



MORPHOLOGICAL SPECTRUM OF LESIONS IN THE SINONASAL AND NASOPHARYNGEAL REGION

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ABSTRACT **BACKGROUND:** Nasal cavity, paranasal sinuses and nasopharynx present a range of non-neoplastic and neoplastic lesions. Though the diagnosis is arrived based on symptoms and imaging techniques, histopathology is definitive for diagnosis and management

OBJECTIVES: To study the incidence, mode of presentation and histologic types of sinonasal lesions in surgical pathology material.

MATERIALS AND METHODS: Retrospective study of histomorphology of sinonasal, nasopharyngeal lesions biopsied or excised over a period of five years between Jan 2011 and Dec 2015. Special stains and immunohistochemistry were done wherever indicated.

RESULTS: In five years, 483 sinonasal and nasopharyngeal lesions were reported, representing 0.96% of all surgical pathology specimens. Out of 483, 346 (71.6%) were non-neoplastic and 137 (28.4%) were neoplastic. The lesions were common in second and third decades of life, with male predominance.

CONCLUSION: Non-neoplastic and neoplastic lesions in the sinonasal and nasopharyngeal region have similar clinical manifestations. Histopathology is necessary for differential diagnosis, management and prognosis of these lesions.

KEYWORDS : sinonasal, nasopharynx, non-neoplastic, neoplastic, histopathology

INTRODUCTION: The nasal cavity, paranasal sinuses and nasopharynx form a functional unit of specialized tissues, each with its own aberrations.¹ They share many pathologic processes, most of which are inflammatory.² Exposure to various influences like chemicals, antigenic stimulants, and mechanical trauma results in deleterious consequences, including formation of tumors and tumor-like conditions.³ Inflammatory polyps are a common cause of nasal obstruction, with a prevalence of 4% in the general population.⁴ Benign tumors are relatively common, but malignant neoplasms are rare, accounting for 0.2-0.8% of all carcinomas and only 3% of those in the upper aero digestive tract.⁵ Most of these lesions present as polypoid masses, making it difficult to distinguish non-neoplastic polyps from polypoid neoplasms clinically.⁶ Histopathologic diagnosis is therefore mandatory for appropriate management and prognosis of sinonasal and nasopharyngeal lesions. This study was undertaken to classify sinonasal lesions based on histopathology and to analyze their age and sex distribution.

MATERIALS AND METHODS: This is a retrospective study conducted in the Department of Pathology, at Madras medical college, Chennai. The blocks and slides of all sinonasal lesions biopsied or excised over a period of five years, from Jan 2011 to Dec 2015, were retrieved and reviewed. All slides were stained with hematoxylin and Eosin stains. Biopsies with material inadequate for opinion were excluded from the study. Special stains and immunohistochemistry were used where required. The lesions were classified as non-neoplastic and neoplastic. The neoplastic lesions were further categorized as benign or malignant. Clinical history was obtained from medical records department of the hospital in all the cases. Histopathological findings were correlated with clinical and radiologic features.

OBSERVATIONS: A total of 483 specimens from sinonasal and nasopharyngeal region were received in the histopathology laboratory over a period of five years, accounting for 0.96% of all surgical specimens. 346 (71.6%) were non-neoplastic and 137 (28.4%) were neoplastic of various histologic patterns were reported. Among neoplasms, malignant tumors (57.6%) (Table 4) were more frequent than benign tumors (42.4%). Both non-neoplastic and neoplastic lesions showed a slight male predominance, with a male to female ratio of 1.2:1 and 3.8:1 respectively. The age of these patients ranged from thirteen to seventy-five years. Most patients were in the third decade of life (Table 1 & Graph 2).

Simple nasal polyps were the commonest of all non-neoplastic lesions in the sinonasal region, accounting for 205 cases (59.2%) (Table 2 & Graph 1). Most patients were in the second and third decades of life. The youngest patient was thirteen years old and the oldest was sixty-four years old. The common presenting symptoms were mass

protruding from the nostril nasal obstruction and head ache. Nasal cavity, maxillary and ethmoid sinuses were the commonly involved sites. On gross examination, polyps were soft, grape-like structures, with a glistening surface. They were further categorized as allergic (73.6%) and inflammatory (26.4%), based on the predominant inflammatory cell infiltrate. Microscopic examination of inflammatory polyps revealed lining respiratory epithelium. The stroma was edematous, with an infiltrate of lymphocytes, plasma cells, neutrophils, and eosinophils. Mucous glands and fibroblasts were also noted. Allergic nasal polyps showed an abundance of eosinophils along with other inflammatory cells.

Fungal polyp (49 cases-14.2%) was reported. The youngest patient was 19 years and oldest patient was 60 years. Commonest presenting symptom was headache and nasal block. Microscopic examination of fungal polyp shows necrosis, inflammatory cells and fungal elements. Aspergillus was reported in 23 cases, mucormycosis was reported in 22 cases and 4 cases were reported as mixed (both aspergillus and mucormycosis). Per iodine acid Schiff and silver stain show positive (Fig:1)

Chronic sinusitis with nonspecific inflammation was noted in sixty eight cases (19.6%). These patients presented with nasal block and discharge. The maxillary sinus was involved in all the cases. Notable microscopic features were squamous metaplasia of the respiratory epithelium, chronic inflammatory infiltrate, edema, and glandular hyperplasia.

Rhinospidiosis (15 cases-4.3%) was reported. Common presenting symptom was nasal block. Microscopically shows polypoid lesion lined by squamous epithelium with edematous stroma, chronic inflammatory cells and sporangia of varying sizes filled with endospores.

Angiomatous polyp (6 cases-1.73%) was reported. HPE shows polypoid lesion with congested blood vessels and haemorrhage.

Rhinosccleroma (1 case- 0.29%) was reported in a twenty- four year male. Characteristic Mikulicz cells (foamy histiocytes) and plasma cells were seen in the sub epithelium.

Tuberculosis (1 case-0.29%) was reported in thirty years male, characterized by presence of epitheloid granulomata, Langhans giant cells and chronic inflammatory cells.

Fibrous dysplasia (1 case-0.29%) was reported in 45 years male. Microscopically characterized by immature bone without osteoblast rimming is seen along with plump fibroblast arranged in fascicles.

Among the benign neoplasms, inverted papilloma was the commonest (24 cases-37.9%) (table 3 & Graph 3). The youngest was 26 years old male and oldest was fifty four years male. Among 24 (15-62.5%) were male and (9-37.5%) were female. They presented with mass in the nasal cavity and were diagnosed as nasal polyp clinically. Grossly, the tumors were polypoidal, with undulant surface. They were composed of ribbons and islands of stratified squamous and respiratory epithelia, invaginating in to the edematous stroma. The epithelium had a "moth-eaten" appearance due to the presence of microcysts in one of them.(Fig:3)

Angiofibroma was the second commonest benign neoplasm (34.4%) (Table 3). Most of them presented as reddish mass in the nasal cavity with bleeding (Fig.2). Common in the second decade of life, exclusively in males. Histologically, the tumor was composed of thin-walled blood vessels of varying size and architecture, in a fibroblastic stroma (Fig. 2).

Seven cases (12%) of capillary hemangioma were reported, six were male and one female; Lobules of dilated capillaries were seen amidst areas of hemorrhage on microscopy.

Four cases of haemangiopericytoma (6.8%) were reported. All of them were males and commonly seen in 3rd decade in our study. Microscopically the tumor composed of uniform, spindle-shaped cells with indistinct cytoplasm and large nuclei dispersed around vascular channels exhibiting typical staghorn branching pattern (Fig : 6).

Non ossifying fibroma was reported in a 18 year female with nasal block.HPE reveals spindle shaped cells arranged in storiform pattern,multinucleate giant cell and histiocytes with foamy cytoplasm.

psammomatous ossifying fibroma was reported in a 70 year male presented with antrochoanal polyp. Microscopy revealed lamellar bone with osteoblast rimming with prominent psammoma like bodies are present.

Squamous cell carcinoma was the most common malignant neoplasm reported (62 cases- 77.2%) (Table 4). Common in males(50cases) compared to females(11 cases).one case of adenosquamous and basaloid squamous carcinoma a rare variant of squamous cell carcinoma reported in the fifth and sixth decades. Tumors commonly involved the right nasal cavity (30cases), 21cases involved the left nasal cavity. Maxillary sinus involved in 4 cases . The left nasal cavity with maxillary sinus involvement was seen in one case.. Nasopharynx was involved in 6 cases. Microscopy showed polygonal cells, arranged in nests and sheets, with pleomorphic nuclei, prominent nucleoli and numerous mitoses. Necrosis was seen in some foci. One of them was associated with a inverted papilloma. All were categorised as poorly differentiated.

Five cases of olfactory neuroblastoma(6.3%) were reported. 3 were males and 2 were females in the second, third and fourth decade.All cases were presented with nasal block and nasal mass. Microscopy examination revealed nest and sheets of uniform small round cells with scant cytoplasm with round nuclei and salt & pepper chromatin. Homer wright rosettes are also seen.(Fig : 7)

Three cases of adenocarcinoma(3.8%) were reported.two were females and one case was male.youngest age group reported was 36yrs and the oldest is 67years. Histopathological examination shows that cells are arranged in glandular pattern with pleomorphic hyperchromatic cells.(Fig : 8)

Three cases of sarcomatoid carcinoma(3.8%) were reported. All are males. Microscopy shows malignant features of both epithelial and mesenchymal component.

Two cases of non hodgkins lymphoma was reported in males in sixth decade. Histopathological examination of the tumor composed of sheets of round cells with scant cytoplasm and dark staining nuclei. Immunohistochemistry shows Positivity for Cd20.

Two cases of adenoid cystic carcinoma (2.53%) was reported in one male and one female in the third decade, both presented with a mass in the right nostril. The growth was firm to hard in consistency and eroding the medial wall of the maxillary sinus. On microscopy, the tumor was composed of round to oval basaloid cells with scant

cytoplasm and hyperchromatic nuclei, arranged in cribriform pattern. These spaces were filled with eosinophilic hyaline material (Fig. 4).

One case of chondrosarcoma reported in 44 year female presented with nasal cavity mass.Histopathology shows cartilage with pleomorphic chondrocytes.(Fig : 5)

DISCUSSION: Sinonasal and nasopharyngeal lesions display a complex and interesting spectrum of histopathologic features. While the non-neoplastic lesions are numerous, the morphologic variants of neoplasms are many. Most of them present as polypoid masses and are difficult to distinguish clinically; they are labeled as "nasal polyps". Histopathologic categorization is essential in the management of these lesions. The majority of sinonasal pathology is inflammatory, with neoplasms comprising approximately 3% of head and neck tumors.⁷

The incidence of sinonasal and nasopharyngeal lesions was 0.9% of surgical pathology material received in the Department of Pathology,Madras medical college,chenai. The incidence of non-neoplastic lesions in the sinonasal region was 13.67 cases per year. This was consistent with the findings of Kulkarni MA et al⁸(14.42 cases per year). Dasgupta A et al⁹ reported an incidence of 17.4 cases per year. In this series, out of a total of 61 cases, there were 41 (67.21%) non-neoplastic lesions and 20 (32.79%) neoplasms. Among neoplastic lesions, 12 (60%) were benign and 8 (40%) were malignant. Similar statistics were reported by Modh SK et al⁶, Mysorekar VV et al¹⁰ and Khan N et al¹¹.

Common symptoms recorded in our study were nasal obstruction (48 cases- 78.69%), polypoid mass (42- 68.85%), and nasal discharge (27 cases- 44.26%). Nasal obstruction and discharge were the commonest presenting symptoms in a study conducted by Bakari A et al¹² at a Nigerian centre.

True nasal polyps are tumor-like polypoid masses arising from nasal cavity and sinuses. it is associated with inflammation, allergy, or mucoviscidosis. Choanal polyps arise from one of the paranasal sinuses: antrochoanal polyp is the most common.¹³ Allergic polyps are associated with nasal allergy and predominant eosinophilic infiltrate in the stroma whereas inflammatory polyps are found in chronic sinonasal infection. Eosinophils are not restricted to polyps having a presumed allergic pathogenesis, although they are more numerous in them.²

In our study, two hundred sixty cases (75.1%) of nasal polyps were reported. This was similar to the incidence reported by jyothiraj et al (80.49%)Khan N et al¹¹ (83.33%), Modh SK et al⁶ (82.06%) and Zafar U et al¹⁴ (82.06%). Lower incidence was reported by Kulkarni MA et al⁸ (69.3%) and Dasgupta et al⁹ (62.85%). The peak age of presentation was in the 2nd and 3rd decades of life, which was similar to that observed by these authors. Slight male predominance (1.36:1) was reported in this study.Jyothiraj et al¹⁶ (1.36:1), Dasgupta et al⁹ (1.39:1) and Modh SK et al⁶ (1.53:1) reported similar sex ratio in their study.Among the two hundred sixty polyp,Fungal polyp(49cases-14.2%)was reported. Out of 49 ; 46 are healthy and 3 of them are diabetic which is similar to the study of ravikumar et al a study of(10 cases –healthy)of allergic fungal sinusitis and ponikau et al study identified fungus inn 14 healthy individual.

The maxillary sinus is the most commonly involved site for chronic sinusitis.¹⁶ Sixty eight cases (19.6%) of chronic sinusitis with nonspecific inflammation were reported in our study, all were involving the maxillary sinus and the nasal cavity. Jyothi et al²⁶ (14.67%),Kalpana Kumari MK¹⁷ et al reported 8 cases of nonspecific inflammation, in their series of 66 non-neoplastic lesions.

Rhinosporidiosis is a chronic granulomatous disorder previously thought to be caused by rhinosporidium seeberi but now a cyanobacterium, microcystis aeruginosa has been proposed as a causative agent . Most commonly involves nasal mucosa. In the nasal cavity septum, inferior turbinate, floor and lateral wall are commonly involved. In our study 15 cases was reported which is similar to the study of khade archana L et al²⁷(4.09%).

Rhinoscleroma is a chronic progressive infectious disease of the upper respiratory tract, caused by an organism of the Klebsiella group.²⁰ One case (0.29%) of rhinoscleroma was reported in our study, in a twenty-two year old male. The patient presented with nasal discharge and

obstruction. Similar incidence was reported by Dasgupta et al⁹ (1.2%), Modh SK et al⁶ (1.82%), jyothiraj et al²⁶ (2.44%) and Zafar U et al¹⁴ (4.83%). Higher incidence (15.84%) was reported by Kulkarni MA et al⁸ from Kolhapur, Maharashtra.

Tuberculosis is a granulomatous lesion caused by mycobacterium tuberculi bacilli. One case (0.29%) of tuberculosis was reported in our study in a 30 year male which was similar to the study of zafar u et al¹⁴ (4.17%)

Fibrous dysplasia is a non neoplastic condition reported in one male (0.29%) in our study similar to the study of zafar u et al¹⁴ (1.38%)

Among benign tumors, Inverted papillomas are gray-white prune-like polypoid tumors, common in the 5th and 6th decade, with a strong male predominance (2:1). Dysplasia is seen in approximately 10% of cases.²³ These tumors are aggressive, tend to recur following surgery and are known to undergo malignant transformation.²⁴ It was the commonest benign epithelial neoplasm in various studies [current study (41.3%) ,Sharma R et al⁷ (20%),jyothiraj et al²⁶ (16.67%), Kulkarni MA et al¹⁸ (15.38%), Narayanaswamy KV et al²⁵ (13.33%),].

Angiofibroma constitutes 0.5% of all head and neck tumors. It is histologically benign but locally destructive, with a tendency to recur.²¹ It was the second commonest non-epithelial benign neoplasm (34.4%) in the present study. 41.67% was the reported incidence in a similar study conducted by Modh SK et al⁶. Khan N et al¹¹ reported an incidence of 42.85% among benign lesions in this region. Jyothiraj et al²⁶ reported incidence of 50%.

Capillary hemangioma is a benign vascular tumor that is unusual in the nasal cavity. Suggested etiologic factors include trauma and hormones.²² It was the second most common non-epithelial benign neoplasm (12%) in the present series. Jyothiraj et al²⁶ (16.6%), Modh SK et al⁶ and Sharma R et al⁷ reported an incidence of 19.4% and 11% respectively in their studies.

Hemangiopericytomas (HPC) are rare (fig:6), vascular neoplasms, derived from Zimmerman's capillary pericytes, which surround all capillaries, and which account for 1% of all vascular tumors. paranasal sinuses, ethmoid and sphenoid sinuses are most commonly involved. HPCs at these sites do not have the same risk of malignancy and metastasis as HPCs elsewhere. Four cases of (6.8%) was reported in current study. Hughes and bard reported 15 cases in their 39 year study¹⁸.

Non ossifying fibroma and psammomatous ossifying fibroma are benign fibro-osseous lesion each of one case was reported in our study. peter manes et al reported 137 cases of fibro-osseous lesion in his study³⁵

Neurofibroma very rare neoplasm of nasal cavity reported in one female patient. Microscopy revealed that spindle shaped cells arranged in fascicles. The cells have moderate cytoplasm with wavy nuclei, which is similar to study of fraczek et al reported cases of neurofibroma in nose²⁹

Malignancies in the sinonasal region accounting for 0.2-0.8% of all carcinomas and only 3% of those in the upper aero digestive tract.⁵ They are often mistaken for simple nasal polyps or chronic inflammatory disease. Malignant tumours in this location are not common in our country. However carcinomas are, the commonest.⁹ Squamous cell carcinoma is the most common type and maxillary antrum, the most common site.²⁴ In our study malignant tumor is more common than benign tumors which is similar to the study of sweta sawant et al³⁰

Squamous cell carcinomas were the most common malignancies (78.4%) in this series. Similar incidence was reported by Panchal L et al²⁷ (53%), jyothiraj et al²⁶ (50%) Modh SK et al⁶ (43.75%) and Sharma R et al⁷ (42%). These patients presented with mass, nasal obstruction, epistaxis and pain. Common sites were nasal cavity and maxillary sinus. One case was associated with inverted papilloma, underlining the importance of thorough sampling.

Olfactory neuroblastoma (fig:7) is a rare malignant tumor of nasal cavity showing bimodal age distribution. In the present study 5 (6%) cases were reported similar to the study of shweta sawant et al³⁰

(6.45%).

Adenocarcinoma (fig:8) was reported in 3 cases (3.6%) in our study similar incidence was reported by shweta sawant et al³⁰ (6.45%)

Sarcomatoid carcinoma was reported in 3 cases (3.6%) in our study. pankaj M Shirsat reported 13 cases in his study³³.

Non hodgkins lymphoma was reported in 2 cases (2.4%) in our study which was similar to the study of shweta sawant et al³⁰ (3.23%)

Adenoid cystic carcinoma (fig:4) is the most common malignant salivary gland tumor of the sinonasal tract. Maxillary sinus and nasal cavity are the common sites of involvement. Present series (2.53%) were reported. Jyothi et al²⁶ reported one case (12.5%) in their study. Sharma R et al⁷ also reported 1 case (5%) in their study. Panchal L et al²⁷ (17.8%) and Dasgupta et al⁹ (19.5%) reported 8 cases each in their large series.

Chondrosarcoma reported in 1 case are malignant mesenchymal tumors of cartilage comprises less than 10% in head & neck region³¹ (fig:5)

CONCLUSION: Non-neoplastic and neoplastic lesions in the sinonasal region have similar clinical and radiological manifestations, with only a provisional diagnosis possible in most cases. Definitive diagnosis requires histopathological examination, as most lesions are either inaccessible for fine needle aspiration cytology or is not recommended for fear of hemorrhage. Categorization based on histopathology is therefore mandatory for management and prognosis of these lesions.

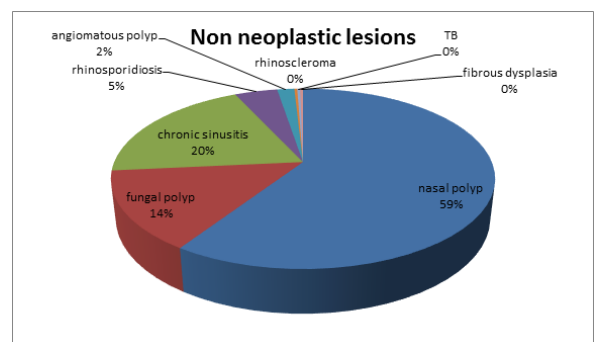
Table 1- Age- wise distribution of lesions in the sinonasal region

Age range in years	Non-neoplastic	Neoplastic benign	Neoplastic malignant	Total no. of cases	Total in percentage
0-10	-	-	-	-	-
11-20	216	20	-	236	48.86%
21-30	114	29	2	145	30.02%
31-40	08	3	03	14	2.89%
41-50	04	1	24	29	6%
51-60	03	0	41	44	9.1%
61 and above	01	05	9	15	3.1%

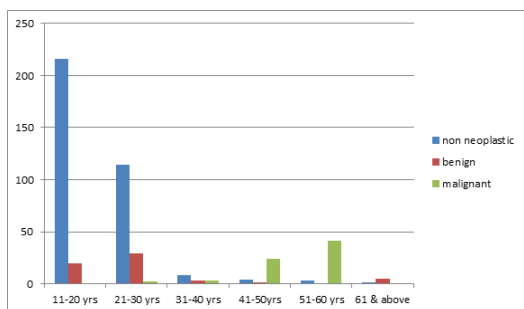
Table 2- Non-neoplastic lesions in the sinonasal region

Diagnosis	No. of cases	Percentage (%)	No. of males	No. of Females
Nasal polyps -Inflammatory - 54(26.4%) -Allergic - 151(73.6%)	205	59.25%	104	111
Fungal polyp	49	14.2%	30	19
Chronic sinusitis	68	19.6%	37	31
Rhinospodriodis	15	4.3%	13	2
Angiomatous polyp	6	1.73%	3	3
Rhinoscleroma	01	0.29%	1	-
Tuberculosis	01	0.29%	1	-
Fibrous dysplasia	01	0.29%	1	-

Graph : 1



Graph:2Agewise distribution



Graph : 3

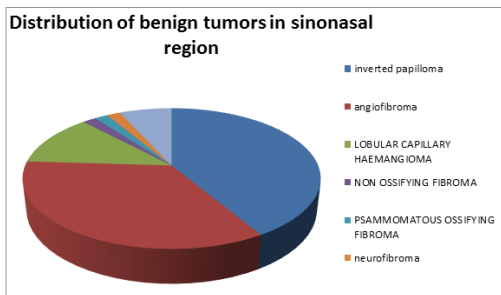


Table 3- Benign Neoplasms in the sinonasal region

Diagnosis	No. of cases	Percentage (%)	No. of males	No. of Females
Inverted papilloma	24	41.3%	15	9
Angiofibroma	20	34.4%	20	0
Capillary haemangioma	7	12%	6	1
Hemangiopericytoma	4	6.8%	4	-
Non ossifying fibroma	1	1.72%	-	1
Psammomatous ossifying fibroma	1	1.72%	-	1
Neurofibroma	1	1.72%	-	1

Table 4- Malignant neoplasms in the sinonasal region

Diagnosis	No. of cases	Percentage (%)	No. of males	No. of Females
Squamous cell carcinoma	62	78.4%	50	11
Olfactory neuroblastoma	5	6%	3	2
Adenocarcinoma	3	3.6%	1	2
Sarcoma	3	3.6%	3	0
Non hodgkins lymphoma	2	2.4%	2	0
Adenoid cystic carcinoma	2	2.4%	1	1
Chondrosarcoma	1	1.2%	0	1
Inverted papilloma with malignant transformation	1	1.2%	1	0

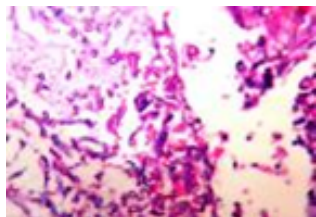


Fig.1. Mucormycosis: HPE showing broad aseptate fungal hyphae along with haemorrhage and necrosis

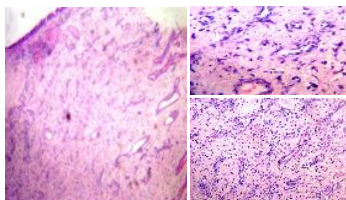


Fig.2. Angiofibroma: photomicrograph showing thin-walled blood vessels of varying size and architecture, in a fibroblastic stroma. (H&E,4x,10x& 40x)

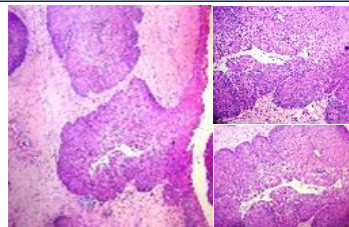


Fig.3. Inverted papilloma: HPE shows inward growth of epithelium with peripheral palisading of nuclei and microabscess with minimal nuclear atypia (10x & 40x)

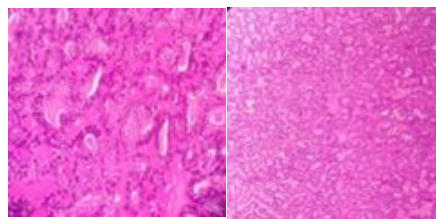


Fig.4. Adenoid cystic carcinoma: photomicrograph showing basaloid cells arranged in cribriform pattern. The spaces are filled with eosinophilic material.(10 & 40x)

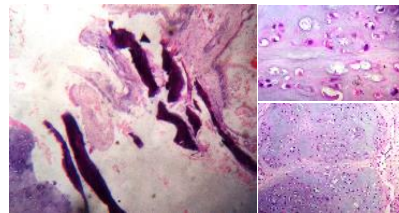


Fig.5. Chondrosarcoma:HPE shows respiratory epithelium with cartilaginous neoplasm composed of chondrocytes with pleomorphic nuclei and some are binucleated(4x,10x & 40x)

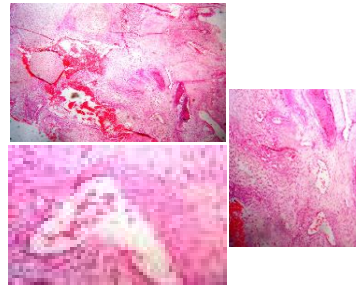


Fig.6. Haemangiopericytoma Characterized by numerous capillary spaces surrounded by accumulation of spindle cells.(H&E10x & 40x)

Inset shows capillary space surrounded by spindlecells

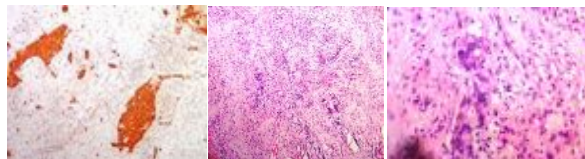


Fig:7 Olfactory neuroblastoma: HPEshows small round cells with scant cytoplasm & salt & pepper chromatin and rosette formation. IHC: synaptophysin positive

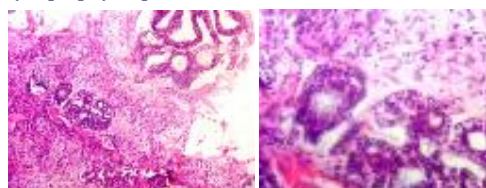


Fig:8.adenocarcinoma: HPE shows respiratory epithelium with an malignant neoplasm arranged in glandular pattern with nuclear pleomorphism.(H&E x,10x & 40x)

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