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Salivary gland tumors: Retrospective audit and diagnostic evaluation of 163 Cases

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Abstract

Introduction: - The salivary glands are exocrine glands responsible for the production, modification, and secretion of saliva into the oral cavity. Salivary gland tumors account for approximately 5% of all malignancies located in the head and neck region and represent between 0.5% and 13.5% of the total malignancies in the human body, with a reported annual incidence of 0.5 to 2 cases per 100,000 individuals.

Methods: - A six-year retrospective analysis of 163 cases involving salivary gland neoplasms among patients who sought treatment at the oral and maxillofacial surgery clinic, as well as the outpatient facility of the Ear, Nose, and Throat (E.N.T.) department. Data retrieved are demographic information such as age, sex, duration of the salivary gland tumor at initial presentation, tumor localization, and the specific histopathological types of the tumors diagnosed and the FNAC reports of individual patients Analysed.

Result: - Categorical variables were analysed as frequencies and percentages, while quantitative variables were assessed by using chi-square analysis and the significance was inferred at 0.05. The mean age of the subjects was 40.7(±20.6) for both benign (72.4%) and malignant (27.6%) cases. Females represent the predominant demographic in both benign 69(58.5%) and malignant cases 49(55.6%) observed. Among the benign tumors, pleomorphic adenoma accounts for the highest incidence rate, comprising 61.9% of diagnosed cases and occurred more in 3rd to 4th decade of life, whereas both mucoepidermoid carcinoma and adenoid cystic carcinoma demonstrate a closely aligned incidence with 15(33.3%) and 14 (31.1%), respectively. submandibular gland reveals the greatest frequency of malignant neoplasms, particularly adenoid cystic carcinoma at 7(10.1%) and mucoepidermoid carcinoma at 5(7.3%) cases. A statistically significant difference is evident when analysing the histological classification of neoplasms. Fine needle aspiration and cytological evaluation of 123 cases exhibits a sensitivity of 92.9% and specificity of 97.6%. for the research study. Statistical significance difference is also observed between the histopathological diagnosis of the salivary gland tumors (SGTs) and fine needle aspiration cytology (FNAC) (P=0.001).

Conclusion: - The variation in the geographic distribution of salivary glands is similar to documentation in literature; the parotid gland was identified as the most frequently affected gland, with a higher prevalence observed in the female

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population within the study. A significant proportion of cases that originated from the major salivary glands were classified as benign, whereas the majority of minor salivary gland tumors (SGTs) were determined to be malignant.

Keywords: Salivary gland; Neoplasms, benign, malignant Fine Needle Aspiration cytology (FNAC); Histopathology

1. Introduction

Salivary glands are present throughout the oral, upper aerodigestive tract and maxillofacial region(1–3). The salivary glands are exocrine glands responsible for the production, modification, and secretion of saliva into the oral cavity(4–6). Over 400–1200 minor salivary glands exist in the oral cavity and aerodigestive tract area along with the three paired major salivary glands (parotid, submandibular and the sublingual gland) (2,7).

The disparities in the global epidemiology pertaining to the distribution of salivary gland neoplasms have been documented(7,8). While salivary gland tumors (SGTs) are characterized as infrequent occurrences, they account for approximately 5% of all malignancies located in the head and neck region and represent between 0.5% and 13.5% of the total malignancies in the human body, with a reported annual incidence of 0.5 to 2 cases per 100,000 individuals(7,9). SGTs exhibit a wide range of histomorphology characteristics, with the World Health Organization (WHO) recognizing 33 distinct types of tumors, thereby complicating both diagnosis and therapeutic strategies(5,10).

The etiology of salivary gland neoplasms is multifaceted, characterized by intricate interactions between environmental factors and genetic predispositions.(7,8) Factors such as ionizing radiation, exposure to chemicals, obesity, autoimmune diseases, and viral infections (notably, Epstein–Barr virus in the context of lymphoepithelial carcinoma) have been associated with these neoplasms, although definitive causal relationships remain to be elucidated(6,10). Moreover, aberrations in tumor suppressor genes and oncogenes, along with chromosomal translocations, may facilitate the emergence of salivary gland neoplasms, encompassing both benign and malignant forms.(7,11–13)

The non-neoplastic disorders seen in salivary glands range from developmental, inflammatory, infectious, granulomatous, traumatic conditions and cystic lesions (7,9). Eighty per cent of all SGTs had been documented to be benign, and these are said to be prevalent in the third to fourth decade, with a higher female predilection(13).

Concerning malignant salivary gland tumors (SGTs), it has been observed that the smaller the size of the salivary gland the higher the likelihood of malignancy, with nearly 100% of sublingual tumors and approximately 60% of minor salivary gland tumors being classified as malignant upon diagnosis(13). Malignant tumors exhibit a higher incidence during the fourth to fifth decades of life, with a slight preference noted among the male population.

Accurate diagnosis is of paramount importance in the effective management of salivary gland tumors; however, the unique challenges associated with diagnosing these tumors make tissue biopsy the definitive standard. Consequently, fine-needle aspiration cytology (FNAC) assumes a critical role in the management of salivary gland tumors. FNAC is a procedure that is generally well-accepted, relatively devoid of pain, straightforward to execute, and cost-effective (14,15). This technique serves to distinguish between neoplastic and non-neoplastic, as well as benign and malignant salivary gland tumors, thereby informing subsequent management strategies (14–16). The reported accuracy rates for FNAC sensitivity and specificity pertaining to salivary gland lesions have been documented to fluctuate between 74%-98% and 70%-100%, respectively (14–16). It is noteworthy that fine-needle aspiration demonstrates superior sensitivity and specificity for benign masses in comparison to malignant counterparts (14,16). Thus, this study is to provide a comprehensive picture of the salivary gland tumors managed within our local Centre and this also to enable targeted preventative measures and treatment of salivary gland tumors.

2. Methods

A six-year retrospective analysis of 163 cases involving salivary gland neoplasms among patients who sought treatment at the oral and maxillofacial surgery clinic, as well as the outpatient facility of the Ear, Nose, and Throat (E.N.T.) department at the Lagos State University Teaching Hospital (LASUTH), was conducted. Ethical approval for collection of data for the study was obtained from LASUTH. The Collected data from patient medical records included demographic information such as age, sex, duration of the salivary gland tumor at initial presentation, tumor localization, and the specific histopathological types of the tumors diagnosed. Additionally, the reports from fine needle aspiration and cytology (FNAC) along with laboratory histopathological evaluations, the therapeutic interventions administered, and any postoperative complications documented were also extracted.

3. Analysis

163 case files of various subjects where collated and analysed using Statistical Package for Social Sciences) software version 24.0 (SPSS Inc., Chicago, IL, USA). Categorical variables were analysed as frequencies and percentages, while quantitative variables were assessed by using chi-square analysis and the significance was inferred at $p \leq 0.05$

4. Results

The mean age of the subjects was 40.7(±20.6) for both benign (72.4%) and malignant (27.6%) cases. The demographic cohort aged between 41 and 50 years exhibits the highest prevalence of patients diagnosed with salivary gland tumors. The overall male-to-female distribution of salivary gland tumors is 65 (39.9%) to 98 (60.1%). Females represent the predominant demographic in both benign 69(58.5%) and malignant cases 49(55.6%) observed. Among the benign tumors, pleomorphic adenoma accounts for the highest incidence rate, comprising 61.9% of diagnosed cases and occurred more in 3rd to 4th decade of life, whereas both mucoepidermoid carcinoma and adenoid cystic carcinoma demonstrate a closely aligned incidence with 15 (33.3%) and 14 (31.1%), respectively. Adenoid cystic carcinoma and mucoepidermoid carcinoma exhibit their maximum incidence within the fifth decade of life. The parotid gland demonstrates a significantly higher incidence rate, with 63 (38.7%) cases, in relation to the overall occurrence of salivary gland neoplasms when compared with alternative anatomical locations. Conversely, the submandibular gland reveals the greatest frequency of malignant neoplasms, particularly adenoid cystic carcinoma at 7 (10.1%) and mucoepidermoid carcinoma at 5 (7.3%) cases. A statistically significant relationship is evident when analyzing the histological classification of neoplasms in relation to their anatomical sites, with a p-value of 0.001. The palate has the highest cases among the minor salivary gland site in both benign and malignant tumors. Fine needle aspiration and cytological evaluation of 123 cases exhibits a sensitivity of 92.9% and specificity of 97.6%. for the research study. Statistically significant difference is also observed between the histopathological diagnosis of the salivary gland tumors (SGTs) and fine needle aspiration cytology (FNAC) (P=0.001). Furthermore, a significant association exists between the histological classifications and the age demographics of the patients (p=0.001). The therapeutic interventions administered encompass enucleation, excision, and excision coupled with chemotherapy. Patients in the first to fourth decades of life predominantly undergo enucleation and excision of the neoplasms as part of their treatment regimen, whereas individuals in the fifth decade and beyond receive excision of the neoplasms in conjunction with chemotherapy or radiotherapy. The relationship between age categories and the treatment modalities applied was found to be statistically significant (p=0.001). The complications documented in this investigation include infections, wound dehiscence, neurological complications, and pain, with no statistical significance noted.

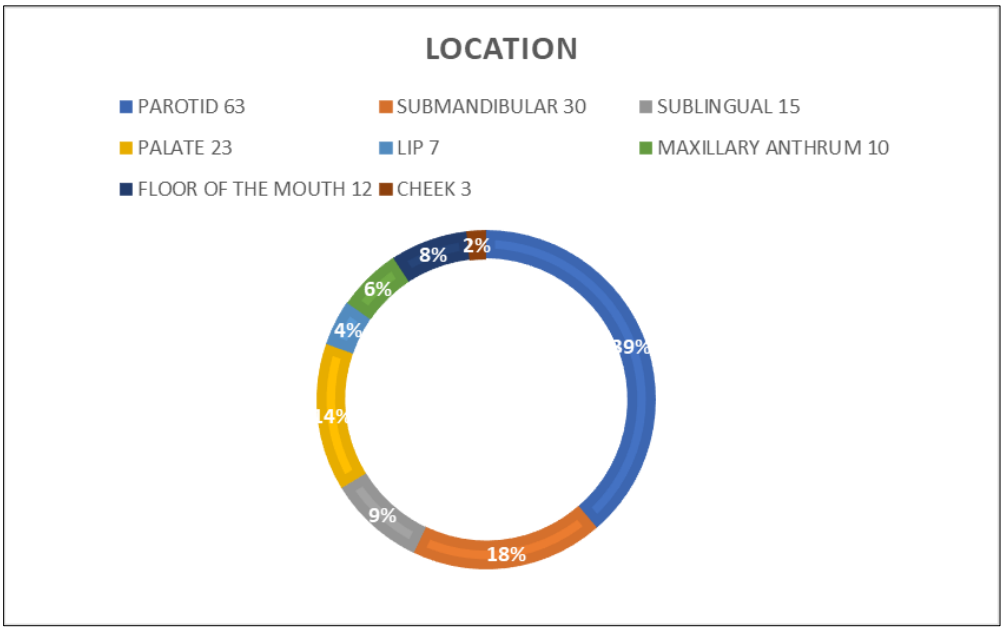

Figure 1 Location

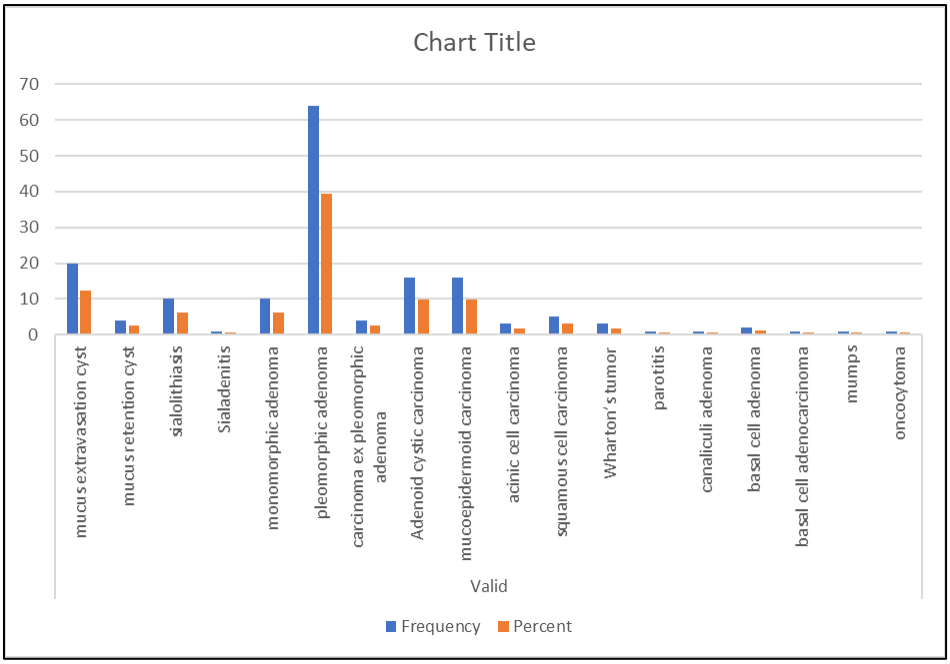

Figure 2 Histology Diagnosis

Table 1 The distribution of duration of swelling at presentation

		Frequency	%
Valid	0-12 months	79	48.5
	13-24 months	41	25.2
	25-42 months	21	12.9
	43-54 months	13	8.0
	55-66 months	3	1.8
	67-78 months	4	2.5
	79-90 months	2	1.2
	Total	163	100.0

Table 2 Relationship between Age and treatment

		AGE GROUP											Total
		.00	1-10	11-20	21-30	31-40	41-50	61-70	7.00	71-80	>80	10.00	
TREATMENT	enucleation	1	7	4	2	1	1	1	0	0	0	0	17
	excision	0	7	12	12	14	23	14	12	2	1	1	98
	excision + chemo	0	1	2	3	9	7	13	4	4	2	0	45
	nil	0	0	0	0	1	1	0	0	0	1	0	3
Total		1	15	18	17	25	32	28	16	6	4	1	163

P=0.0001*

Table 3 Association between Treatment complications and Age Group

		AGE GROUP											Total
		0.00	1-10	11-20	21-30	31-40	41-50	61-70	7.00	71-80	>80	10.00	
COMPLICATION AFTER TREATMENT	infection	0	1	3	4	1	2	1	2	1	0	0	15
	wound breakdown	0	2	1	1	1	0	0	0	0	0	0	5
	pain	0	2	1	2	2	3	8	2	1	1	0	22
	nerve complication	0	1	0	0	2	0	0	0	0	0	0	3
	nil	1	8	12	9	12	22	14	9	4	2	1	94
	combined complications	0	1	1	1	7	5	5	3	0	1	0	24
Total		1	15	18	17	25	32	28	16	6	4	1	163

P=0.755 (not significant)

5. Discussion

Epidemiological investigations of salivary gland tumors delineate variations that are correlated with patient demographics, tumor prevalence, and anatomical localization (13). In adult populations, the epidemiological characteristics and prognostic indicators of salivary tumors are extensively documented, resulting in well-defined protocols for therapeutic intervention predicated on tumor histology and differentiation (14). Contrary to other investigations that have indicated a male predominance in salivary gland tumors (12,15), the present study revealed a female majority which corresponds with findings from several local and international studies(7,16–20) this phenomenon can largely be attributed to cultural practices. Females in the South-Western part of the country are more social enlightened and are very particular about their physical appearance, this is believed to contributes to their seeking of medical attention more aggressively compared to the male counterpart. This contrasts the cultural belief in the northern part of the country where limited physical facial exposure exists and may prevent eager seeking medical attention coupled with the fact that females also require their husband consent to attend clinics (12).

The age spectrum from the first to the sixth decade reported in this investigation is consistent with other studies (20,21). Aside from malignant neoplasms, which exhibit a preference for older age groups, salivary gland disorders can manifest at any age; this study, alongside various authors, concurs that the peak incidence of benign conditions occurs between the third and fifth decades(7,15). Nonetheless, in this study, the observed decrease in benign cases below the second decade of life also still in accordance with the literature (8). In the academic discourse, the ratio of benign to malignant neoplasms present within the salivary glands exhibits variability contingent upon the specific anatomical site(22). In this retrospective examination of salivary gland tumors, a significant prevalence of benign neoplasms was observed, with pleomorphic adenoma representing the most frequently identified subtype(19,23), whereas adenoid cystic carcinoma and mucoepidermoid carcinoma were recognized as the most common malignant variants(19,22). Typically, individuals with benign, asymptomatic lesions often postpone seeking medical intervention for extended durations in numerous regions across African nations unless they manifest accompanying clinical symptoms (21,22). The financial burden of out-of-pocket expenses also contributes to the delay in presentation.

The parotid gland has been extensively referenced in the literature as the gland most frequently impacted by benign tumors(19,22) and some for both (19), a conclusion that is corroborated by this study. In contrast, the submandibular gland is predominantly associated with malignant tumors and ranks second in the prevalence of benign cases, this is in alignment with some studies(19,22,24). With respect to malignant salivary gland tumors (SGTs), empirical evidence suggests that a direct inverse relationship exists between the size of the salivary gland and the probability of malignancy, with nearly 100% of sublingual tumors and approximately 60% of tumors originating from minor salivary glands being identified as malignant at the time of diagnosis (24)). The palate exhibits the highest prevalence of both benign and malignant neoplasms in this study, corroborating findings from other studies that designate it as the primary site of involvement for minor salivary gland tumors.(20,24). The involvement of the sublingual gland is rare and also reflected in this study evident by the low number of cases recorded (19,20).

The primary manifestation associated with benign neoplasms was characterized by a non-painful enlargement, in contrast, rapid proliferation and ulcerative lesions were observed in malignant instances, particularly in high-grade tumors(25,26). A substantial proportion of individuals diagnosed with parotid tumors exhibited a non-painful enlargement(17,25). Also, individuals with tumors of the submandibular gland, most exhibited non-painful, gradually enlarging masses however in some cases pain and difficulty in swallowing was observed. This observation is consistent with the majority of cases that have been examined

Preoperative diagnosis of salivary gland masses is a key point for the correct management of the patients, and fine-needle aspiration cytology (FNAC) may play a crucial role in this setting(27). Like in several previous studies(28–30), the values of the sensitivity and specificity of this study is not different further ascertaining the important role of this investigation in the diagnostic differentiation between the benign and malignant salivary gland tumours. Fine-needle aspiration cytology (FNAC) represents a dependable methodology for preoperative assessment that yields critical insights for the preoperative diagnostic evaluation(28,31,32). It also serves to inform the surgeon about the potential existence of malignancy, aids in the delineation of a surgical strategy concerning resection margins, evaluates the necessity for lymph node dissection, and determines the urgency of the therapeutic intervention(33–35). However, in the use of FNAC, the accuracy varies greatly depending on the disease entity. The morphological heterogeneity and cytological overlap within salivary gland neoplasms can also affect the specific subtyping of such tumors (36)

The initial surgical intervention is deemed the most suitable therapeutic approach for salivary gland neoplasms, particularly in instances that are amenable to resection and exhibit no metastatic progression (37). The comprehensive excision of the entire neoplastic tissue is imperative for achieving a favorable outcome, as radiotherapy is not considered an ideal primary treatment modality and is reported to lack efficacy in cases where significant residual tumor remains (37). Surgical resection is the predominant therapeutic strategy employed in the research, with chemotherapy utilized as an adjunctive treatment in scenarios characterized by advanced malignancy.

The surgical approach to SGTs is closely related to the tumor type.(38). The characteristics pertaining to the salivary gland neoplasm, including its dimensions, duration, and the preferred surgical technique of the operating surgeon, exert a considerable influence on the type and severity of complications that are documented. Various scholarly investigations have indicated that nerve-related complications are the most frequently encountered; however, in the present study, while nerve complications remain among the least frequently reported, the manifestation of multiple complications appears to be the predominant finding within the research.

6. Conclusion

The variation in the geographic distribution of salivary glands is well documented in the literature; the parotid gland was identified as the most frequently affected gland, with a higher prevalence observed in the female population within the study. A significant proportion of cases that originated from the major salivary glands were classified as benign, whereas the majority of minor salivary gland tumors (SGTs) were determined to be malignant. Benign neoplasms predominantly arose from the parotid gland, specifically identified as pleomorphic adenomas. It was noted that there is an increased likelihood of patients developing malignant tumors as they age.

Compliance with ethical standards

Disclosure of conflict of interest

No conflict of interest to be disclosed.

Statement of ethical approval

Ethical approval obtained for the collection of data.

The study is retrospective assessment of patient treated at the Hospital. No animal subject was involved.

Statement of informed consent

Informed consent was obtained from all individual participants included in the study.

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