



A Study of Lesions of Upper Respiratory Tract

K. Anbukkarasi¹, Hemalatha Ganapathy¹ and J. Thanka^{1*}

¹*Department of Pathology, Sree Balaji Medical College and Hospital (Affiliated to Bharath Institute of Higher Education and Research), Chennai, Tamil Nadu, India.*

Authors' contributions

This work was carried out in collaboration among all authors. All authors read and approved the final manuscript.

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ABSTRACT

The development of the organ systems are highly regulated in physiological conditions and the development of nose and paranasal sinuses commences in the 3rd week of gestation, when the primordial structures first appear and continues until completion in early adulthood when sinus pneumatization and bony growth have ceased. Their misregulation lead to the development of many cancers and primitive nasal septum Squamous cell carcinoma (SCC) of the upper respiratory tract ranks as the sixth leading cause of cancer worldwide. In the current study, out of 31 cases, maximum cases were found to be moderately differentiated grade amounting to 64.5%, followed by well differentiated grade (22.6%) and poorly differentiated grade (12.9%). The present study also showed that poorly differentiated SCC had higher Ki 67 proliferative index and it could be a useful tool for determining the stages of tumors. Ki 67 proliferative index study of the tumor helps in better understanding of the tumor behavior so as to provide appropriate treatment and thereby increasing the survival rate of the patient.

Keywords: Para nasalsinuses; pneumatization; nasal septum; squamous cell carcinoma.

*Corresponding author: E-mail: thanka.path@bharatuniv.ac.in;

1. INTRODUCTION

The nasal cavity, Para nasal sinuses, pharynx and larynx though in continuity form a complex system of upper respiratory tract, this region is endowed with a variety of elements such as epithelial, glandular, lymphoid, cartilage, and bone and is also exposed to a variety of infection s, tumor like and true neoplastic conditions.

The nasal cavity and Para nasal sinuses are collectively called as sinonasal tract. The sinonasal tract and nasopharynx form a functional unit and affected by a wide range of non - neoplastic and neoplastic lesions [1]. Mechanical trauma, exposure to chemical agents, allergens and infectious agents results in formation of various tumors like conditions and neoplastic lesions [2]. The lesions present as mucosal thickenings or polypoidal masses with epistaxis or obstruction, making it difficult to differentiate non neoplastic lesions from neoplastic masses on clinical examination [3,4]. Histopathological diagnosis is mandatory for treatment and prognosis of sin nasal and nasopharyngeal lesions [5,6].

Squamous cell carcinoma (SCC) of the upper respiratory tract ranks as the sixth leading cause of cancer worldwide [7]. This represents about 4% of all cancers [8]. This includes a heterogeneous group of neoplasms arising from regions like oral cavity, nasopharynx, oropharynx, hypopharynx and larynx, excluding the neoplasms arising from salivary glands [9]. Among the oral and upper respiratory tract malignancies, squamous cell carcinoma comprises more than 90%.

Oral cavity and upper respiratory tract SCC involves the organs that are vital for speech, smell, taste and voice. The diagnosis is often delayed because the symptoms like pain and dyspnea present in the late stages of disease [10]. Upper respiratory tract SCC involves a multistep carcinogenesis process in which compound genetic events occur earlier and modify the normal function of oncogenes and tumor suppressor genes.

More studies are currently done on clinical trials to detect the lesions in its early stage [10,11]. These results emphasize the overall malignant transformation potential to about 1-2% [12]. However, the incidence of oral and upper respiratory tract SCC is on the rise with a high level of recurrence [13,14,15,16]. This necessitates a better understanding of the

neoplastic transformation at cellular level. This study aimed to analyse the prevalence of lesions in upper airway tract squamous cell carcinoma, which helps in accurate diagnosis of the grade of the tumor and acts as a prognostic factor.

2. MATERIALS AND METHODS

This study is a prospective study on Histomorphological lesions of URT and Immunohistochemical study of SCC of the upper respiratory tract, conducted in the Department of Pathology, Sree Balaji Medical College Hospital and Research Centre, Chennai during the period, October 2016 to September 2018.

A total of 5233 cases were submitted to the Department of Pathology, SBMCH between the period of October 2016 and September 2018 for histopathological examination. Out of that, 186 cases were upper respiratory tract cases. All the specimens were biopsy specimens. The total number of malignant cases of the upper respiratory tract was 38 out of which 31 were SCC specimens.

2.1 Source of Data

All the lesions of Nasal cavity & PNS, pharynx and larynx reported in the Department of Pathology, Sree Balaji Medical College, from October - September 2018 which had been sent by the department of Otorhinolaryngology.

2.1.1 Inclusion criteria for immunohistochemical study

As SCC was the most common malignant lesion received in URT, Squamous cell carcinomas reported in this region irrespective of the age, sex and the procedure done were included for the study.

2.1.2 Exclusion criteria for immunohistochemical study

Non-neoplastic, benign and premalignant lesions of the upper respiratory tract.

Carcinomas other than squamous cell carcinoma and metastatic diseases.

Cases with inadequate material.

2.2 Method of Data Collection

Detailed history regarding age, sex, site, type of procedure done were obtained for all the upper respiratory tract cases reported during the period

of study from surgical pathology records. Haematoxylin and Eosin stained 5 µm thick sections of the paraffin tissue blocks of all the specimens were reviewed. The following clinical and pathological parameters were evaluated: Age, gender, site and type of lesion. And for malignant neoplastic lesions age, sex, site, tumor type and grade were assessed. Squamous cell carcinoma cases were graded into well differentiated, moderately differentiated and poorly differentiated types based on the degree of differentiation. All the three grades of tumors were subjected to Ki 67 immunohistochemical study.

2.3 Immunohistochemical Evaluation

The immunohistochemical detection of biomarker in the SCC of upper respiratory tract were done using monoclonal primary antibody (anti Ki67) against Ki67 nuclear antigen. Ki67 immunostaining was done using peroxidase - anti-peroxidase technique in squamous cell carcinomas of sinonasal tract, nasopharynx and larynx.

2.4 Statistical Analysis

The statistical analysis was carried out using GraphPad Prism (Ver 5) by t-test and two-way analysis of variance (ANOVA) with Turkey test for multiple comparisons. The mean value was presented and the experiments were in triplicates.

3. RESULTS

In the study period of 24 months from October 2016 to September 2018, a total of 5233 specimens were received in the department of Pathology, Sree Balaji Medical College and Hospital for histopathological examination. Total number of URT specimens received was 186 cases (3.6%) (Table 1).

3.1 Upper Respiratory Tract

Total number of upper respiratory tract specimens received was 186 cases of which malignant lesions accounted for 38 cases with a percentage of 20.4%. Of the remaining, 14 were benign cases (7.5%) and non-neoplastic cases were 129 (69.4%) (Table 1, Fig. 1).

3.2 Non-neoplastic Lesions

Non neoplastic lesions were more common in the age group of 20 -30 years accounting for 38 % (Table 5), men were more commonly affected than women and the most commonly occurring

site was sinonasal region (Fig. 2, Table 6). Polyps were the most common non neoplastic lesion (Table 7).

3.3 Neoplastic Lesions –Benign

Benign lesions were more common in the age group of 31-40 accounting for 57.1 % of cases. Males were more commonly affected (71.4 %) and the most common lesion being inverted papilloma of nasal cavity. Benign lesions were more commonly observed in nasal cavity and PNS (Fig. 3).

Among the 31 cases of upper respiratory tract squamous cell carcinoma, the commonest occurrence of SCC was seen in age group above 60 years.

4. DISCUSSION

The histopathological spectrum of lesions of URT is complex and displays a wide range of neoplastic and non neoplastic types. A clinical feature with advanced imaging technique correlation gives a probable diagnosis, however histopathological examination for categorization of these lesions is essential for proper management. Non neoplastic lesions comprise majority of URT lesions followed by malignancy. Neoplasms constitute approximately 3% of head and neck tumors [17,18]

In head and neck tumors, squamous cell carcinoma remains the most common malignancy which has a great impact not only on patient survival, but also on the speech, swallowing and better well being of the patient. It remains the 6th most common cause of malignancy worldwide. The incidence is highest in developing countries. In India, the incidence is about 30 -50% of entire malignancies [19,20]. There had been no significant change in the prognosis of SCC over the years. This is due to the fact that majority of cases are not diagnosed in the early stages. In more than 50% of patients with HNSCC, the disease reaches the advanced stage and the expected survival rate for 5 years falls to 10 -40% (Goldberg et al 1994). This decreased survival rate is due to persistent uncontrollable disease and poor understanding at the molecular level despite intense treatment like radiotherapy, chemotherapy [21,17,18].

In the current study histomorphological study of lesions of upper respiratory tract and immunohistochemical study of upper respiratory tract SCC was done.

Table 1. Distribution of cases of upper respiratorytract

Site	Total specimens received	Non- Neoplastic (NN)	Benign (B)	Premalignant (PM)	Malignant (M)
Upper respiratory tract	186	129	14	05	38
Percentage (%)	100	69.4	7.5	2.7	20.4

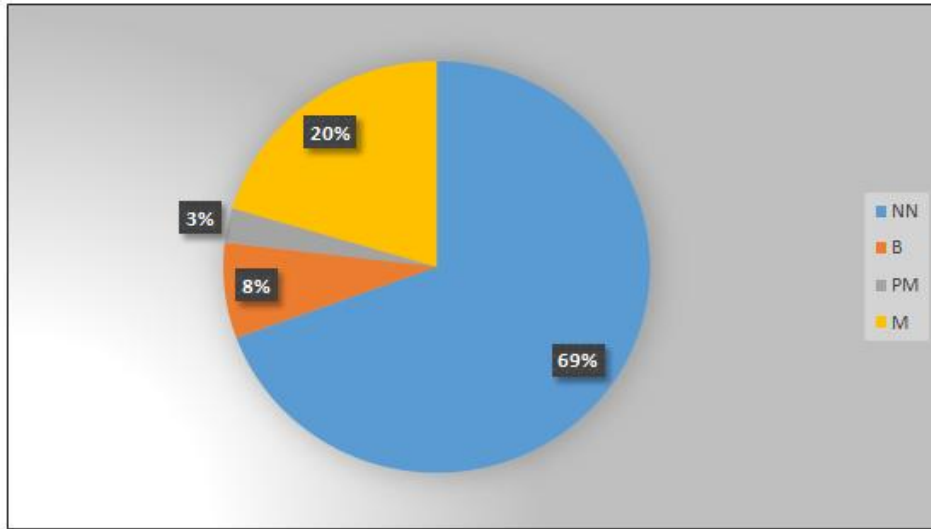


Fig. 1. Distribution of cases of upper respiratorytract

Table 2. Age wise distribution of lesions of upper respiratory tract

Age	Number	Percentage [%]
<10 years	05	2.7
11-20	13	7.0
21-30	51	27.4
31-40	51	27.4
41-50	26	14.0
51-60	08	4.3
>61years	32	17.2
Total	186	100

Table 3. Sex wise distribution of lesions of upper respiratory tract

Sex	Frequency	Percentage [%]
Male	116	62.4
Female	70	37.6
Total	186	100

Table 4. Site wise distribution of lesions of upper respiratory tract

Site	Frequency	Percentage [%]
Nasal cavity & PNS	105	56.5
Pharynx	48	25.8
Larynx	33	17.7
Total	186	100

Table 5. Age wise distribution of non- neoplastic lesions

Age	Frequency	Percentage [%]
<10	05	3.9
11-20	13	10
21-30	49	38
31-40	42	32.5
41-50	07	5.4
51-60	12	9.4
>61	01	0.8
Total	129	100

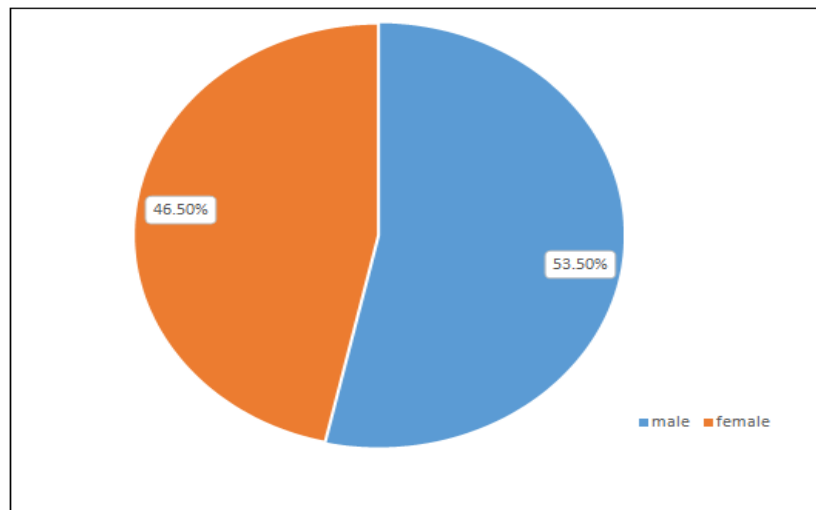


Fig. 2. Sex wise distribution of non-neoplastic lesions

Table 6. Site wise distribution of non- neoplastic lesions

Site	Frequency	Percentage [%]
Nasal cavity & PNS	90	69.9
Pharynx	21	16.2
Larynx	18	13.9
Total	129	100

Table 7. Histological diagnosis of non- neoplastic lesions

Histological diagnosis	Frequency	Percentage [%]
Non allergic polyp	29	22.4
Allergic polyp	46	35.6
Antrochoanal polyp	15	11.6
Rhinosporidiosis	08	6.1
Fungal infections	06	4.6
RLH	01	0.7
ATH	15	11.6
AMP	01	0.7
BVCP	06	4.6
FVLP	02	1.4
Tuberculosis	01	0.7
Total	129	100

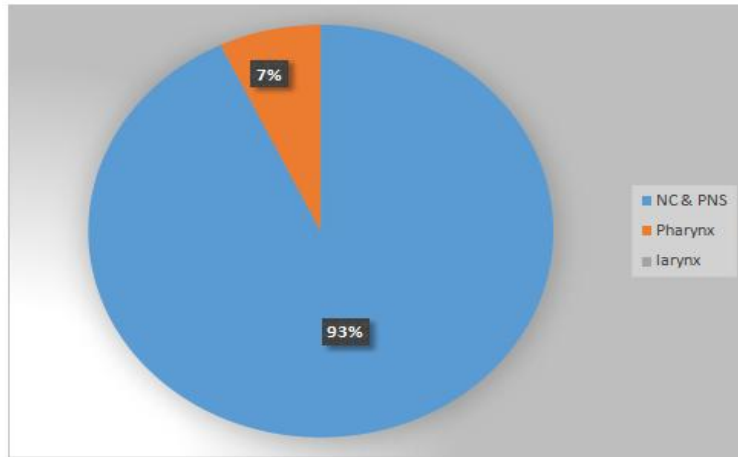


Fig. 3. Site wise distribution of benign lesions

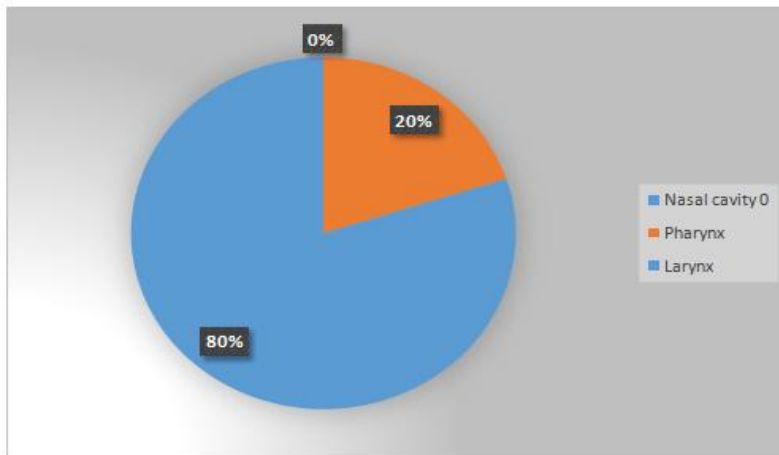


Fig. 4. Site wise distribution of premalignant lesions

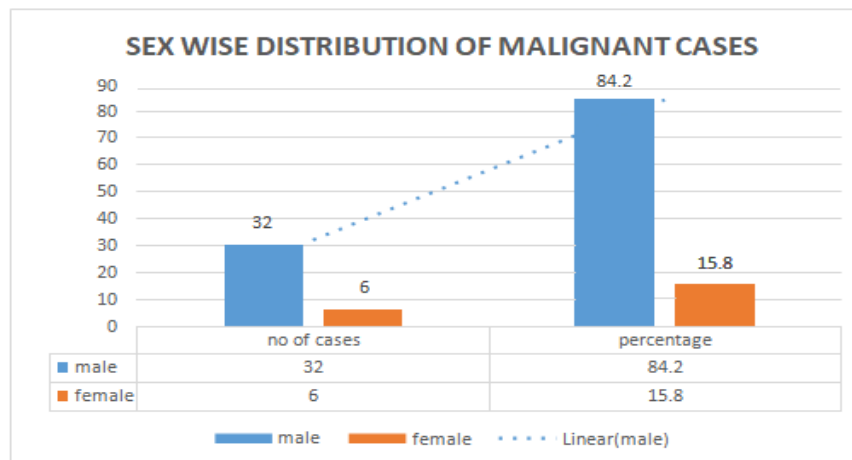


Fig. 5. Sex wise distribution of malignant cases

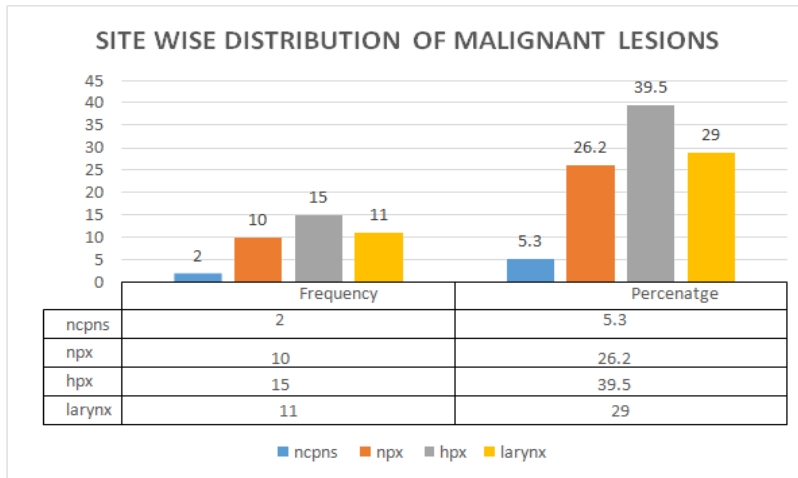


Fig. 6. Site wise distribution of malignant cases

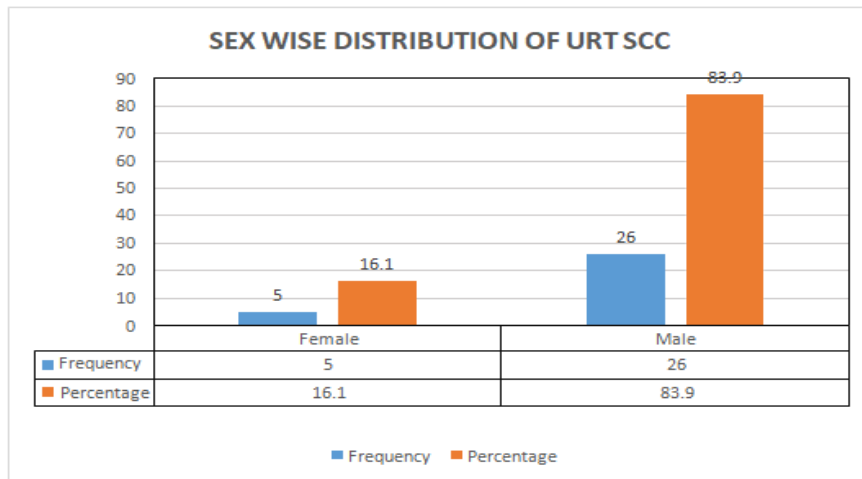


Fig. 7. Sex wise distribution of URT SCC

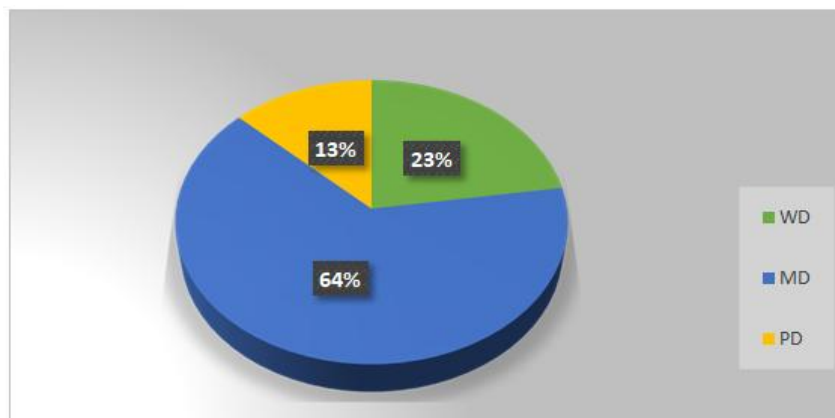


Fig. 8. Colour plates

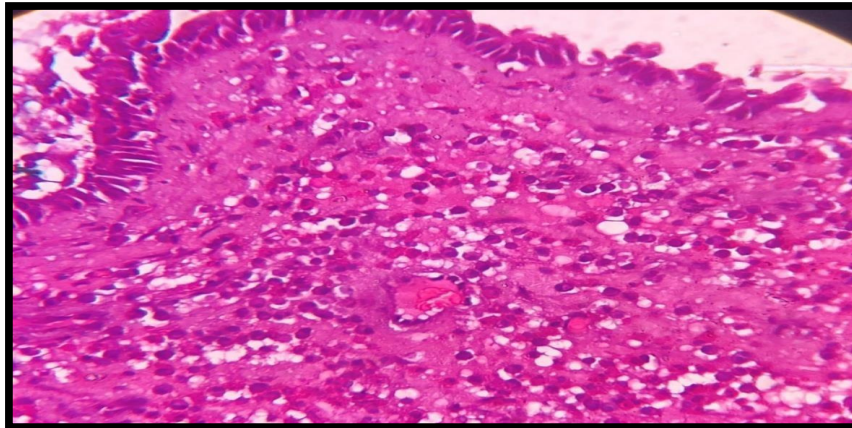


Fig. 9. H&E picture of allergic polyp -40xmagnification

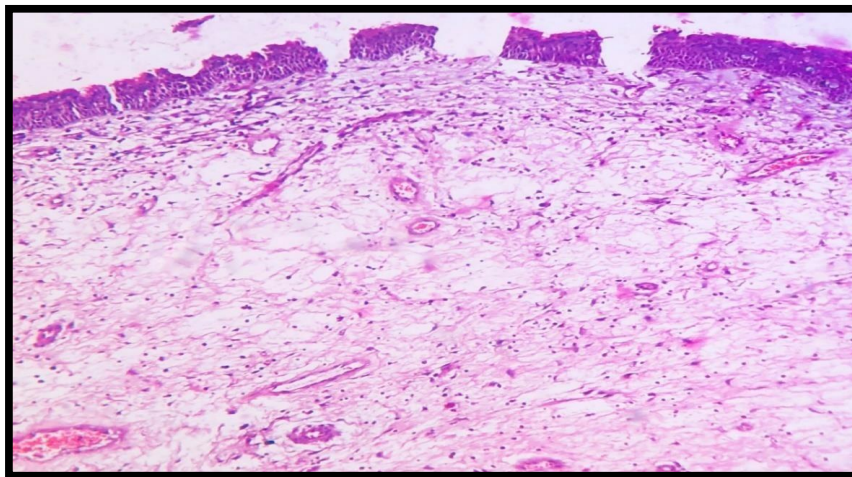


Fig. 10. H&E picture of Antrochoanal Polyp -10x magnification

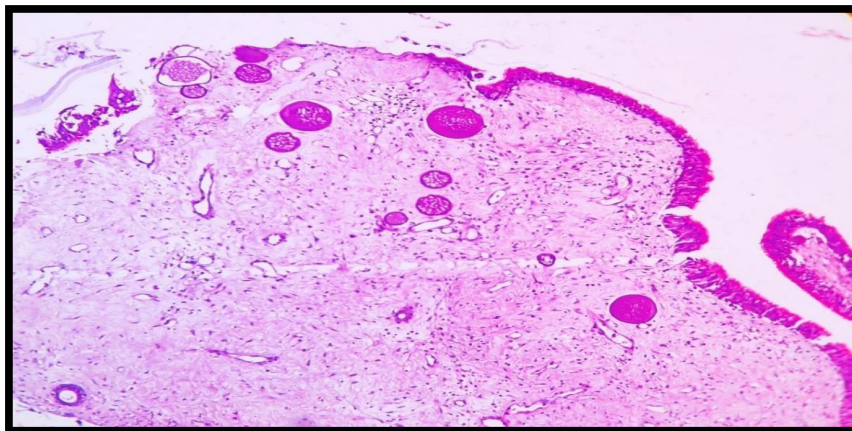


Fig. 11. H&E Picture of Rhinosporidiosis -10x magnification

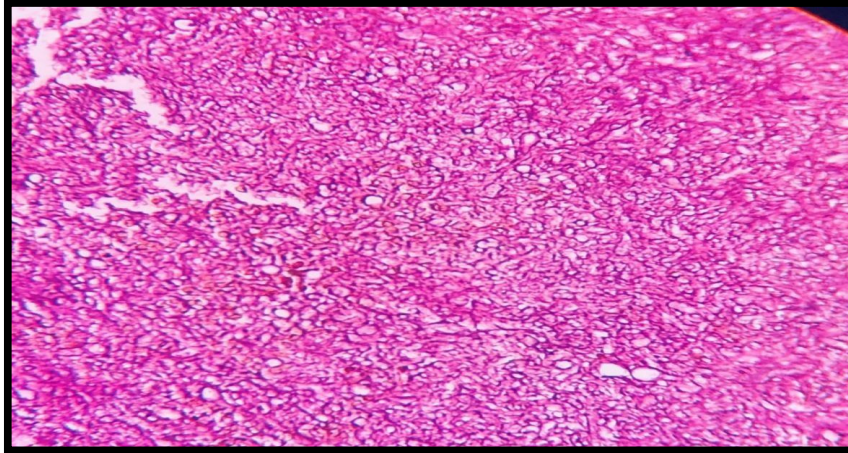


Fig. 12. H&E Picture of Mucormycosis- 10x magnification

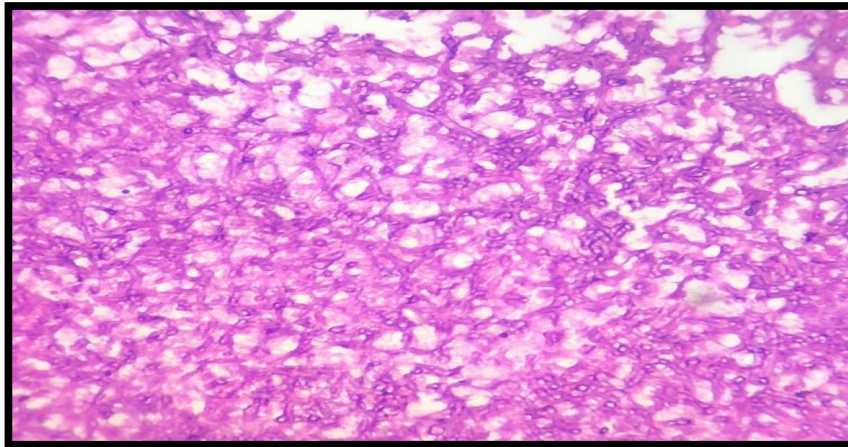


Fig. 13. H&E Picture of Aspergillosis – 10x magnification

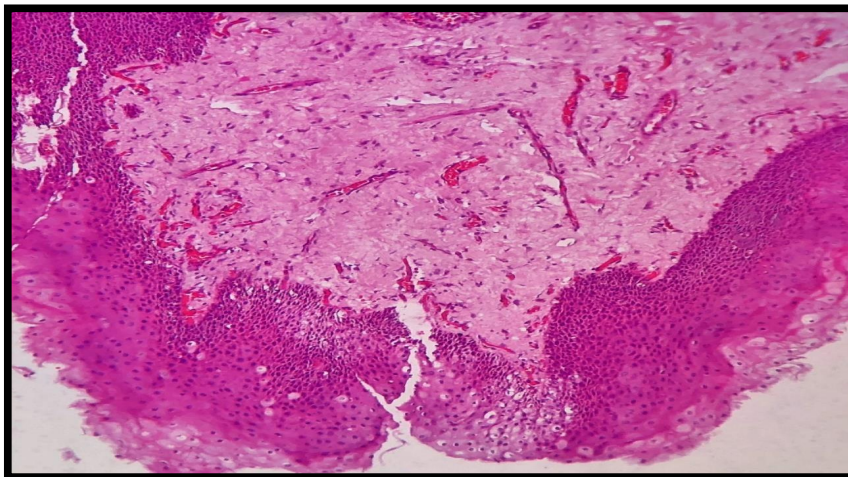


Fig. 14. H&E picture of fibrovascular laryngeal polyp - 10x magnification

The total number of specimens received in SBMCH from October 2016 - September 2018 was 5233, out of which 186 (3.6%) specimens were from upper respiratory tract and out of which 129(69.4%) were non neoplastic, 14(7.5%) were benign,5(2.7%) were premalignant and 38 (20.4%) cases were malignant.

The non-neoplastic lesions were more common in URT (69.4%); this was in concordance with Shaila N shah et al. who also observed that non neoplastic lesions were the most common in this region (70%). The non-neoplastic lesions were common in 2nd and 3rd decade which is in concordance with studies by Khan N et al [5], Shaila N shah et al. Nasal polyps (69.8%) and nasal cavity (69.9%) are the commonest type and site of lesion in this study and this also goes by the observation in studies by Khan N et al (82%, 74%), Shaila et al. (70%,69%) respectively.

Of the benign neoplastic lesions inverted papilloma (50%) was the most common lesion followed by capillary lobular hemangioma (35.8%) in this study, which is slightly higher than the results observed by Bhattacharya J et al. where the incidence was 29.4% for both inverted papilloma and capillary hemangioma.

Both non neoplastic and benign lesions showed male predominance with a ratio of 1.1:1 and 2.4:1 respectively. This was in concordance with the studies conducted by Khan et al, Bhattacharya J et al.

Of the malignant lesions SCC was the most common tumor accounting for 81.7% of malignant cases followed by undifferentiated nasopharyngeal carcinoma. In this study, the age group of upper respiratory tract SCC ranged from fourth decade to eighth decade. The highest incidence of SCC was observed between sixth and seventh decade in 18 cases (58.06%). This was followed by seventh and eighth decade in 07 cases (22.6%). This value was in concordance with the study by Kajanti M et al who showed the mean age of 60 years.

In this study, out of 31 cases, the maximum occurrence of tumor was noted in males, 26 cases (83.9%). In females, 05 cases (16.1%) were reported. This was in concordance with the study conducted by American Cancer Society which also showed male predominance in upper respiratory tract SCC.

In this study, it was observed that the site of distribution was maximum in hypo pharynx. A total of 15 cases (48.4%) were reported in hypo pharynx, followed by 11cases (35.5%) in larynx and nasopharynx 05 cases (16.1%). This distribution was compared with the study conducted by Silver C E et al. [22]. In their study, the distribution was noted as glottis 26%, hypo pharynx 10%, supraglottis 35% and nasopharynx 2% of cases.

On observing the data analyzed in the study period, it was also found that the incidence of preform sinus SCC was more common in males compared to females. Totally 15 cases of SCC were noted from preform sinus region and it was common in males compared to females. A similar male predominance was observed with preform sinus SCC in the study conducted by Driscoll W G et al. [23].

In the current study, out of 31 cases, maximum cases were found to be moderately differentiated grade amounting to 64.5%, followed by well differentiated grade (22.6%) and poorly differentiated grade (12.9%). This varied when compared to a study conducted by Hulya Simsek et al. [24] where maximum upper respiratory tract malignancy was reported as poorly differentiated SCC (35.9%) followed by moderately differentiated SCC (33.7%).

5. CONCLUSION

This study shows that in Sree Balaji Medical College and Hospital the non-neoplastic lesions are the most commonly occurring lesions of upper respiratory tract followed by malignancy. And the most common malignant lesion observed is SCC. The malignant lesions occur in the age group of 60-70 years and men were more commonly affected. It could also be used as a prognostic factor as like in breast, prostate etc. Ki 67 proliferative index study of the tumor helps in better understanding of the tumor behavior so as to provide appropriate treatment and thereby increasing the survival rate of the patient.

CONSENT

It is not applicable.

ETHICAL APPROVAL

The study was approved by the Institutional Ethics Committee.

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COMPETING INTERESTS

Authors have declared that no competing interests exist.

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