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A CLINICOPATHOLOGICAL STUDY OF MASSES ARISING FROM SINONASAL TRACT AND NASOPHARYNX IN NORTH BENGAL POPULATION WITH SPECIAL REFERENCE TO NEOPLASMS

Objectives:

To find the occurrence of various masses arising from the sinonasal tract and nasopharynx and to categorize them into non-specific, non-neoplastic and neoplastic and also to find the correlation between various clinical modes of presentation and histological types of these masses.

Material & Methods:

A prospective study was carried out for one year from February 2010 to January 2011 in a tertiary care hospital. Total of 94 masses arising from sinonasal tract and nasopharynx undergoing either incisional biopsy or surgical excision with proper history and imaging were included in this study.

Results:

The total percentage of these tumors in the one year period was 3.52%. A total of 4 non-specific lesions, 49 non-neoplastic masses, 17 benign neoplastic masses and 24 malignant neoplastic masses were found.

Conclusion:

Non-neoplastic masses were the majority in number (52.12%). Among the neoplastic masses (43.61%) malignant neoplasms constituted 25.53%, a vast majority being nasopharyngeal carcinomas. Immunohistochemistry further helped to differentiate undifferentiated carcinomas into epithelial and lymphoid malignancies.

Keywords: Clinicopathological study, Mass, Sinonasal tract, Nasopharynx.

INTRODUCTION :-

The nasal cavity and paranasal sinuses are collectively referred to as the sinonasal tract which is anatomically and embryologically distinct from the nasopharynx¹. The nasal cavity, paranasal sinuses and nasopharynx form a functional unit which is lined by stratified squamous, respiratory type pseudostratified columnar and transitional (intermediate) epithelium^{2,3}. The mucosa of nasal cavity and paranasal sinuses, is referred to as the Schneiderian membrane⁴. Sinonasal tract and nasopharyngeal lesions can be non-neoplastic (polyps, bacterial and fungal infections) and neoplastic (benign and malignant). Rhinosporidiosis is endemic in India, but it has also been reported in other parts of the world⁵. Foreign body-type granulomas can develop in nasal mucous membranes⁶. Mucocoele can be cystic and clinically mimic malignant process⁷. Respiratory epithelial adenomatoid hamartomas are grossly similar to polyps but are distinctly classified⁸. Though the sinonasal epithelium is an uncommon site for neoplastic processes, it can present an entire range of both epithelial and non-epithelial tumors, epithelial tumors being three times more frequent than the non-epithelial tumors⁹. Inverted papillomas and squamous cell carcinomas are the most frequent neoplasms. Lymphoid tumors involving this area are mainly Non-Hodgkin's lymphomas. Non-Hodgkin's lymphomas of the sinonasal tract are heterogeneous diseases that can be clinically aggressive¹². Nasopharyngeal cancer with a strong correlation with EBV infection, reported to be quite high in Nagaland, is a leading cause of death in south-east Asia¹³. Schmincke type of nasopharyngeal carcinoma poses a diagnostic problem². Though, as a whole sinonasal tumors and malignancies constitute only a very small fraction of solid tumors,¹⁰ with increasing industrialization and with increase in the burning of additional fossil fuels and rising air pollution rates, we are likely to see an increasing incidence of sinonasal tumors¹⁴. There are hardly any reports in Indian literature on this issue,¹⁰ specially from the population of North Bengal. Therefore this present study is to look for the occurrence of various masses arising from the sinonasal tract and nasopharynx, to categorize them and to correlate between their clinical mode of presentation and histological types.

AIMS AND OBJECTIVES:-

The aim of the study is to find the occurrence of various masses arising from the sinonasal tract and nasopharynx and to categorize them into non-specific, non-neoplastic and neoplastic (benign and malignant) and also to find the correlation between various clinical modes of presentation and histological types of these masses and aetiological factors in case of non-neoplastic lesions (fungal infections).

In case of neoplastic masses the role of immunohistochemistry in differentiating epithelial malignancies from lymphomas will be seen.

MATERIALS AND METHODS:-

A prospective study was performed in a tertiary care set up, in the Department of Pathology with the study population of patients attending Department of Otorhinolaryngology with masses arising from sinonasal tract and nasopharynx undergoing either incisional biopsy or surgical excision during the study period of one year from 1st February 2010 to 31st January 2011. A total of 94 patients were evaluated. Sample design included surgically excised specimens of the masses (may or may not be FNAC proved/suggested) arising from sinonasal tract and nasopharynx presenting for first time and incisional biopsy specimens of these masses along with proper history and imaging study of the patient. Any mass invading the region from adjoining areas, masses which have recurred, non availability of proper history and imaging study and patients who have received chemotherapy and/or radiotherapy in the past due to lesion in this zone are excluded from the sample. After receiving the specimens, the patient particulars were noted and grossing was performed followed by proper fixation and processing. Sections were stained by Hematoxylin and Eosin for histopathological study and accordingly classified into different categories provisionally. Various histological findings were correlated with the clinical & imaging parameters. Some sections of non-neoplastic masses were further stained by special stain (PAS) for the demonstration of fungal organisms. Sections of neoplastic masses were further stained by immunohistochemical procedures using antibodies against Cytokeratin (CK) and Leukocyte Common Antigen (LCA) as and when needed to arrive to a final diagnosis.

RESULTS:

A total of 94 cases of sinonasal and nasopharyngeal masses were received among total number of 2670 histopathological specimens. Therefore the total percentage of these tumors in the one year period is 3.52%. A total of 4 non-specific lesions, 49 non-neoplastic masses, 17 benign neoplastic masses and 24 malignant neoplastic masses were found (Table 1). Majority of non-neoplastic masses occurred in the age group of 11 years to 30 years. Highest number of cases of benign and malignant neoplastic masses occurred in the age group of 11-20 years and 51-60 years respectively. A male predominance is seen in both benign and malignant neoplastic categories. Most of the patients presented with nasal obstruction followed by nasal mass,

rhinorrhoea and epistaxis. Out of the total 49 cases of non-neoplastic masses, 36 cases were of different kinds of nasal polyps; 3 cases were of Rhinosporidiosis; 1 case each of Mucormycosis, Candidiasis, Aspergillosis, Histoplasmosis and Fibrous dysplasia; 2 cases of fibromatosis and 3 cases of cysts (Table 2). Among 17 cases of benign neoplasms, 5 cases each of Inverted papilloma and Lobular capillary hemangioma; 4 cases of Angiofibroma; 2 cases of Pleomorphic adenoma and 1 case of Neurofibroma were found (Table 3). Among the total 24 cases of malignant neoplasms, 1 case each of Nasal Squamous cell carcinoma, Olfactory neuroblastoma and Rhabdomyosarcoma; 2 cases each of Nasal Adenoid cystic carcinoma and Nasopharyngeal Non-Hodgkins Lymphoma (NP-NHL); 3 cases of Sinonasal Undifferentiated carcinoma (SN-UDC); 4 cases of Nonkeratinising Nasopharyngeal carcinoma and 10 cases of Nasopharyngeal Undifferentiated carcinoma (Table 4). 10 cases of NP-UDC, 3 cases of SN-UDC and 2 cases of NP-NHL were further subjected to Immunohistochemistry by using PANCK and LCA markers (Table 5). A concordance of 73.33% and a discordance of 26.66% were found between the histopathological diagnosis and final diagnosis after IHC confirmation (Table 6). An association of immunodeficient states with fungal sinonasal masses was found with a P value of 0.02 (Table 7).

DISCUSSION:-

The nasal cavity and paranasal sinuses (maxillary, ethmoid, sphenoid and frontal sinuses) are collectively referred to as the sinonasal tract which is anatomically and embryologically distinct from the nasopharynx, although they are adjacent. The nasal cavity, paranasal sinuses and nasopharynx form a functional unit which is lined by stratified squamous, respiratory type pseudostratified columnar and transitional (intermediate) epithelium^{2,3} and the mucosa of nasal cavity in conjunction with that of the paranasal sinuses, is often referred to as the Schneiderian membrane⁴. 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. A large number of diseases affecting these structures are due, in major part, to many of the specialized tissues, each with its own aberrations that exist in the region¹⁵. The presenting features and symptomatology and advanced imaging technique help to reach a presumptive diagnosis but histopathological examination remains the mainstay of final definitive diagnosis. Thus, careful histological workup is essential for a correct diagnosis and timely intervention. Four cases of granulation tissue were found in the nasal cavity and thus were kept in the category of non-specific lesions. It is important to recognize the range of non-neoplastic lesions in this region and to differentiate them from neoplastic lesions because of different treatment modality and emotional burden on the patient. Zafar et al¹⁶ found that among the polypoidal lesions, nasal polyp was the commonest, which is very much consistent with our study (36 cases of nasal/nasopharyngeal polyps out of a total of 49 non-neoplastic cases). Zafar et al¹⁶, Anjali et al¹⁷ and Tondon et al¹⁸ found an incidence of 20.7, 17.4 and 10 cases of non-neoplastic masses per year respectively over a long and variable study period. The researchers found a total of 49 non-neoplastic masses over a study period of one year. The peak age of presentation, sex ratio, and clinical presentation were similar to that observed by these authors. Rhinosporidiosis is a chronic granulomatous disease caused by Rhinosporidium Seeberi. Although a variety of sites may be affected, the principal site of infection is the nasal mucosa, the disease is endemic in India and Sri Lanka. Samadder et al¹⁹ studied 116 cases of Rhinosporidiosis in the Medical College at Bankura during January 1983 to December 1987 and showed more prevalence in males and in the second decade of life. In our study we found 3 cases of Rhinosporidiosis among which 2 were male and 1 female. 2 cases were in their third decade of life and one in the first decade. Chopra et al²⁰ reported 5 cases of invasive fungal sinusitis in sphenoid sinus among which 3 cases had Aspergillosis and 2 cases had Mucormycosis. In our study we found 1 case each of Aspergillosis, mucormycosis, Candidiasis and Histoplasmosis, the first two being in the maxilla and the last two being in the nasal cavity. Challa et al²¹ identified predisposing conditions in 19 patients out of 63 cases of fungal rhinosinusitis with diabetes mellitus as the commonest and Aspergillus as the commonest etiologic agent. In our study we found diabetes to be associated with Mucormycosis, corticosteroid intake being associated with Aspergillosis and HIV infection being associated with Candidiasis and Histoplasmosis. Our study also found an association of immunodeficient states with fungal sinonasal masses (P value =

Tab. 1: Distribution of various type of masses

Total No. Of Various Histopathological Specimens Received	Sinonasal & Nasopharyngeal Masses Received	Non-specific Lesions	Non-neoplastic Masses	Neoplastic Masses Benign
2670	94 (3.52%)	4 (4.25%)	49(52.12%)	17(18.08%)

Tab. 2: Distribution of Non-neoplastic Masses

Type	No. of Cases (n=49)	Percentage
Antrochoanal Polyp	14	28.57
Ethmoid Polyp	10	20.40
Sinonasal Polyp	11	22.44
Nasopharyngeal Polyp	01	02.04
Rhinosporidiosis	03	06.12
Mucormycosis	01	02.04
Aspergillosis	01	02.04
Candidiasis	01	02.04
Histoplasmosis	01	02.04
Fibrous Dysplasia	01	02.04
Fibromatosis	02	04.08
Cysts	03	06.12

Tab. 3 : Distribution of Benign Sinonasal & Nasopharyngeal Neoplasms

Type	No. of Cases (n=17)	Percentage
Pleomorphic Adenoma	02	11.76
Inverted Papilloma	05	29.41
Lobular Capillary Hemangioma	05	29.41
Angiofibroma	04	23.52
Neurofibroma	01	05.88

Tab. 4 : Distribution of Malignant Sinonasal & Nasopharyngeal Neoplasms

Primary H/P Type	IHC (PAN-CK & LCA)	No. of Cases (n=24)	Percentage
Nasal- Squamous Cell Ca	Not Done	01	04.16
Nasal-adenoid Cystic Ca	Not Done	02	08.33
Nasal-Olf. Neuroblastoma	Not Done	01	04.16
Nasal-Rhabdomyosarcoma	Not Done	01	04.16
Sinonasal Undiff. Ca	Done	03	12.50
Non-keratinising Nasopharyngeal Ca	Not Done	04	16.66
Nasopharyngeal Undiff. Ca	Done	10	41.66
Nasopharyngeal Non-hodgkin Lymphoma	Done	02	08.33

0.02). According to Tsai et al²² fibrous dysplasia in sinonasal tract is rare. However, we found 1 case involving maxilla which is nearly similar to the study of Zafar et al¹⁶ who found 2 cases in the study period of 7 years. In our study we found 3 cysts similar to that of Zafar et al¹⁶ who found 2 of them.

Though the sinonasal epithelium is an uncommon site for neoplastic processes, it can present an entire range of both epithelial and non-epithelial tumors, epithelial tumors being three times more frequent than the non-epithelial tumors⁹. Panchan et al¹⁰ studied 120 specimens of sinonasal tumors in ten years in which 69 cases were epithelial tumors (59.2%), Inverted papillomas and squamous cell carcinomas were the most frequent neoplasms. This is in support of our study which has found 23 cases of epithelial neoplasms (56.09%) and 18 cases of non-epithelial neoplasms among a total of 41 neoplasms. A total of 2 cases of sinonasal squamous cell carcinomas and 1 case of sinonasal undifferentiated carcinoma were found in a total of 6 sinonasal carcinomas. Sinonasal undifferentiated carcinoma is a distinctive clinicopathologic entity that must be distinguished from other, less aggressive sinonasal neoplasms like olfactory neuroblastoma²³. Buchwald et al²⁴ studied 82 patients with sinonasal

Tab. 5 : Differentiation & Categorisation of Sinonasal & Nasopharyngeal Undifferentiated Carcinomas by IHC

Primary H/P Diagnosis	IHC		Final Diagnosis
	PAN-CK	LCA	
SN-UDC	+	-	SN-SCC
SN-UDC	-	+	NP-NHL
SN-UDC	-	-	SN-UDC
NP-UDC	-	+	NP-NHL
NP-UDC	-	+	NP-NHL
NP-UDC	-	+	NP-NHL
NP-UDC	+	-	NPC
NP-UDC	+	-	NPC
NP-UDC	+	-	NPC
NP-UDC	+	-	NPC
NP-UDC	+	-	NPC
NP-UDC	-	-	NP-UDC
NP-UDC	-	-	NP-UDC
NP-NHL	-	+	NP-NHL
NP-NHL	-	+	NP-NHL

Tab. 6: Difference Between H/P Diagnosis & final Diagnosis after IHC Confirmation (n=15)

Concordance	11	73.33%
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Tab. 7: Association of Immunodeficient States with Fungal Sinonasal Masses among all Non-neoplastic Masses

Total Non-neoplastic Masses (n=49)	Immunodeficient States (Present)	Immunodeficient States (Absent)
Fungal Sinonasal Masses (n=7)	4	3
Others (n=42)	6	36

Risk Ratio=0.5, Odds Ratio=0.125
P Value (By Fisher Exact Probability Test) = 0.02 (Significant)

papillomas diagnosed from 1975 to 1993, histologically showed 58 cases of inverted papillomas including 5 cases of associated carcinoma. In our study we found 5 cases of inverted papillomas among 17 cases of benign neoplasms (29.41%) and no other histopathological types of papillomas were reported. Manning et al²⁵ studied that salivary-type neoplasms of the nasal cavity and paranasal sinuses are numerically dominated by adenoid cystic carcinomas and pleomorphic adenomas. All others, benign or malignant, are rarely encountered and are usually biologically and histologically low-grade. Our study found 2 cases of pleomorphic adenomas in a total of 17 benign neoplasms (11.76%) and 2 cases of adenoid cystic carcinoma in a total of 6 cases of sinonasal carcinomas (33.33%). Nasopharyngeal angiofibroma, restricted to young aged males, arising from posterolateral wall of roof of nose, can also grow into nasal cavity, has got definite endocrinal influence². We got 4 cases of angiofibroma all of them are males. Studies based on Nasopharyngeal carcinoma (NPC) cases registered in most of the cancer diagnosis and treatment centres in North-Eastern region of India during 1988-89 and computed with the population structure of the region indicated that the incidence of NPC is quite high in Nagaland (about 4.3 per 100,000 people/year). Taking this into consideration and 1981 census figure for the population structure of Nagaland, the incidence of NPC was nearly 6.2 and 2.1/ 100,000 male and female respectively^{26,27}. Further, hospital based studies on the pattern of cancer incidence in Nagaland revealed that out of 149 biopsies of suspected cancer cases, 37 were histopathologically positive for malignancies and about two third of them were with cancer of nasopharynx²⁸. In our study we found a total of 10 cases of NP-UDC (41.66%), 4 cases of NK-NPC (16.66%) and 2 cases of NP-NHL (8.33%) out of 24 cases of malignant neoplasms. A total of 12 cases of NP malignant neoplasms were further subjected to immunohistochemistry and final diagnosis was reached. 5 cases of NPC, 2 cases of NP-UDC and 5 cases of NP-NHL were diagnosed. It is very difficult to locate and random biopsies are needed from fossa of Rossemuller to get specimen. Schmincke type of nasopharyngeal carcinoma poses a diagnostic problem due to its microscopic similarity

with large cell malignant lymphoma, where nuclear morphology and immunohistochemistry plays important role².

Ye et al²⁹ studied forty-one cases of nasopharyngeal and 13 cases of nasal malignant lymphoma histopathologically and immunohistochemically. All of the cases were non-Hodgkin's lymphoma and concluded that since the large cell type of lymphoma was predominant, the differential diagnosis from undifferentiated carcinoma is important and is facilitated by the use of immunostaining methods. In our study we found 1 case of sinonasal NHL which was previously diagnosed as sinonasal undifferentiated carcinoma. We also found 5 cases of NP-NHL among which 3 cases were previously diagnosed as NP-Undifferentiated carcinoma. A concordance of 73.33% and discordance of 26.66% were found between histopathological diagnosis and final diagnosis after immunohistochemical confirmation.

CONCLUSION:-

Sinonasal and Nasopharyngeal masses, both non-neoplastic and neoplastic, constituted 3.52% of the total surgical pathology specimens during the study period of one year. Nasal obstruction was the presenting symptom in majority of the patients. Non-neoplastic masses were the majority in number (52.12%) and polyps contributed to the bulk. Fungal lesions although small in number had a significant association with immunodeficient states (P=0.02). Among the neoplastic masses (43.61%) malignant neoplasms constituted 25.53%, a vast majority being nasopharyngeal carcinomas. Immunohistochemistry further helped to differentiate undifferentiated carcinomas into epithelial and lymphoid malignancies. A discordance of 26.66% and a concordance of 73.33% were found between histopathological and immunohistochemical diagnosis. Proper histopathological diagnosis is the mainstay while immunohistochemical methods play a major role in differentiating undifferentiated carcinomas. Correct diagnosis will direct the clinician towards the proper management.

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