Abstract:
Background and Objective - Malignancies of nasal cavity and paranasal sinuses account for 0.2-0.8 percentage of all malignant neoplasms and 3 percentage of those occurring in head and neck. In sinonasal tumours 60 percentage occur in maxillary sinus, 20-30 percentage in nasal cavity, 1 percentage in sphenoid and 15 percentage in ethmoid sinus. This study analyses the clinical and pathological findings of sinonasal salivary gland type tumours reported in our institution in the past 6 years. Materials and methods - The clinical and pathological materials of 20 patients diagnosed with salivary gland type tumours from Jan 2007 to Dec 2012 were considered for the study. The clinical and pathological findings were evaluated. Results - Of the 20 cases reported, the most common histological subtype was adenoid cystic carcinoma followed by mucoepidermoid carcinoma. About 73 percentage occurred in females and 27 percentage in males. Average age of presentation was 51 years. Out of the 20 cases 3 were recurrent lesions. Conclusion - A knowledge about the heterogeneous types of salivary gland tumors in nose and paranasal sinuses help in their correct diagnosis, proper treatment and prediction of their clinical behavior. Keyword: Sino-nasal tract - salivary gland type of tumors - maxillary tumors.

Introduction:
The sinonasal cavity extends from the nostrils to the posterior nasal septum ending posteriorly in the nasopharynx. Four aerated paranasal sinuses: maxillary, ethmoid, frontal and sphenoid surround the nasal cavity. Malignancies of the sinonasal tract account for only 3% to 5% of all head and neck cancers (1). The majority of malignant sinonasal cavity tumours are epithelial in origin and approximately 80% are squamous cell carcinomas (2). Salivary gland type of tumours in sinonasal tract is uncommon and majority is malignant.
They are thought to originate from seromucinous glands of the nasal cavity and paranasal sinuses. Majority of them occur in maxillary sinus and nasal cavity. Malignant neoplasms of this region lead to significant morbidity and disfigurement. According to WHO sinonasal tumours are simply classified as squamous cell carcinoma, lymphoepithelial carcinoma, undifferentiated carcinoma, adenocarcinoma, salivary gland type tumours and neuroendocrine carcinoma. The salivary gland type of tumours are further classified as:

- Adenoid cystic carcinoma
- Acinic cell carcinoma
- Mucoepidermoid carcinoma
- Epithelial-myoepithelial carcinoma
- Clear cell carcinoma
- Myoepithelial carcinoma
- Carcinoma ex pleomorphic adenoma
- Polymorphous low grade adenocarcinoma

**Materials and Methods:**
A retrospective study of salivary gland type sinonasal tumours was conducted in our Institute for a period of 6 years. Clinical details including age, sex, presenting complaints and radiological findings were evaluated. The specimens included were both resected specimens and trucut biopsies. The specimens were fixed in 10% neutral buffered formalin and embedded in paraffin. A 5 μm tissue sections were made and the slides were stained with Hematoxylin & Eosin routinely. A total of 20 cases of salivary gland type tumors were studied in the sinonasal tract. The common presenting symptoms were mass, nasal obstruction and rarely septal perforation. Of the 20 cases, 9 were resected specimens. Age incidence ranged from 30-70 years with a mean age of 51 years. A sex predilection was observed in females [chart The maxillary sinus (56%) and the nasal cavity (44%) were the most common primary tumor sites with a mean size of 3.5cm [Chart 1]. CT was the primary modality of investigation done and in majority of cases, a mass was seen arising from the nasal septum and in the maxilla, the growth was aggressive and showed extension into orbital cavity and hard palate. Grossly all were solid grey white friable masses. Out of 20 cases, 14 cases were adenoid cystic carcinoma (70%), 4 were mucoepidermoid carcinoma (20%) and 1 case each of carcinoma ex pleomorphic adenoma (5%) and salivary duct carcinoma (5%) [chart.3]. The most common tumor subtype was adenoid cystic carcinoma (Fig 3). In adenoid cystic carcinoma 8 cases were grade II and 5 cases were stage II. In mucoepidermoid carcinoma all were low grade malignancies. Recurrence was observed in 3 cases of adenoid cystic carcinoma of which 2 cases had completed postoperative radiotherapy.

**Results:**
A total of 20 cases of salivary gland type tumors were studied in the sinonasal tract. The common presenting symptoms were mass, nasal obstruction and rarely septal perforation. Of the 20 cases, 9 were resected specimens. Age incidence ranged from 30-70 years with a mean age of 51 years. A sex predilection was observed in females [chart 2]. The maxillary sinus (56%) and the nasal cavity (44%) were the most common primary tumor sites with a mean size of 3.5cm [Chart 1]. CT was the primary modality of investigation done and in majority of cases, a mass was seen arising from the nasal septum and in the maxilla, the growth was aggressive and showed extension into orbital cavity and hard palate. Grossly all were solid grey white friable masses. Out of 20 cases, 14 cases were adenoid cystic carcinoma (70%), 4 were mucoepidermoid carcinoma (20%) and 1 case each of carcinoma ex pleomorphic adenoma (5%) and salivary duct carcinoma (5%)[chart.3].The most common tumor subtype was adenoid cystic carcinoma (Fig 3). In adenoid cystic carcinoma 8 cases were grade II and 5 cases were stage II. In mucoepidermoid carcinoma all were low grade malignancies. Recurrence was observed in 3 cases of adenoid cystic carcinoma of which 2 cases had completed postoperative radiotherapy.

Fig 1: Mucoepidermoid carcinoma 100x.H&E showing clusters of mucus cells surrounded by sheets and islands of epidermoid cells.
Fig 2: Mucoepidermoid carcinoma. 400x. H&E shows mucus cells with mucin filled cytoplasm and round eccentrically placed nuclei.

Fig 3: Adenoid cystic carcinoma 100x. H&E shows classical cribriform pattern.

Fig 4: Salivary duct carcinoma. 100x. H&E shows...

Fig 5: Salivary duct carcinoma. 400x H&E Round to oval cells with moderate degree of nuclear atypia with necrotic area.

Fig 6: Carcinoma ex pleomorphic adenoma 100x.

Fig 7: Carcinoma ex pleomorphic adenoma. 400x H&E Round cells with scant eosinophilic cytoplasm and round vesicular nuclei in a chondromyxoid background.

**Discussion:**

Adenocarcinomas of various types comprise 10% to 20% of all primary malignant neoplasms of the nasal cavity and paranasal sinuses (3). They are separated into salivary gland-type adenocarcinomas...
and non-salivary gland type adenocarcinomas. Adenocarcinoma of salivary-gland type are uncommon constituting 5–10% of sinonasal adenocarcinomas (3). They are thought to originate from seromucinous glands of the nasal cavity and paranasal sinuses. The salivary gland-type neoplasms of the sinonasal tract are uncommon and include adenoid cystic carcinoma, mucoepidermoid carcinoma, acinic cell carcinoma, epithelial-myoepithelial carcinoma, myoepithelial carcinoma, polymorphous low-grade adenocarcinoma, clear cell carcinoma, and carcinoma ex-pleomorphic adenoma. Benign salivary gland neoplasms are less common than malignant tumors and include pleomorphic adenoma, myoepithelioma, and oncocytoma. Histologically, these carcinomas are similar to those originating from major and minor salivary glands. The most common type is adenoid cystic carcinoma usually occurring in the maxillary sinus and nasal cavity.

**Adenoid cystic carcinoma:**

Adenoid cystic carcinoma is the most frequent malignant salivary gland-type tumor of the sinonasal tract and second most common malignancy in this region after squamous cell carcinoma (4). Adenoid cystic carcinoma is predominantly a tumor of adulthood with a peak incidence in the fourth to sixth decades with a female predominance as in other studies. It is an aggressive neoplasm with an indolent growth, high incidence of local recurrence and distant metastasis, regardless of treatment modality. Local recurrence is more common in incomplete excision or with perineural spread. Common presenting symptoms of sinonasal adenoid cystic carcinoma include nasal obstruction, facial pain, epistaxis, and nasal drainage rarely with septal perforation as in our study. The most frequent site is maxillary sinus followed by nasal cavity as previously reported. Three histological subtypes based on the growth pattern include tubular, cribriform and solid. Cribriform is the most common pattern with a favourable prognosis than the solid pattern. Late metastatic spread is seen in lungs, bone and liver. Many studies have indicated that surgery with postoperative radiation therapy is the most common treatment for patients with sinonasal adenoid cystic carcinoma. The advantage of postoperative radiation therapy is to clear the positive margins. Despite radiation, patients who were treated with surgery and postoperative radiation had a high recurrence rate (65%) (1). Similarly in our study local recurrence was noted in 3 cases as early as 2 years after primary treatment, of which 2 cases were treated with postoperative radiotherapy. The plausible reason being the spread of the tumour by perineural invasion.

**Mucoepidermoid carcinoma:**

Mucoepidermoid carcinoma is the second most frequent salivary gland type carcinoma after adenoid cystic carcinoma. It accounts for <0.1% of all malignant sinonasal tract neoplasms (5). Histologically 3 cell types are seen and include mucus cells, epidermoid cells and intermediate cells in variable proportions. Usually a three tier grading system is used based on intracystic component<20%, neural invasion, necrosis, mitotic figures 4/10HPF and anaplasia. In our study majority of the tumours were low grade tumors with low clinical staging compared to adenoid cystic carcinoma. The most frequent site is nasal cavity followed by maxillary sinus. Age incidence peaked between fourth to sixth decade with a mean age of 55 years and showed male predilection in contrast to other studies which show female predilection.
The prognosis depends on histological grade, clinical staging and Ki67 index. When compared to adenoid cystic carcinoma, mucoepidermoid carcinoma showed better clinical outcome in our study. Mucoepidermoid carcinoma is uncommon in sinonasal tract, resulting in potential diagnostic dilemmas because of their varied clinical and histological manifestations. It should be emphasized that marked nuclear atypia, frequent mitoses and extensive necrosis are not typical of mucoepidermoid carcinoma of any grade. If these features are seen, then the other possibilities like poorly differentiated adenocarcinoma and adenosquamous carcinoma should be considered in the differential diagnosis.

**Carcinoma ex pleomorphic adenoma:**
Carcinoma ex pleomorphic adenoma is a malignant epithelial neoplasm arising in a benign mixed tumor (i.e., pleomorphic adenoma or PA) and accounts for approximately 3–4% of all salivary gland neoplasms (6). Though malignancy arising from the seromucinous glands in the nasal cavity is exceedingly rare, pleomorphic adenoma is the commonest among the salivary gland type tumour that shows malignant transformation. The most frequent malignant components are high-grade adenocarcinoma NOS and salivary duct carcinoma, but any type of carcinoma can occur. Nasal PAs behave in an entirely benign fashion. About 6.2% of pleomorphic adenoma can undergo malignant transformation (7). Carcinoma ex pleomorphic adenoma (CXPA) is the rarest of all malignancies in the sinonasal tract. Our case presented as longstanding nasal mass with sudden rapid increase in size and the duration was about 3 years. In our study only one case of carcinoma ex pleomorphic adenoma in a 54 year old male was reported in contrast to other studies that shows a female predilection for nasal CXPA with an age incidence of 6th to 7th decade. Histologically they are subclassified into noninvasive, minimally invasive and invasive based on the extent of the malignant component beyond the benign pleomorphic adenoma area. Nasal CXPAs will not necessarily have the classic clinical or full pathologic features characteristic for CXPA at other sites. Pleomorphic adenoma of the nasal cavity should be sampled thoroughly to exclude the possibility of CXPA.

**Salivary duct carcinoma:**
Salivary duct carcinoma is an aggressive malignant neoplasm reminiscent of ductal carcinoma of breast. It can occur de novo or as the malignant component in carcinoma ex pleomorphic adenoma. It most frequently affects elderly males with the peak incidence in the sixth to seventh decade as in our study. Histologically it resembles in-situ and infiltrating ductal carcinoma comprises pleomorphic tumour cells showing cribriform pattern and central comedo necrosis. Salivary duct carcinoma affecting the minor salivary glands has been reported in only 4% of the salivary duct carcinoma cases and constitutes 2% of all the salivary gland malignant neoplasms (8). Intra-orally, the common sites of occurrence are the palate, followed by the buccal mucosa, vestibule, the upper lip, the maxilla and the mandible. We reported a case of salivary duct carcinoma in a 74 year old male, who presented with maxillary swelling and this is a very rare site as noted in various studies.

**Conclusion:**
In our study the most common salivary gland type tumour was adenoid cystic carcinoma.
The most common site was maxillary sinus followed by nasal cavity. A female predilection was observed. Adenoid cystic carcinoma showed a recurrence rate of 25% despite postoperative radiotherapy. Mucoepidermoid carcinoma showed better clinical outcome when compared to adenoid cystic carcinoma. Prognostic factors generally considered in these tumours are histological grade, clinical stage, perineural invasion and resectability. Though carcinoma ex pleomorphic adenoma is rarest of all the malignancies in sinonasal tract, pleomorphic adenoma of the nasal cavity should be sampled thoroughly to exclude the possibility of CXPA. Also other rarer malignant salivary gland type tumours like salivary duct carcinoma should be considered in the differential diagnosis of aggressive neoplasms in the sinonasal tract, as has been inferred from our study. This study highlights the importance of considering salivary gland type tumors in the differential diagnosis of aggressive lesions in maxilla and mandible and especially when the aggressive lesion is involving palate and orbital cavity.

References:


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