure to such influences can lead to a variety of lesions primarily affecting the sinonasal tract. Nasal polyps are polypoidal masses arising from the nasal cavity and paranasal sinuses. They can be non - neoplastic, can have an infective etiology, or they can be benign or malignant. The aim of this study was to find out the incidence, age and sex distribution and to enlist the different types of lesions of the nasal cavity and paranasal sinuses. Materials and methods: The present study was undertaken in histopathology laboratory of Department of Pathology, GMERS medical college and hospital, sola, Ahmedabad for period of 10 months from July 2021 to April 2022. A histopathological study of total 100 cases of nasal lesions was done. The formalin fixed specimens were received with complete clinical and radiological features. Routine gross examination and required number of sections were taken and stained with hematoxylin and eosin. Periodic acid Schiff'swas used wherever necessary. Result: A total of 100 patients presented in this study. Out of this 64 patients are male and 36 patients are females. Male to female ratio is 1.7: 1. Maximum numbers of case present in 51 - 60 age group with 24 (24%) of case. These 100 cases were broadly categorized in two categories, one category as non neoplastic lesion and the other as neoplastic lesions. In this study 95 cases are non neoplastic and 5 cases are neoplastic. In neoplastic lesions 4 case are benign and 1 case was malignant lesions. These lesions were common in fifth and sixth decade with male predominance. Conclusion: Sinonasal lesions are common lesions of head and neck region with higher prevalence of benign lesions, where nasal cavity is commonest site. It is concluded that for proper evaluation of a nasal lesions, clinical and histopathological evaluation helps us to categorize these sinonasal lesions into various non - neoplastic and neoplastic types. Histopathology always gives a confirmatory diagnosis. Although rare, unexpected clinically relevant findings may be identified during routine histologic examination of nasal mass specimens.***

Keywords: Sinonasal lesions, histopathological study, non neoplastic, neoplastic

1. Introduction

'Sinonasal tract' is a collective term used for nasal cavity and paranasal sinuses ([2]. It is principally involved in filtering, humidifying and adjusting the temperature of inspired air ([14]. The nasal cavity also has specific olfactory receptors for airborne odorant molecules ([2]. The paranasal sinuses additionally have the functions of acting as resonating chambers during speech and reducing the relative weight of the skull [(2]. These functions lead to exposure of various allergens, pathogens, chemical and physical irritants and other environmental influences ([2]. As a result of these multifaceted exposures, various inflammatory conditions, infections and neoplasms can occur in the sinonasal tract ([2]. These deleterious exposures lead to formation of tumor like and tumor like conditions which can range from simple hypertrophied inferior turbinate, nasal polyps, granulomatous lesions to malignant lesions and can present in all age group ([3]. Polypoidal mass in the nose is a very common lesion encountered in clinical practice. Common presenting symptoms of sinonasal lesions are nasal blockade, nasal discharge, epistaxis, facial swelling, orbital and ear symptoms ([9]. Although, clinical complaint of a mass in nose seems to be a simple problem but it gives arise to a large number of differential diagnosis in the mind of treating physician and diagnosing pathologists ([9]. Nasal polyps are the most common cause of nasal obstruction with 04% of prevalence rate ([9]. Their exact pathogenesis is unknown but they have association with allergy, asthma, infections and aspirin sensitivity ([9]. Tumors of nose are usually uncommon. Malignant tumors account for 0.2% to 0.8% of total malignancies and only 3% of all malignant tumors of upper aerodigestive tract ([14]. The presenting features, symptomatology and advanced imaging technique help to reach a presumptive diagnosis but histopathological examination remains the mainstay of final definitive diagnosis ([14].

2. Materials and Methods

A Retrospective study was undertaken at GMERS Medical College, Sola which is a tertiary care hospital in Ahmedabad. They involved patients with lesions in nose and paranasal sinuses including both tumor, tumor like lesions and various granulomatous lesions and conducted over a period of ten months, from July 2021 to April 2022.100 patients with nasal or paranasal sinus lesions attending ENT OPD were included and detailed history and consent was taken as per self - made preforma, complete ENT examination was done. Detailed history was taken considering the patient's complaints, mainly nasal obstruction, mass in the nose, epistaxis, rhinorrhoea, hyposmia and deformity of nose and face. Occupational history, personal habits and socioeconomic status of patients were documented. Clinical examinations were carried out as per standard protocols. The inclusion criteria for selection of

cases was medically untreatable cases of masses in nasal cavity, paranasal sinuses and nasopharynx, requiring surgical treatment and are fit for surgery. For Histopathological examination, the specimens were received in 10% formalin. The received specimens have been fixed in 10% formalin and kept overnight. After passing the tissue dehydration in graded alcohol for 6 hours each in three changes, clearing is done with two changes of xylene for hour each. Followed by this, impregnation and embedding in paraffin were done, blocks were prepared and 5µ sections were cut. Sections were stained with Hematoxylin and Eosin (Hand E) stain. Special stain like Periodic Acid Schiff was used wherever necessary. The stained sections were studied under light microscopy. The relevant clinical details and laboratory investigations were collected from the hospital case sheet.

3. Results

The present study was taken in histopathology laboratory of Department of Pathology, GMERS medical college and hospital, sola, Ahmedabad. All the patients had nasal lesions, attending GMERS hospital, sola was studied in the duration of July 2021 to April 2022. Most of the patients' specimens for Histopathological study in our institute came from ENT department mainly. A histopathological study of total 100 cases of nasal lesions was done. Tissue were processed and studied. In the present study age of the patient ranged from 0 - 90 years. In this study out of 100 cases, 64 (64 %) were males and 36 (36 %) were females. Male to female ratio was 1.44: 1 (Figure 1).

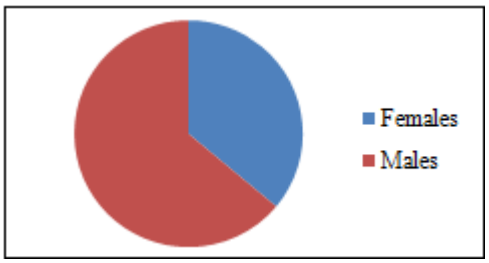

Figure 1: Distribution of nasal biopsy according to gender.

The mean age of presentation was 39 years, youngest aged 9 and oldest 87 years. Thus, indicating that the majority of the patients were middle aged adults. Maximum number of cases 24 (24 %) were seen in the age group 51 - 60 years followed by 21 (21 %) in 61 - 70 years age group (Table - 1). Maximum lesions 83 (83%) were in nasal cavity, out of which 78 (93.97%) were inflammatory lesions and 5 (6.02%) were malignant. The benign lesion 4 (4%) arise from nasal cavity, while the melignant lesion 01 (01%) where present in right inferior turbinate (Figure - 2).

17 (17%) lesions were in paranasal sinuses which are inflammatory in origin. Non neoplastic lesions were composed of the majority of cases followed by benign neoplastic lesions. Present study showed predominance of non neoplastic nasal lesions over other benign and malignant nasal lesions. A male predominance was seen both neoplastic and non neoplastic nasal lesions. (Table - 2) Among 95 cases of non neoplastic nasal lesions, fungal infection was the most common comprising 35 (35%) cases, followed by 20 (20%) cases of allergic nasal polyp. In our study, non - neoplastic lesions is commonly found in 4th, 5th and 6th decade of life.

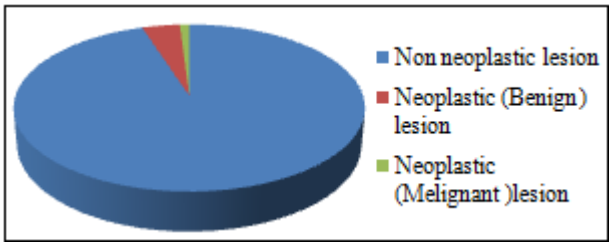

Figure 2: Distribution of nasal lesions.

Table 1: Distribution of nasal lesions in the various age groups and in males and females

Age (years)	Neoplastic lesion	Non neoplastic lesion	Male	Female
0 - 10	1	1	0	2
11 - 20	1	5	4	2
21 - 30	1	4	5	0
31 - 40	1	16	7	10
41 - 50	0	20	16	4
51 - 60	0	24	18	6
61 - 70	1	20	10	11
71 - 80	0	4	4	0
81 - 90	0	1	0	1
Total	5	95	64	26

Table 2: Gender and histopathology wise distribution of lesions

Type of lesion	Total case in males	Total case in females	Total
Non neoplastic lesions	61 (61%)	34 (34%)	95 (95%)
Benign neoplastic lesions	3 (3%)	1 (1%)	4 (4%)
Malignant neoplastic lesions	0 (0%)	1 (1%)	1 (1%)

In terms of frequency, the non - neoplastic lesions of nasal cavity diagnosed were, in descending order, fungal infection, allergic nasal polyp, inflammatory nasal polyp, chronic sinusitis, nonspecific inflammation, acute on chronic sinusitis, adenoid, capillary haemangioma, abscess formation, undifferentiated sinusoidal carcinoma, allergic rhinosinusitis, mucocele, pyogenic granuloma, haemangioma, actinomycosis and angiofibroma. Out of 95 cases of non neoplastic nasal lesions, fungal infections were the most common comprising 35 (36.84%), followed by 20 (21.05%) cases of allergic nasal polyp. Fungal inflammation commonly affected the age group 51 - 60 years (15 cases, 15%) followed by 61 - 70 years (9 cases, 9%). Maximum patients of non neoplastic cases belonged to 51 - 60 (24 cases, 24%) and 61 - 70 (21 cases, 21%) and 41 - 50 (20 cases, 20%). Benign neoplastic lesions were mostly noted in first to fourth decade of life (4 cases, 4%) whereas a malignant lesion was reported in 61 - 70 years age group (1 case, 1%). Out of total 95 cases of non neoplastic lesions, 35 (35%) cases were fungal infection, 20 (20%) cases were allergic nasal polyp, 17 (17 %) cases were inflammatory nasal polyp, 8 (8%) cases were chronic sinusitis, 6 (6%) cases were nonspecific inflammation, 2 (2%) cases were acute on chronic sinusitis, 2 (2%) cases were adenoid, 1 (1%) case was abscess formation, 1 (1%) case was allergic rhinosinusitis, 1 (1%) case was mucocele, 1 (1%) case was pyogenic granuloma and 1 (1%) case was actinomycosis. Out of 5 neoplastic lesions, benign neoplastic lesions were 3 (3%) cases of haemangioma and 1 (1%) case of

angiofibroma and malignant neoplastic lesion was 1 (1%) case of undifferentiated sinusoidal carcinoma (Table - 3).

Table 3: Distribution of nasal lesions in the various age groups

Lesions/ Age groups	0 - 10	11 - 20	21 - 30	31 - 40	41 - 50	51 - 60	61 - 70	71 - 80	81 - 90
Fungal infection	0	0	0	3	6	15	9	1	1
Allergic nasal polyp	0	1	1	7	2	4	5	0	0
Abscess formation	0	0	0	0	1	0	0	0	0
Inflammatory nasal polyp	0	2	2	5	3	1	4	0	0
Chronic sinusitis	0	0	0	1	1	3	1	2	0
Undifferentiated sinusoidal carcinoma	0	0	0	0	0	0	1	0	0
Acute on chronic sinusitis	0	1	0	0	0	0	1	0	0
Allergic rhinosinusitis	0	0	0	0	1	0	0	0	0
Mucocele	0	0	0	0	1	0	0	0	0
Adenoid	0	1	0	0	0	0	0	1	0
Nonspecific inflammation	0	0	1	0	4	1	0	0	0
Pyogenic granuloma	1	0	0	0	0	0	0	0	0
Capillary haemangioma	1	0	1	1	0	0	0	0	0
Actinomycosis	0	0	0	0	1	0	0	0	0
Angiofibroma	0	1	0	0	0	0	0	0	0

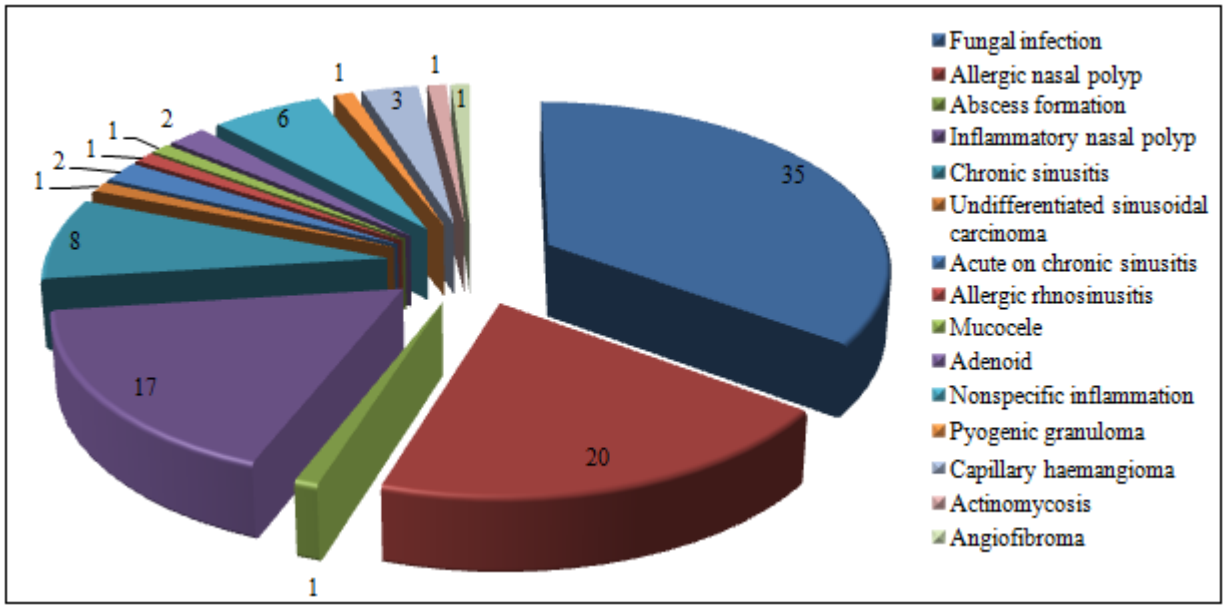

Figure 3: Distribution according to histopathological diagnosis

Table 4: Comparison of age wise distribution of nasal lesions in the present study with other studies

Age group/Study	Kulkarni A et al [2]	Lathi A et al [13]	Parajuli S et al[6]	Present study
0 - 10	4 (3.28%)	11 (9.82 %)	21 (14.18%)	2 (2%)
11 - 20	12 (9.84)	24 (21.42%)	37 (25%)	6 (6%)
21 - 30	27 (22.13%)	22 (19.64%)	35 (23.64%)	5 (5%)
31 - 40	28 (22.95%)	23 (20.53%)	22 (14.86)	17 (17%)
41 - 50	18 (14.75%)	15 (13.39%)	18 (12.16%)	20 (20%)
51 - 60	17 (13.93%)	6 (5.35%)	9 (6.08%)	24 (24%)
61 - 70	13 (10.66%)	11 (9.82%)	6 (4.05%)	21 (21%)
. >70	3 (2.46%)	0 (0%)	0 (0%)	5 (5%)

In present study 20 cases of allergic nasal polyp were present which was consistent with Dua K et al ([11]). Total 17 (17%) cases of inflammatory nasal polyp were found in present study which was consistent with Lathi Aet al ([13]) and Agarwal Pet al ([12]). Present study 03 (4 %) cases of capillary haemangioma were found which was consistent with other similar study groups, K. Pushpalatha et al ([1]) and Kulkarni Aet al ([2]). Out of total 4 benign neoplastic cases, 01 (01%) case of angiofibroma was noted. The result was in accordance with other studies - and Kulkarni Aet al ([2]) and Lathi A et al ([13]). Present study 17 (17%) were present in 31 - 40 yrs age group which was consistent with Parajuli S et al ([6]). Lathi A et al ([13]) and Kulkarni A et al ([2]), which was suggested that middle age group people was more venerable to nasal lesions.

4. Discussion

Masses in nasal cavity, paranasal sinuses and nasopharynx form a heterogeneous group of lesions with a broad spectrum of histopathological features ([9]). Non - neoplastic lesions formed 95% of the total cases of fungal infections, allergic nasal polyp, inflammatory nasal polyp and chronic sinusitis most common in our study. It is important to

recognize the range of non - neoplastic lesions in a region and to differentiate them from neoplastic lesions because of different treatment modality and emotional burden on the patient [14]. Polyps of the nasal cavity are common inflammatory lesions and their etiology is not exactly known [1]. There are various theories for the formation of nasal polyps including adenoma and fibroma theory, mucosal exudate theory, cystic dilatation of the excretory duct, obstruction of vascular supply, inflammation of the veins and lymphatics, hyperplasia of the mucosal glands, formation of new glands, etc. [1]

In the present study, age of presentation showed a wide range from 0 to 90 years [2]. Maximum cases were noted in the fifth decade (24 cases, 24%) followed by the sixth decade (21 cases, 21%) [2]. Male to female ratio of 1.7: 1 was calculated in this study. Our study revealed male predominance which was similar to Singh SGet al [3] study. In the present study, more of allergic and inflammatory polyps were observed in non - neoplastic lesions. This finding compares well with the study of Parmar NJet al [14] who found allergic polyps to constitute 70 - 80% of overall nasal polyps. The 4th, 5th and 6th decades of life are the most vulnerable period for development of nasal lesions.

It was observed that usually there was a discrepancy in diagnosing allergic fungal polyp. They were mainly reported as eosinophil rich polypi (Allergic fungal sinusitislike syndrome) on biopsy [11]. The clinical presentation of allergic fungal sinusitis is not diagnostic [11]. There are two ways to diagnose allergic fungal sinusitis (AFS) —one to have the presence of characteristic allergic mucin and the other to have evidence of fungal etiology [11]. Patients who have allergic mucin without documentation of the presence of fungus are identified as having AFS - like syndrome. [11] The management of allergic fungal polypi still remained the same as earlier, i. e. complete removal of fungus and polypi [11]. Comparison of clinical and histopathological findings showed that of the 37 patients with clinically non - neoplastic benign polyps, 20 patients had allergic while 17 had inflammatory nasal polypi [11]. But the clinical presentation was same in both the cases [11]. However, Dua Ket al [11] observed no difference in the histological appearance of allergic and infective polyps [11].

Out of 17 cases of inflammatory polyp 8 were male and 9 females with age range of 10 - 70 years and mean age of presentation 30 years. Most of the patients came from urban areas which may be due to the fact that they have better awareness and present early in the OPD. The male to female ratio was 0.8: 1. Our findings are comparable to the study conducted by Singh SG et al [3] in which nasal polyps constituted commonest type of non neoplastic lesions with 64 cases of inflammatory polyp 34 were male and 30 females with age range of 15–56 years and mean age of presentation 35.6 years. The male to female ratio was 1.3: 1.

In the present study, majority of the lesions were of non - neoplastic etiology. The most common nonneoplastic lesion was fungal infection (35%) followed by allergic nasal polyp (20%), inflammatory nasal polyp (17 %) and chronic sinusitis (8 %). Studies conducted by Kulkarni Aet al [2]. A A vare et al [4] and Parmar NJet al [14] also noted that sinonasal polyp was the most common nonneoplastic lesion.

One case of mucocele was diagnosed in the present study accounting for a percentage of 1.05% amongst the nonneoplastic lesions. Mucoceleis chronic, cystic lesion in the paranasal sinuses. Similar incidence was reported in a retrospective review of the archives of the Department of Pathology, Kathmandu Model Hospital (August 2007 to August 2012) which identified 3 cases of mucocele over a period of 5 years and found an incidence of 2.52%. [6]

We diagnosed 3 cases (75%) of capillary hemangioma amongst the benign lesions studied. Hemangioma is not regularly seen in the nasal cavity, though if it occurs, is predominantly capillary and is found attached to the nasal septum. All the cases were found to be arising from the cartilaginous part of the nasal septum. This finding corresponds to the observation of ParajuliS et al [6].

Patients with neoplastic samples were significantly older than those with benign samples. Age was also weakly correlated with neoplasm, while gender was neither correlated nor significantly different between patients with neoplasms and those with inflammatory lesions. In our study of the 4 benign cases, hemangioma was the most common with 3 % of cases followed by angiofibroma with 1 % of cases. In a study by Agarwal P et al [12] of the 39 cases of benign tumors, hemangioma was the most common with 43.6 % of cases followed by inverted papilloma with 30.7 % of cases. The present day practice is to treat first by medical management and if unresponsive then to perform endoscopic guided sinus surgery forremoval of benign polyps and for malignancies standard treatment protocols are followed.

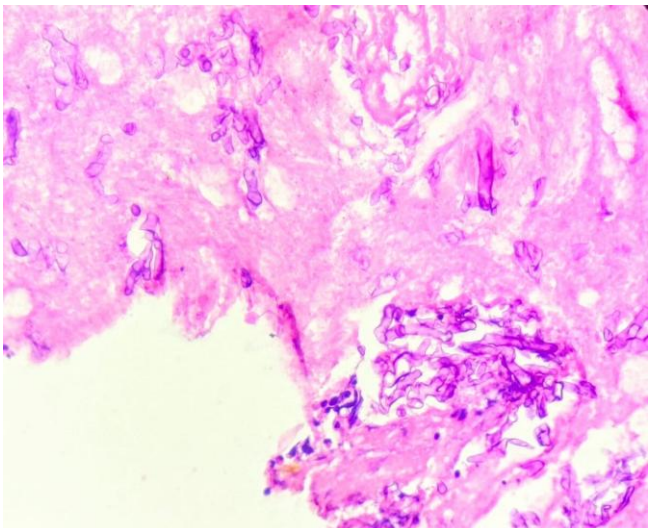

Figure 4 (A): Fungal infection - Mucormycosis (PAS Stain, 100X)

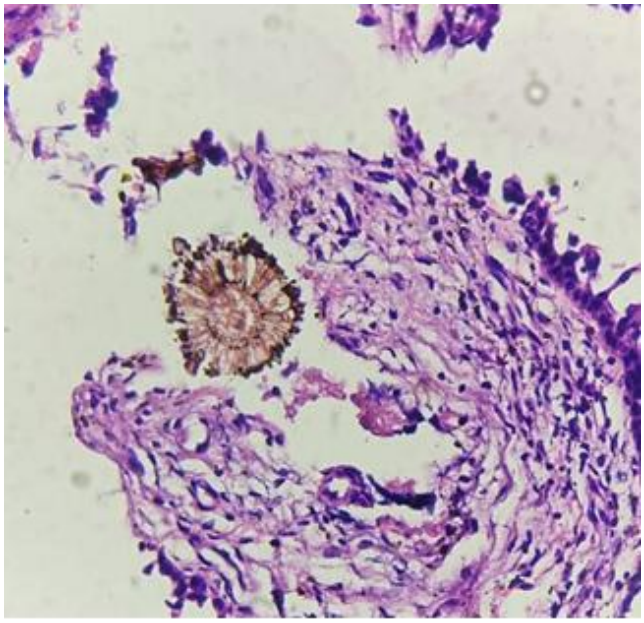

Figure 4 (B): Fungal infection - Aspergillosis (H & E, 10X)

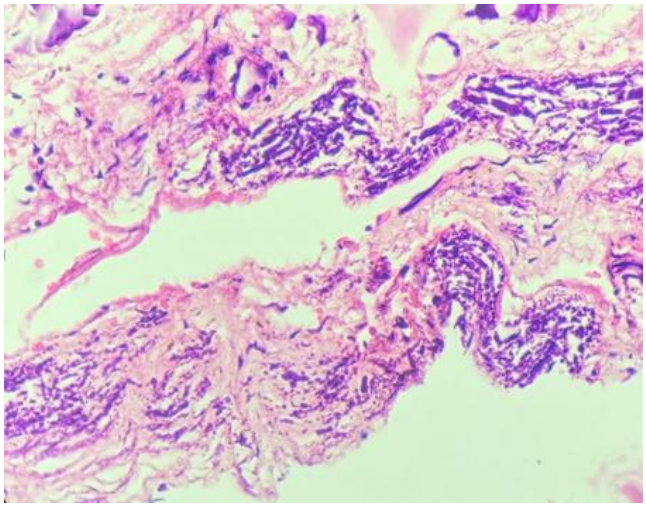

Figure 4 (C): Fungal infection - Candidiasis (H & E, 10X)

Out of 95 cases of non neoplastic nasal lesions, fungal infections were the most common comprising 35 (36.84%). On histopathology, the fungal hyphae seen were broad, ribbon like, irregular and aseptate with branching at right angle. Mucormycosis infection of the sinuses is a form of life - threatening invasive fungal sinusitis that typically affects immunocompromised individuals with an impaired neutrophilic response. Patients can include those with uncontrolled diabetes mellitus, acquired immunodeficiency syndrome, iatrogenic immunosuppression and haematological malignancies, and those who have undergone organ transplantation [16]. (Figure - 4 (A)). Aspergillosis and candidiasis fungal infection also seen in present study (Figure - 4 (B) and (C)). Some of the aspergillosis and candidiasis fungal infection also associated with mucormycosis infection which was mostly seen in post - covid 19 infected patient.

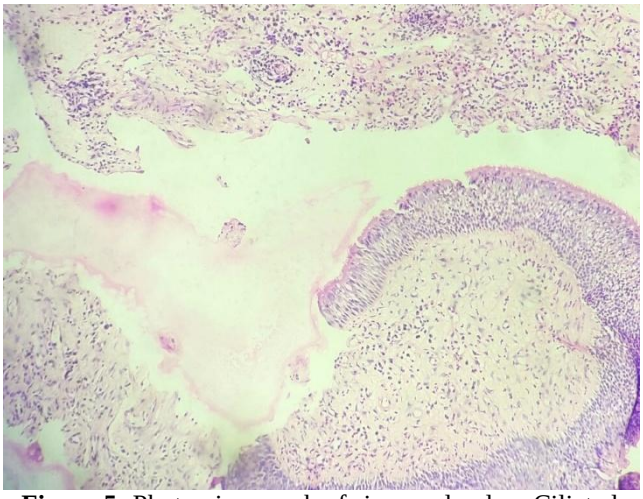

Figure 5: Photomicrograph of sinonasal polyp. Ciliated pseudostratified columnar respiratory epithelium with stromal mixed inflammatory infiltrate. (H&E, 10X)

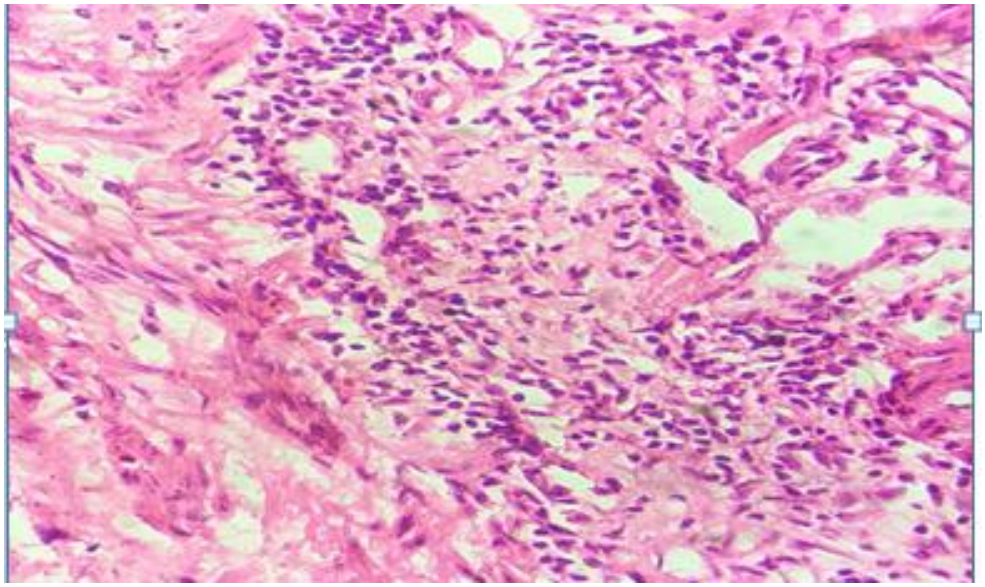

Figure 6: Stromal mixed inflammatory infiltrate. (H&E, 100X)

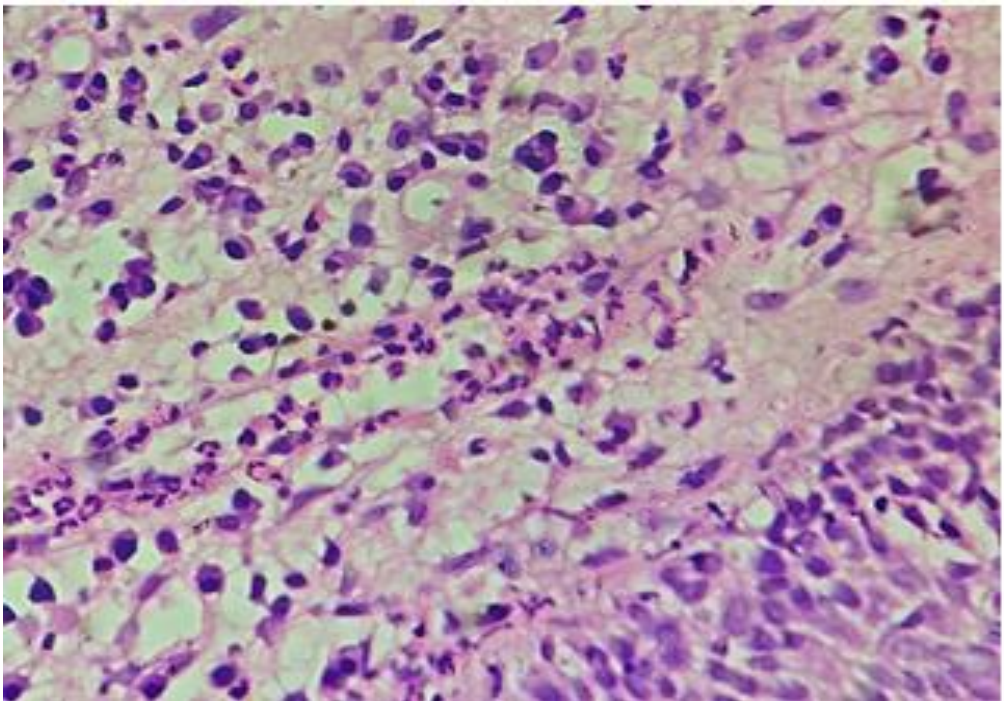

Figure 7: Stromal infiltration of eosinophiles (Allergic nasal polyp)

Peak incidence of sinonasal polyps was noted in the third decade. Similar findings were observed by Kulkarni Aet al ([2]) and A A Vareet al ([4]), who reported (85.72% and72% case respectively) a peak incidence in second and third decade of life. In the present study, male to female ratio was 1.11: 1 for nasal polyp which is similar to study by Kulkarni Aet al ([2]) and A A Vareet al ([4]). Microscopically, the epithelial lining is ciliated pseudostratified columnar, with stromal infiltrate comprising of eosinophils, lymphocytes and neutrophils. (Figure 5, 6, 7)

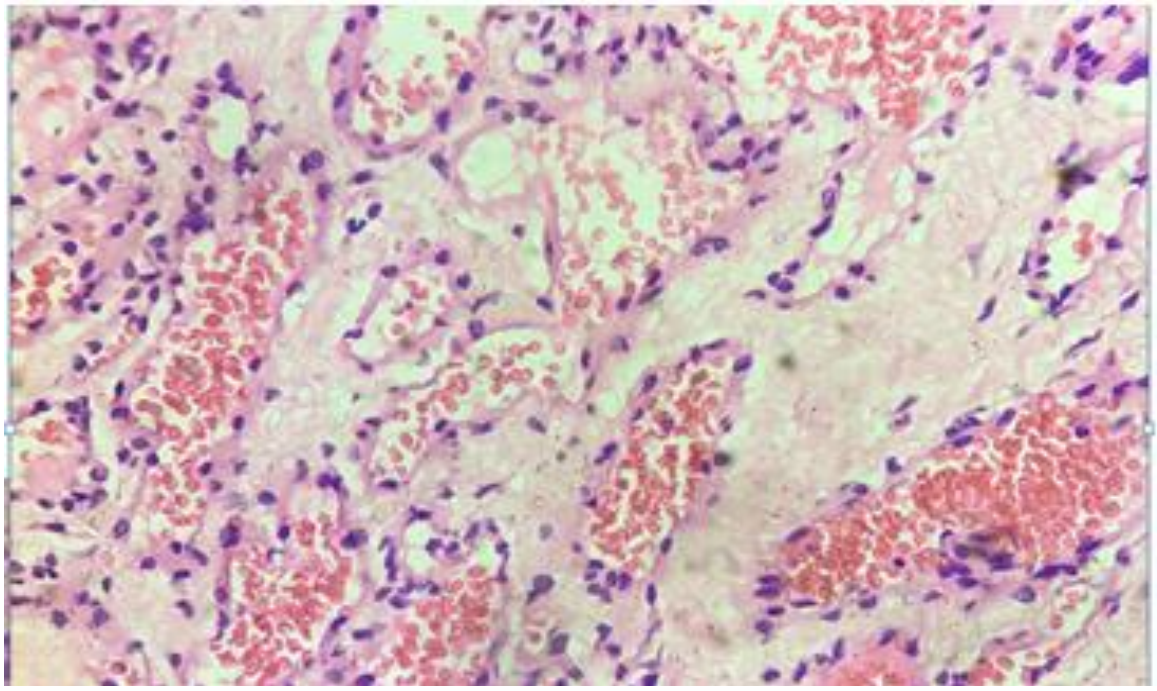

Figure 8: Capillary proliferation of hemangioma

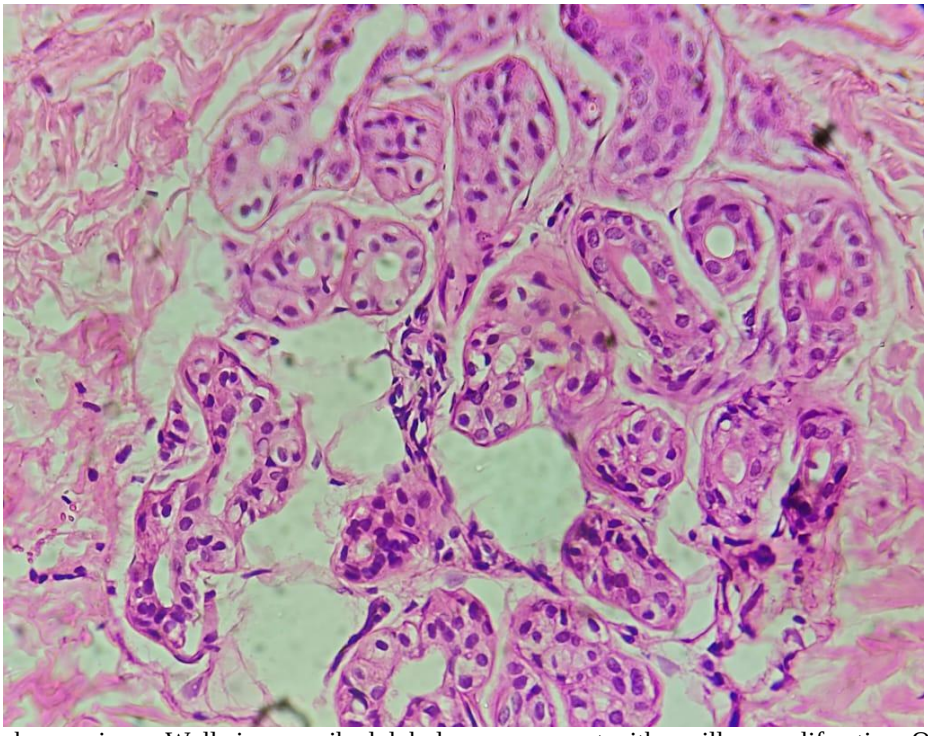

Figure 9: Capillary hemangioma. Well circumscribed, lobular arrangement with capillary proliferation. Overlying collarette of epithelium is noted. (H&E, 100X)

It was noted that hemangioma could occur in any age group but was most commonly noted in the fourth decade. Microscopic features such as lobular arrangement, capillary proliferation and capillary lining by plump endothelial cells were noted. (Figure - 8, 9). Among 4 cases of benign lesion we observed 3 cases of hemangioma. Out of 4 cases 3 were capillary hemangioma and 1 was of angiofibroma. So we found capillary hemangioma as predominant type. It is seen that the incidence of hemangioma in the present study is 75% among benign neoplastic lesions. This was close to the incidence observed by Dua K et al ([11]) study.

5. Conclusion

A variety of non - neoplastic and neoplastic conditions involve nasal cavity, paranasal sinuses and nasopharynx. The presenting features, symptomatology and advanced imaging techniques help to reach a presumptive diagnosis but histopathological examination remains the mainstay of final definitive diagnosis so that a correct and timely intervention is done. Various types of lesions affect the sinonasal tract. These lesions can affect any age group. Irrespective of their etiology, whether non - neoplastic or neoplastic, the lesions can present with similar clinical features. Nasal polyps show most commonly allergic and inflammatory morphology. Radiological studies and other investigations can help provide a differential diagnosis, but the final diagnosis can only be given on histopathological examination. Therefore histopathology plays an intergral role and remains the gold standard for establishing the diagnosis of sinonasal tract lesions. However many a times CT scan and biopsy are necessary to differentiate them from each other and for treatment planning. Due to the overlapping presentation of lesions of this region with more commonly encountered inflammatory and infectious diseases, role of histopathological examination needs to be understood and is mandatory for proper and early treatment of the patient. In the present study of masses in sinonasal cavity and nasopharynx, most of the time, patients present with trivial nasal symptoms, and there is always a possibility to miss the diagnosis if great care is not taken while examining the patient. Timely diagnosis and early medical treatment will decrease the burden of morbidity and mortality in these patients. Sometime combined modalities of treatment should be used for effective treatment. Awareness regarding the disease process and health education should be provided to people regarding smoking, maintenance of hygienic conditions, avoid public pond bathing, and utilization of health facilities.

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