Histopathological Study of Lesions of the Nasal Cavity, Paranasal Sinuses and Nasopharynx in a Tertiary Care Centre, Visakhapatnam over a Period of 2 Years

Rajendra Prasad Jagannadham[1], Lakshmi Latchupatula[2], Sravani Ponnada[3], Neelima Lalam[4], Raghunadhababu Gudipudi[5], Bhagyalakshmi Atla[6]

[1, 2, 3, 4, 6] Department of Pathology, Andhra Medical College, Visakhapatnam, Andhra Pradesh, India.
[5]Department of ENT, Andhra Medical College, Visakhapatnam, Andhra Pradesh, India.

ABSTRACT

BACKGROUND

A variety of non - neoplastic and neoplastic conditions involve the nasal cavity, paranasal sinuses and nasopharynx and these are very common lesions encountered in clinical practice. Histopathological examination of these lesions is the gold standard for diagnosis because management and prognosis vary among different lesions. The aim of the present study was to evaluate the histopathological study of the lesions of the nasal cavity, paranasal sinuses and nasopharynx in relation to their incidence, age, gender and site wise distribution and to compare the results with the available data.

METHODS

A study of 88 cases was conducted for a period of 2 years from August 2017 to July 2019. After fixation, Processing and Haematoxylin and Eosin staining and special stains histopathological diagnosis was made.

RESULTS

Among 88 total cases, 58 were males and 30 were females. A male predominance was observed with a male to female ratio of 1.93 : 1. They were more common in third, fourth and fifth decade of life. Malignant nasal lesions were seen after fourth decade of life. Nasal lesions were more common in nasal cavity (67.05 %), followed by paranasal sinuses (18.18 %) and nasopharynx (14.75). Out of 88 total cases, 39 (44.32 %) were non - neoplastic, 30 (34.09 %) were benign and 19 (21.59 %) were malignant nasal lesions.

CONCLUSIONS

Sinonasal lesions and nasopharyngeal lesions can have various differential diagnoses. A complete clinical, radiological and histopathological correlation helps to categorize these sinonasal lesions into various non - neoplastic and neoplastic types. But histopathological examination remains the mainstay of definitive diagnosis.

KEYWORDS

Nasal Cavity, Paranasal Sinuses, Nasopharynx, Benign Tumours, Malignant Tumours, Histopathological Examination

Corresponding Author:
Dr. Lakshmi Latchupatula,
Department of Pathology,
Andhra Medical College,
KGH Campus, Maharanipeta,
Visakhapatnam -530002,
Andhra Pradesh, India.
E-mail: luckyneelu2009@gmail.com

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BACKGROUND

Nose is the most sensitive part of the face with great aesthetic significance and functional importance.[1] Sinonasal and nasopharyngeal area is exposed to various infective agents, dust, chemicals, irritants, antigens and other influences. These exposures may lead to formation of tumour like and neoplastic conditions.[2] These can range from simple nasal polyp to infective polypoidal granulomatous lesions to malignant neoplastic lesions. A large number of diseases affecting these structures are due to many of the specialized tissues, each with its own aberrations that exist in the region.[3] A variety of non - neoplastic and neoplastic conditions involve the nasal cavity (NC), paranasal sinuses (PNS) and nasopharynx and these are very common lesions encountered in clinical practice.[4] The presenting features, symptomatology and advanced imaging technique including computed tomography / magnetic resonance help to reach a presumptive diagnosis, but a careful histopathological examination is essential for a correct diagnosis and timely intervention.[5] The aim of the present study was to evaluate the histopathological study of the lesions of the nasal cavity, paranasal sinuses and nasopharynx in relation to their incidence, age, gender and site wise distribution and to compare the results with the available data.

METHODS

The present study is a retrospective study for a period of two years from August 2017 to July 2019, conducted in the department of Pathology, Andhra medical college, Vishakhapatnam. A total of 88 cases were studied for histopathological examination. All the cases were received from department of ENT, government ENT hospital, Vishakhapatnam. Information such as name, age, presenting complaints were noted. The relevant clinical details, laboratory investigations including radiological findings (x-ray, CT, MRI) were obtained for clinic - pathological correlation. All the received biopsies were fixed in 10 % buffered formalin, processed, embedded and then stained with Haematoxylin and Eosin stains. Special stains like PAS, Giemsa, Reticulin were used to confirm diagnosis wherever necessary. All the cases were carefully examined histopathologically and it was found that the sinonasal and nasopharyngeal region was affected by a variety of lesions.

Statistical Analysis

Results were tabulated and data was analyzed using Microsoft office word 2007, SPSS software to know relative frequencies of lesion presentation.

RESULTS

A total 88 cases were studied in the present study for a period of 2 years from August 2017 to July 2019. In the present study age of the patients ranged from 9 - 82 years. Maximum number of cases were 23 (26.14 %) seen in the age group of 41 - 50 years (5th decade) followed by 15 cases (17.04 %) each in 21 - 30 years (3rd decade) and 31 - 40 years (4th decade) age group. (Table 1). In the present study of total 88 cases, males were 58 (65.90 %) and females were 30 (34.09 %). A male predominance was observed with a male to female ratio of 1.93 : 1. In the present study out of 88 cases, maximum number of cases were seen in the nasal cavity (59 cases, 67.05 %) followed by Paranasal sinuses (16 Cases, 18.18 %) and nasopharynx (13 cases, 14.77 %. (Table 2). Out 88 cases, 39 Cases (44.32 %) were non - neoplastic nasal lesions, 30 Cases (34.09 %) were benign neoplastic lesions and 19 cases (21.59 %) were malignant neoplastic nasal lesions.

Non-Neoplastic Lesions

Among total 39 cases of non - neoplastic lesions, nasal polyp with 27 cases (69.23 %) was the most common type of non - neoplastic nasal lesion followed by 4 cases (10.26 %) of fungal infection, 3 cases (7.69 %) each of rhinosporidiosis and granulomatous inflammatory lesion and 2 cases (5.13 %) of rhinoscleroma. Non - neoplastic lesions were more common in the age group of 41 - 50 years (5th decade, 11 Cases) followed by 31 - 40 years (4th decade, 10 cases) and 21 - 30 years (3rd decade, 7 Cases). A male preponderance was observed in non - neoplastic nasal lesions with a male to female ratio of 2.9 : 1. Non-neoplastic lesions were more common in nasal Cavity (28 cases, 71.79 %), followed by paranasal sinuses (10 cases, 25.64 %) and nasopharynx (1 case, 2.56 %). (Table 3).

Benign Neoplastic Nasal Lesions

Out of total 30 cases of benign neoplastic lesions, 17 cases (56.66) of angiofibroma, 7 Cases (23.33 %) of inverted papilloma, 2 cases (6.67 %) of capillary haemangioma, 1 Case (3.33 %) each of pleomorphic adenoma, Schwannoma, meningiotheliomatous meningioma, fibromyxoma were noted. Angiofibroma was the most common benign nasal lesion observed in the study. Benign nasal lesions were most common in the age group of 41 - 50 years(5th decade, 7 Cases) followed by 21 - 30 years (3rd decade, 6 Cases) and 11 - 20 years (2nd decade, 6 cases). Males (21) were more commonly affected than females (9) with a male to female ratio of 2.33 : 1. Benign neoplastic lesions were more common in nasal Cavity (22 Cases, 73.33 %) followed by nasopharynx (6 cases, 31.58 %) and paranasal sinuses (2 cases, 6.67 %). (Table 4).

Malignant Neoplastic Nasal Lesions

Among total 19 cases, Squamous cell carcinoma (7 cases, 36.85 %) was the most malignant neoplastic nasal tumour observed in the present study followed by 3 cases (15.79 %) each of adenoid cystic Carcinoma and nasopharyngeal carcinoma, 2 Cases (10.53 %) of olfactory neuroblastoma, 1 Case (5.26 %) each of chondrosarcoma, chordoma, adenocarcinoma and undifferentiated carcinoma. Malignant

neoplastic tumours were more common in the age group of 41 - 50 years (5th decade, 5 cases) and 51 - 60 years (6th Decade, 5 Cases) and 61 - 70 years (7th decade, 3 Cases). Malignant tumours were more common in females (11 Cases) than males (8 Cases) in this study with a male to female ratio of 0.73 : 1.

Malignant nasal tumours were more common in nasal cavity (9 Cases, 47.37 %) followed by nasopharynx (6 cases, 31.58 %) and Paranasal sinuses (4 Cases, 21.05 %). (Table 5).

Age Groups (in Years)	Non - Neoplastic Nasal Lesions	Benign Neoplastic Nasal Lesions	Malignant Neoplastic Nasal Lesions	Total
< 10	2	0	0	2
1 - 20	4	6	2	12
21 - 30	7	6	2	15
31 - 40	10	3	2	15
41 - 50	11	7	5	23
51 - 60	3	4	5	12
61 - 70	2	3	3	8
> 70	0	1	0	1
Total	**39**	**30**	**19**	**88**

Table 1. Distribution of Nasal Lesions According to Age of Presentation (N = 88)

	Nasal Cavity Number (%)	Paranasal Sinuses Number (%)	Nasopharynx Number (%)
Non - neoplastic nasal lesions	28 (71.79)	10 (25.64)	1 (2.56)
Benign neoplastic lesions	22 (73.33)	2 (6.67)	6 (20 %)
Malignant neoplastic lesions	9 (47.37)	4 (21.05)	6 (31.58)
Total	**59 (67.05)**	**16 (18.18)**	**13 (14.77)**

Table 2. Distribution of Nasal Lesions According to Site of Presentation (N = 88)

Histopathological Diagnosis	Incidence No (%)	Male (M)	Female (F)	M : F	Age Range (in Years) (Peak Age in Decades)
1. Inflammatory Polyp	27 (69.23)	18	9	2 : 1	9 - 68 years (4th & 5th decade)
2. Fungal Infection	4 (10.26)	3	1	3 : 1	40 - 35 Years (4th & 5th decade)
3. Rhinosporidiosis	3 (7.69)	3	0	3 : 0	16 - 30 Years (3rd decade)
4. Granulamatous Inflammatory lesion	3 (7.69)	0	3	0 : 3	27 - 37 years (4th decade)
5. Rhinoscleroma	2 (5.13)	2	0	2 : 0	29 - 33 Years (3rd & 4th decade)
Total	**39 (100)**	**29**	**10**	**2.9 : 1**	

Table 3. Distribution of Non-Neoplastic Nasal Lesions According to Incidence, Gender and Age of Presentation (N = 39)

Histopathological Diagnosis	Incidence No (%)	Male (M)	Female (F)	M : F	Age Range (in Years) (Peak Age in Decades)
1. Angiofibroma	17 (56.67)	12	5	2.4	13 - 62 years (2nd & 3rd decade)
2. Inverted Papilloma	7 (23.33)	6	1	6 : 1	35 - 82 Years (5th decade)
3. Capillary Haemangioma	2 (6.67)	1	1	1 : 1	27 Years, 45 Years
4. Pleomorphic adenoma	1 (3.33)	1	0	1 : 0	54 Years
5. Schwannoma	1 (3.33)	0	1	0 : 1	54 years
6. Meningiotheliomatous meningioma	1 (3.33)	0	1	0 : 1	45 years
7 Fibromyxoma	1 (3.33)	1	0	1 : 0	19 years
Total	**30 (100)**	**21**	**9**	**2.33 : 1**	

Table 4. Distribution of Benign Neoplastic Nasal Lesions According to Incidence, Gender and Age of Presentation (N = 30)

Histopathological Diagnosis	Incidence No (%)	Male (M)	Female (F)	M : F	Age Range (in Years) (Peak Age in Decades)
1. Squamous Cell Carcinoma (SCC)	7 (36.85)	3	4	0.75 : 1	18 - 70 years (6nd & 7rd decade)
2. Adenoid Cystic Carcinoma (ACC)	3 (15.79)	2	1	2 :1	25 – 60 Years (5th, 6th decade)
3. Nasopharyngeal Carcinoma	3 (15.79)	2	1	2 : 1	14 - 45 years (5th decade)
4. Olfactory Neuroblastoma	2 (10.53)	0	2	0 : 2	22 - 55 Years
5. Chondrosarcoma	1 (5.26)	0	1	0 : 1	45 Years
6. Adenocarcinoma	1 (5.26)	0	1	0 : 1	40 Years
7. Chordoma	1 (5.26)	0	1	0 : 1	55 Years
8. Undifferentiated Carcinoma	1 (5.26)	1	0	1 : 0	65 Years
Total	**19 (100)**	**8**	**11**	**0.73 : 1**	

Table 5. Distribution of Malignant Neoplastic Nasal Lesions According to Incidence, Gender and Age of Presentation (N = 19)

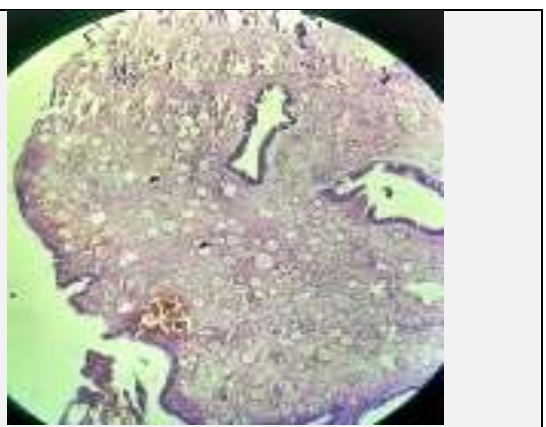

Figure 1. Rhinosporidiosis Showing Multiple Thick Walled Sporangia Containing Numerous Spores (H & E Stain, 200 x)

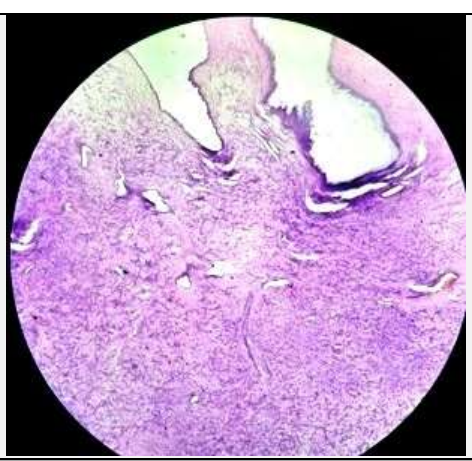

Figure 2. Angiofibroma Showing Vascular Channels Embedded in Fibrous Stroma (H & E stain, 200 x)

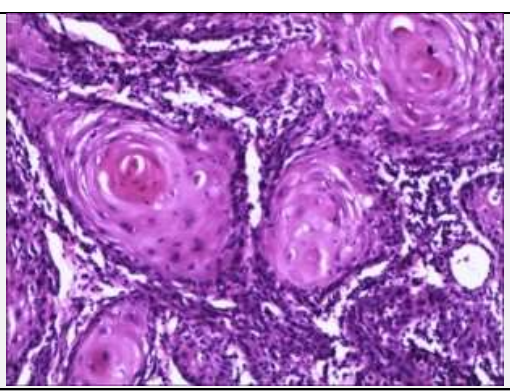

Figure 3. Squamous Cell Carcinoma – Well Differentiated Type (H & E Stain, 400 x)

DISCUSSION

Sinonasal and nasopharyngeal lesions form a complex group of lesions with a wide spectrum of histopathological features. These lesions cannot be differentiated clinically. Hence histopathological examination remains the gold standard. In the present study a male predominance was observed with a male to female ratio of 1.93 : 1 which is consistent with studies done by Dafale SR et al[6] (M : F ratio of 1.8 : 1), Garg et al[1] (1.98 : 1) and Trilok C Guleria et al[7] (1.68 : 1). In our study the mean age of presentation was 39.3 years which is similar to studies conducted by Trilok C Guleria et al[7] (37.74 years), Humayun et al[8] (32.38 years) and Bakari et al[9] (33 Years). In the present study age of presentation has a wide range from 9 to 82 years (1st to 9th decade of life). Maximum cases were reported in the age group of 41 - 50 years (5th decade) with 23 Cases (26.14 %) followed by 21 - 30 years (3rd decade) and 31 - 40 years (4th decade) each with 15 cases (17.04 %). Kulkarni et al[5] reported maximum cases in 4th decade (28 Cases, 22.95 %) followed by 3rd decade (27 Cases, 22.13 %) while Mane et al[10] observed maximum cases in 3rd decade (35 Cases, 27.78 %) followed by 4th decade (31 Cases, 24.60 %).

In our study, out of 88 cases, 39 (44.32 %) were non - neoplastic and 49 (55.68 %) were neoplastic nasal lesions. This is similar to study done by Bijjaragi et al[11] who reported 52 non - neoplastic and 56 neoplastic lesions out of 108 lesions. However Anjali Dasgupta et al[12] recorded an almost equal proportion of non – neoplastic (50.70 %) and neoplastic (49.30 %) nasal lesions. Out of total 49 neoplastic nasal lesions 30 (61.22 %) were benign and 19 (38.77 %) were malignant neoplastic lesions. Benign lesions outnumbered the malignant lesions. This correlates with study done by Anjali Dasgupta et al[12] (75.9 % benign and 24.1 % malignant) and Asha Satvara et al[13] (75 % benign and 25 % malignant).

In our study, nasal lesions were more common in nasal cavity (59 cases, 67.05 %) followed by paranasal sinuses (16 cases, 18.18 %) and nasopharynx (13 cases, 14.77 %). It is in accordance with a study done by Shaila N Shah et al[14] who observed maximum cases in nasal cavity (60 %) followed by PNS (25 %) and nasopharynx (15 %). Khan N et al[15] showed majority of lesions in nasal cavity (65 %) followed by PNS (20 %) and nasopharynx (15 %). 4 cases of fungal infection were observed of which 3 were mucormycosis and 1 case was aspergillus. They presented with foul smelling nasal discharge. They presented in 40 - 60 years of age with a male predominance (M : F ratio of 3 : 1) this closely correlates with Dafale SR et al[6] (2 cases), Parmar NJ et al[16] (3 cases). Microscopy of mucormycosis showed a broad and thin walled hyphae with acute angle branching whereas aspergillus showed a narrow tubular septae with dichotomous branching arising at acute angles. In the present study, 3 cases (7.69 %) of Rhinosporidiosis were found with a male preponderance (M : F ratio of 3 : 0) and with a peak of age presentation in 2nd & 3rd decades. This is closely correlates with Bhattacharya et al[17] (6.12 %), Kulkarni et al[5] (13.86 %) and Dafale et al[6] (14.5 %). Microscopically there are numerous globular cysts representing thick walled sporangium containing numerous spores (fig 1). 3 cases (7.69 %) of granulomatous inflammatory lesions were found with a female preponderance. By doing AFB stain by Ziehl - Neelsen method, tuberculosis was excluded and fungal infection was excluded by doing special stains. In our study 2 cases (5.13 %) of Rhinoscleroma were seen with a male predominance. Microscopically the predominant cells were histiocytes (Mikulicz cells) and plasma cells). This correlates with Kulkarni et al[5] (15.84 %).

Non – Neoplastic Lesions

They were more common in males with male to female ratio of 2.9 : 1. This is similar to studies conducted by Kulkarni et al[5] (M : F ratio of 2.26 %), Kahn N et al [15] (M : F ratio of 1.7 : 1) and Anjali Dasgupta et al[12] 12 (M : F ratio of 1.86 : 1). Non - neoplastic lesions were most common in 3rd, 4th and 5th decade of life (21 - 50 years) which closely correlates with a study by Mane et al[10] who showed 3rd, 4th decades of life (21 - 40 years). They were more common in nasal cavity (28 cases, 71.79 %) followed by PNS (10 cases, 25.64 %) and nasopharynx (1 case, 2.56 %). This agrees with study done by Khan N et al[15] (76.39 % cases in nasal cavity and 23.61 % in PNS).

Inflammatory polyp (27 cases, 69.23) was the most common non - neoplastic lesion with a male preponderance (M : F ratio of 2 : 1). This is in agreement with studies conducted by Anjali Dasgupta at al[12] (62.8 %), Kulkarni et at[5] (69.3 %) and Dafale SR et at[6] (66.13 %). In our study peak age of incidence of polyp was seen in 4th and 5th decades (31 - 50 yrs.) while Zafar et al[4] & Kulkarni et al[5] showed a peak age of incidence in 2nd and 3rd decade. On examination polyp was a glistering grape like mass, sensitive to probing and did not bleed on touch. The histological study of inflammatory polyp showed a loose mucoid stroma, mucus glands covered by respiratory epithelium. Stroma was infiltrated by lymphocytes, plasma cells, neutrophils and eosinophils.

Benign Neoplastic Nasal Lesions

Benign nasal lesions were more common in age group of 11 - 60 years with a peak in 2nd 3rd and 5th decade of life. This is similar to studies done by Mane et al[10] (3rd and 5th decade) and Bist et al[18] (3rd and 5th decade). They showed a strong male preponderance with a male to female ratio of 2.33 : 1. This correlates well with studies conducted by Kulkarni et al[5] (M : F. ratio 1 : 6 : 1) and Anjali Dasgupta et al[12] (M : F. ratio 2 : 69 : 1). Nasal cavity (22 cases, 73.33 %) was the most common site involved followed by nasopharynx (6 cases, 20 %) and PNS (2 cases, 6.67 %). Similar finding were reported by Shaila N Shah et at[14] (Nasal cavity in 87.5 % cases, nasopharynx in 12.5 % cases) and Khan et al[15] (with 50 % in nasal cavity, 42.85 % in nasopharynx and 7.14 % in PNS).

Angiofibroma with 17 cases (56.67 %) was the most common benign tumour followed by inverted papilloma with 7 cases (23.33 %) and capillary haemangioma with 2 cases (6.67 %). A study by Guleria et al[7] showed angiofibroma in 30.7 % cases, inverted papilloma in 30.7 % cases and

capillary haemangioma in 15.4 % cases while Khan et al[15] also reported 42.85 % cases of angiofibroma and 26.78 % cases of inverted papilloma. In our study angiofibroma showed peak age of presentation in 2nd and 3rd decades with a male preponderance and male to female ratio of 2 : 4. This agrees with studies done by Kulkami et al[5] (2nd, 3rd, 4th decades) and Gulelria et at[7] (2nd decade) and Kahn N et al[15] (2nd decade). Microscopy of angiofibroma (fig 2) showed a tumour composed of blood vessels and fibrous stroma. The stroma varies from loose and oedematous with stellate fibroblasts and numerous mast calls to acellular highly collagenized tissue. The vessels range from capillary size to venous size. In our study inverted papilloma presented with a peak in 4th and 5th decades with a strong male predominance (M : F ratio of 6 : 1). This is in concordance with Kulkarni et al[5] (4th decade) and Khan N et al[15] (5th decade) and Guleria et al[7] (5th decade). Microscopic features showed hyperplastic epithelium that growing endophytically into the underlying stroma. The epithelium was composed of squamous or ciliated columnar cells admixed with mucin containing cells. In our study we encountered a rare case of schwannoma in 54 year old female patient. This is similar to studies done by Guleria et al[7] and Kulkarni et al.[5] In the present study we also encountered 1 rare case of fibromyxoma, 1 case of pleomorphic adenoma and 1 rare case of meningotheliomatous meningioma.

Malignant Neoplastic Nasal Lesions

In our study malignant tumours were more common in 5th, 6th, 7th decade of life. This is similar to Khan N et al[15] (4th to 7th decade) and Kullkarni et al[5] (6th & 7th decades). In our study we found more malignant tumours in females (11) than in males (8) with a female preponderance. This does not correlate with other studies which showed a male preponderance for malignant nasal tumours. Nasal lesion were more common in nasal cavity (9 cases, 47.37 %) followed by nasopharynx (6 cases, 31.58 %) and PNS (4 cases, 21.05 %). This correlates with other studies such as Kulkarni et al 5[5] and Shaila N Shah et al.[14] In the present study, out of 19 malignant tumours, Squamous cell carcinoma with 7 cases (36.85 %) was the most common malignant nasal tumour with a peak age of incidence in 6th 7th decades followed by 3 cases of (15.79 %) Adenoid Cystic Carcinoma (peak in 5th & 6th decades) this correlates well with other studies conducted by Panchal et al,[18] Bist et al[19] and Guleria et al.[7] Microscopic picture of squamous cell carcinoma (fig 3) showed a tumour composed of cells arranged in nests, sheets, clusters and discretely with few keratin pearl formations and desmoplastic stromal reaction. Tumour cells showed moderate pleomorphism with hyperchromatic nucleus. Microscopy of Adenoid cystic carcinoma showed a characteristic cribriform pattern and cysts filled with mucoid material and focal hyaline globules. We found 3 cases (15.79 %) of nasopharyngeal carcinoma with a peak age of incidence in 5th decade and with a male predominance (M : F ratio of 2 : 1). This is closely similar to Khan N et al[15] with 10 cases (25 %), Maru et al[20] (2 cases, 33.33 %) and Parajuli S et al[21] (2 cases, 20 %). We found 2 cases (10.53 %) of Olfactory neuroblastoma in 22 years and 55 years old females. This agrees with other studies by Bhattacharya et al [17] (1 case, 12.50 %) and Guleria et al[7] (2 cases, 14.28 %). Homer wright type of pseudorosette were seen in the microscopic picture. 1 case (5.26 %) of Adenocarcinoma in a 40 year old female was observed similar to studies of Khan N et al[15] (2 cases, 5 %), Seema Modh et al[22] (1 case, 6.25 %) and Anjali Dasgupta et al[12] (2 cases, 4.9 %) in our study. 1 case (5,26 %) of chordoma was reported in 55 year old female and 1 rare case of chordosarcoma was found in 45 yr old female similar to study done by Seema K Modh et al[22] (1 case, 6,25 %). Female preponderance of the malignant tumours in our study could be due to increase in smoking especially reverse smoking in females of these regions.

CONCLUSIONS

Sinonasal and nasopharyngeal lesions have various differential diagnosis. A complete clinical, radiological and histopathological correlation helps to categorize these sinonasal lesions into various non - neoplastic and neoplastic types. Among all the investigations, histopathological examination remains the gold standard for definitive diagnosis and it is essential for a correct diagnosis and timely intervention.

Polyp was the most common non - neoplastic lesion, Angiofibroma was the most common benign lesion and Squamous cell carcinoma was the most common malignant neoplastic nasal lesion. Males were more commonly affected than females. Most common age group affected was third, fourth and fifth decades. Sinonasal and nasopharyngeal lesions were more common in nasal cavity followed paranasal sinuses and nasopharynx. Non - neoplastic lesions were more common than benign neoplastic lesions and malignant neoplastic lesions.

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REFERENCES

[1] Garg D, Mathur K. Clinico-pathological study of space occupying lesions of nasal cavity, paranasal sinuses and nasopharynx. J Clin Diagn Res 2014;8(11):42-48.
[2] Lingen MW, Kumar V. Head and Neck. In: Kumar V, Abbas AK, Fausto N, eds. Robbins and Cotran Pathologic basis of disease. 7th edn. Philadelphia: Elsevier Inc., 2005: p. 783.
[3] Mills SE, Fechner RE. The nose, paranasal sinuses and nasopharynx. In: Sternberg SS, edr. Diagnostic surgical pathology. 3rd edn. Philadelphia: Lippincott Williams and Wilkins 1999: p. 885-892.
[4] Zafar U, Khan N, Afroz N, et al. Clinicopathological study of non-neoplastic lesions of nasal cavity and paranasal sinuses. Indian J Pathomicrobiol 2008;51(1):26-29.

[5] Kulkarni AM, Mudholkar VG, Acharya AS, et al. Histopathological study of lesions of nose and paranasal sinuses. Indian J Otolaryngol Head and Neck Surg 2012;64(3):275-279.
[6] Dafale SR, Yenni VV, Bannur HB, et al. Histopathological study of polypoidal lesions of the nasal cavity – a cross sectional study. Al-Ameen J Med Sci 2012;5(4):403-406.
[7] Guleria TC, Mohindroo S, Mohindroo NK, et al. A Histopathological profile of nasal cavity, paranasal sinuses and nasopharyngeal masses in hill state of Himachal Pradesh, India. Clinical Rhinology: An International Journal 2017;10(2):93-98.
[8] Humayun AHMP, Huq AHMZ, Ahmed SMT, et al. Clinicopathological study of sinonasal masses. Bangladesh J Otorhinolaryngol 2010;16(1):15-22.
[9] Bakari A, Afolabi OA, Adoga AA, et al. Clinico-pathological profile of sinonasal masses: an experience in National Ear Care Center Kaduna, Nigeria. BMC Res Notes 2010;3:186.
[10] Mane PS, Agale SV. Clinicopathological study of sinonasal Masses. Annals Pathol Laboratory Med 2017;4(3):261-267.
[11] Bijjaragi S, Kulkarni VG, Singh J. Histomorphological study of polypoidal lesions of nose and paranasal sinuses. Ind J Basic App Med Res 2015;4(3):435-439.
[12] Dasgupta A, Ghosh RN, Mukherjee C. Nasal polyps – histopathologic spectrum. Indian J Otolaryngol Head Neck Surg 1997;49(1):32-37.
[13] Satvara A, Madan Y, Atara A, et al. Histopathological study of lesions of nose, paranasal sinuses and nasopharynx at tertiary care centre. Medpulse International Journal of Pathology 2018;6(2):23-26.
[14] Shah SN, Goswami Y. Study of lesions of nasal cavity nasopharynx and paranasal sinuses by histopathological examination. Guj Med J 2012;67(2):70-72.
[15] Khan N, Zafar U, Afroz N, et al. Masses of nasal cavity, paranasal sinuses and nasopharynx: a clinico-pathological study. Indian J Otolaryngol Head Neck Surg 2006;58(3):259-263.
[16] Parmar NJ, Jethwani DP, Dhruva GA. Histopathological study of nasal lesions: 2 years study. Int J Res Med Sci 2018;6(4):1217-1223.
[17] Bhattacharyya R, Goswami BK, Banerjee A, et al. A clinicopathological study of masses arising from sinonasal tract and nasopharynx in North Bengal population with special reference to neoplasms. Egypt J Otolaryngol 2015;31:98-104.
[18] Panchal L, Vaideeshwar P, Kathapal D, et al. Sino-nasal epithelial tumours: a pathological study of 69 cases. Postgrad J 2005;51(1):30-35.
[19] Bist SS, Varshney S, Baunthiyal V, et al. Clinico-pathological profile of sinonasal masses: an experience in tertiary care hospital of Uttarakhand. Natl J Maxillofac Surg 2012;3(2):180-186.
[20] Maru AM, Patel UV, Shrivastav A, et al. Histopathological study of nasal masses in patients coming to a tertiary care hospital: a study of 70 cases. Med J Dy Patil Univ 2015;8:468-473.
[21] Parajuli S, Tuladhar A. Histomorphological spectrum of masses of the nasal cavity, paranasal sinuses and nasopharynx. J Pathol Nepal 2013;3(5):351-355.
[22] Modh SK, Delwadia KN, Gonsai RN. Histopathological spectrum of sinonasal masses - a study of 162 cases. Ind J Cur Res Rev 2013;5(3):83-91.