MAK HILL Publications Research Journal of Medical Sciences

Research Article
doi: 10.59218/makrjms.2023.55.60

A Clinico Histopathological Study of Salivary Gland Tumors: A Diagnostic Conundrum

[1]V.R. Ranadive, [1]K.A. Jagadale, [1]Anuja Patil, [1]Tanaya Kulkarni, [2]Anish Arvind Jagadale and [3]R.C. Nimbargi and [3]M.N. Karandikar

[1]Department of Pathology, Bharati Vidyapeeth Medical college, Pune, Maharashtra, India
[2]B.J. Medical College and Sassoon Hospital, Pune, India
[3]Department of Pathology, Bharati Vidyapeeth Medical college, Pune, Maharashtra, India

OPEN ACCESS

Key Words
Salivary glands, histopathology, carcinoma ex-pleomorphic adenoma

Corresponding Author
Vijeeta Ranadive,
Department of Pathology, Bharati Vidyapeeth Deemed University Medical College, Pune 411043, India
Tel: 9881144168

Received: 14 March 2023
Accepted: 22 March 2023
Published: 11 April 2023

Citation: V.R. Ranadive, K.A. Jagadale, Anuja Patil, Tanaya Kulkarni, Anish Arvind Jagadale and R.C. Nimbargi and M.N. Karandikar, 2023. A clinico histopathological study of salivary gland tumors: A diagnostic conundrum. Res. J. Med. Sci., 17: 55-60, doi: 10.59218/ makrjms.2023.55.60

ABSTRACT
Tumors of the salivary gland account for 3-4% of all head and neck cancers. These tumors pose a diagnostic dilemma oweing to their histological diversity coupled with overlapping morphological features. Reassessment studied have shown that the histopathological impression was revised in 12-25.2% cases. Inspite of recent advances, histopathological examination remains the gold standard for diagnosis of these tumors. Hence the present study was undertaken at our tertiary care hospital to study the clinicopathological correlation between various salivary gland tumors. This was an observational study conducted in the department of pathology over a period of one year. Cases received from October 2019 to November 2021 were studied prospectively. For retrospective evaluation, H and E slides and requisition forms and clinical details were retrieved from the Pathology department and the medical records department. The results of the histopathological study were correlated with the clinical findings. Out of 48 salivary tumors, 35 (72.9%) were found in the parotid gland. Pleomorphic adenoma was the most common benign tumor studied while the most common malignant tumor was mucoepidermoid carcinoma. The commonest clinical presentation was that of an asymptomatic slow growing mass. It can be concluded from the present study that salivary gland tumors exhibit a wide spectrum of histological patterns and hence histopathological examination and immunohistochemistry remain the most important method in evaluation of these tumors due to the profound impact diagnostic accuracy has on further patient management and prognosis.

INTRODUCTION

Salivary glands play an integral role in the regulation of homeostasis within the oral cavity. They are responsible for the secretion of saliva which is a fluid possessing multifunctional qualities. It aids in mastication, swallowing, digestion, speech articulation and also has antimicrobial properties[1,2]

Tumors of the salivary gland are rare and account of approximately 3-4% of all head and neck cancers[3] Various etiological factors have been implicated in the development of these tumors but the etiopathogenesis still remains unclear. Diets rich in vitamin C and cholesterol are said to aid in prevention of these tumors. A study conducted in Sweden concluded that patients with Hodgkins lymphoma are at a 4-fold higher risk. EBV and HIV infections are also said to increase the risk of salivary gland tumors. Various risk factors such as exposure to radiation, occupational hazards such as asbestos, rubber, plumbing and wood working have been implicated as carcinogens[4-6].

Approximately 80% tumors are benign. Pleomorphic adenoma comprises 65% of this entity hence these are the most common tumors of salivary gland. The Parotid gland is the most common site for salivary gland tumors accounting for approximately 70% of all SGT while 10% are seen in the submandibular gland and minor glands account for roughly 20% cases. The sublingual gland accounts for less than 1% of tumors but the tumors that occur here are almost always malignant. Likewise, malignancy of the minor salivary glands is more common as compared to the major salivary glands (20%)[7,8].

The 2017 WHO classification identifies more than 30 subtypes[9].

Diagnostic accuracy is key for the management of these tumors due to its deep impact on further patient management and prognosis. For example, if malignancy is suspected in a tumor of the parotid, the treatment of choice in most cases is a parotidectomy. However temporal facial palsy (56-57%) is a potential post-operative complication. The risk of permanent facial palsy is almost 2-7%[10]. Hence if the chances of malignancy are low the patient may be advised to moniter the swelling[11]. Hence the benefits and implications must be weighed before a decision is made. Another problematic area lies in the management of the cervical lymph nodes. Surgical neck dissection maybe required in malignant cases hence this required preoperative planning[12].

In spite of recent advances in molecular pathology as well as immunohistochemistry, the diagnosis still rests on the pillars of histomorphology. Hence the present study was undertaken at our tertiary care center to analyze the clinical and histopathological correlation of salivary gland tumors.

MATERIALS AND METHODS

In this observational study, 48 cases of salivary gland neoplasms presenting to the department of pathology, Bharati Vidyapeeth deemed university medical college pune, were analysed. Cases received from January 2015 to September 2019 were studied retrospectively and cases received from October 2019 to November 2021 were studied prospectively. For retrospective evaluation, H and E slides and requisition forms and clinical details were retrieved from the Pathology department and the medical records department. For the cases presenting thereafter, specimens were collected in 10% buffered formalin. This included bioposies as well as partial and total resection specimens. The lymph nodes when submitted were also analysed. A thorough gross examination was performed. Tissues processing was done as per standard protocol. Paraffin blocks were prepared measuring 4um in thickness. Slides were prepared and stained with Hematoxylin and Eosin. The data was entered in Microsoft excel sheets and analyzed using SPSS (Statistical package for social sciences) software. The results were presented in tabular and graphical formats. The data was expressed as mean/median standard deviation values, rates, ratios and percentages. Institutional Ethical committee permission was taken prior to the commencement of the study.

RESULTS

The aim of the present was to analyse the clinicopathological profile of salivary gland tumors diagnosed at our tertiary care centre. A total of 48 patients presenting with salivary gland tumors were included (Table 1).

The mean age of the patients was 43.27±14.56 years. There were 27 (56.3%) males and 21 (43.8%) females, with male to female ratio of 1.29:1 (Table 2).

Out of 48 salivary tumors 35 (72.9%) were present in parotid gland, 7 (14.6%) in submandibular gland and in minor salivary gland among 6 (12.5%) patients. The most common site of tumor was the parotid gland (Table 3).

Table 1: Age wise distribution of the study participants

Age groups (years)	No.	Percentage
<20	2	4.2
21-40	18	37.5
41-60	24	50.0
>60	4	8.3
Total	48	100.0

Meanage: 43.27 +/-14.56 years

Table 2: Distribution of patients according to gender

Gender	No.	Percentage
Female	21	43.8
Male	27	56.3
Total	48	100.0

Table 3: Distribution of patients according to tumor site

Tumor site	No.	Percentage
Parotid gland	35	72.9
Submandibular gland	7	14.6
Minor salivary gland	6	12.5
Total	48	100.0

Table 4: Distribution of patients according to the site of the tumor against type of tumor

	Typeof tumor					
	Benign		Malignant		Total	
Tumor site	No.	Percentage	No.	Percentage	No.	Percentage
Parotid gland	25	71.4	10	28.6	35	100.0
Submandibular gland	5	71.4	2	28.6	7	100.0
Minor salivary gland	3	50.0	3	50.0	6	100.0
Total	33	68.8	15	31.3	48	100.0

Table 5: Distribution of patients according to whether tumor was benign or malignant

Benign	No.	Percentage
Pleomorphicadenoma	28	58.3
Basalcelladenoma	3	6.3
Myoepithelioma	2	4.2
Total	33	68.8
Malignant		
Aciniccellcarcinoma	1	2.1
Adenocarcinoma	1	2.1
Adenoid cystic carcinoma	2	4.2
Carcinoma ex-pleomorphic adenoma	1	2.1
Mucoepidermoid carcinoma	6	12.5
Salivary duct carcinoma	3	6.3
Secretory carcinoma	1	2.1
Total	15	31.3

Table 6: Distribution of patients according to type and site of tumor

	Site of tumor						
	Parotid gland		Submandibular gland		Minor salivary gland		
Type of tumor	No.	Percentage	No.	Percentage	No.	Percentage	Total
Benign							
Pleomorphic adenoma	21	75.0	5	17.9	2	7.1	28
Basal cell adenoma	3	100.0	0	0.0	0	0.0	3
Myoepithelioma	1	50.0	0	0.0	1	50.0	2
Malignant							
Mucoepidermoid carcinoma	5	83.3	0	0.0	1	16.7	6
Salivary duct carcinoma	1	33.3	1	33.3	1	33.3	3
Adenoid cystic carcinoma	1	50.0	1	50.0	0	0.0	2
Acinic cell carcinoma	1	100.0	0	0.0	0	0.0	1
Adenocarcinoma	0	0.0	0	0.0	1	100.0	1
Carcinoma ex-pleomorphic adenoma	1	100.0	0	0.0	0	0.0	1
Secretory carcinoma	1	100.0	0	0.0	0	0.0	1

Out of 35 patients with tumor in parotid gland, majority (25 (71.4%)) of the tumors were benign while the distribution of benign and malignant tumors at the submandibular and minor salivary glands was almost equal (Table 4).

Out of 17 malignant tumors encountered in the present study, six were Mucoepidermoid carcinoma (35.2%), five Adenoid cystic carcinoma (29.4%), one Polymorphous low- grade adenocarcinoma (5.8%), one Carcinoma ex-pleomorphic adenoma (5.8%), one Basal cell adenocarcinoma (5.8%) and three were Salivary duct carcinoma (17.6%). Mucoepidermoid carcinoma was the most commonly observed malignant tumor in the present study (Table 5).

The most common site was parotid gland with the most common benign tumor being pleomorphic adenoma (21), followed by the malignant tumor mucoepidermoid carcinoma (5) (Table 6).

About 33 cases (68.75%) cases presented as slow growing masses and were not associated with pain. About (31 (64.58%) cases. Hence the most common clinical presentation overall was that of a painless slow growing tumor. Facial nerve involvement was reported in only three cases (2 cases of salivary duct carcinoma and one of secretory carcinoma) while recurrence of swelling was seen in only one case of a pleomorphic adenoma (Table 7).

Majority of the tumors presented as solid masses (41 cases ie 85.41%) while only 7 masses presented as cystic swellings (14.58%). Lymphovascular invasion was seen in a single case of salivary duct carcinoma. Perineural invasion was seen in two cases of which one case was that of a salivary duct carcinoma and the other two were of adenoid cystic carcinoma. Regional lymph node involvement was reported in two cases of

Table 7:Distribution of tumors according to Clinical features

Feature	Total	PA	BA	Myoepi	Ca-ex	Mec	Sdc	Sc	Ad	Adc	ACC
Slow growing	33	20	3	2	0	5	0	0	0	2	1
Rapidly growing	12	5	0	0	1	1	3	1	1	0	0
Recently rapidly growing	03	3	0	0	0	0	0	0	0	0	0
Pain	17	06	00	00	01	04	03	01	00	02	00
Painless	31	22	03	02	00	02	00	00	01	00	01
Facial nerve involve-ment	03	0	0	0	0	0	2	1	0	0	0
Recurre-nce	01	1	0	0	0	0	0	0	0	0	0

PA: Pleomorphic adenoma, BA: Basal cell adenoma, Myoepi: Myoepithelial carcinoma, Ca-ex: Carcinoma ex-pleomorphic adenoma, Mec: Mucoepidermoid carcinoma, SDC: Salivary duct carcinoma, Ad: Adenocarcinoma, Adc: Adenoid cystic carcinoma and ACC: Acinic cell carcinoma

Table 8:Pathological features

Feature	Total	PA	BA	Myo	Ca-ex	MEC	SDC	SC	Ad	AdCC	ACC
CysticMass	07	2	0	0	0	3	1	1	0	0	0
LVI	01	0	0	0	0	0	1	0	0	0	0
PNI	03	0	0	0	0	0	0	1	0	2	0
Metastasis	0	0	0	0	0	0	0	0	0	0	0
Regional lymph node status	02	0	0	0	0	2	0	0	0	0	0
Adherence to surrounding structures	01	0	0	0	1	0	0	0	0	0	0

PA: Pleomorphic adenoma, BA: Basal cell adenoma, Myoepi: Myoepithelial carcinoma, Ca-ex: Carcinoma ex-pleomorphic adenoma, Mec: Mucoepidermoid carcinoma, SDC: Salivary duct carcinoma, Ad: Adenocarcinoma, Adcs: Adenoid cystic carcinoma, ACC: Acinic cell carcinoma, LVI: lymphovascular invasion and PNI: Perineural invasion

mucoepidermoid carcinoma. Adherence of tumor to surrounding structures was reported in one case (Carcinoma ex-pleomorphic adenoma) (Table 8).

DISCUSSION

Salivary gland tumors are a rare phenomenon. This heterogeneous group of pathologies encompasses approximately 3-5% of head and neck carcinomas and only 0.5% of all malignant tumors match these types[13]. There are three major salivary glands, namely parotid, submandibular and sublingual along with numerous minor salivary glands scattered throughout the oral cavity mucosa. These tumors show diverse morphological variation between different entities and sometimes even within an individual tumor mass[14].

A total of 48 patients with salivary gland tumors were included, the mean age of the patients was 43.27±14.56 years, with almost equal gender distribution, as there were slightly more males than females with a male to female ratio of 1.29:1. Half of the patients belonged to age group of 41-60 years, followed by 21-40 years, >60 years and ≤20 years. Similar results to that of present study were found by Shrestha *et al*.[15] who found that males were more affected by both benign and malignant tumors, with a age range of 12-75 years and a mean age of 44.76 years. Bobati *et al*.[14] also reported similar results[13] Kumar *et al*.[16] reported similar results regarding age with most patients belonging to 41-50 age group, however in their study SGTs were more common in females except Warthin tumour which has an equal incidence in males. In contrast to the present study, Ghartimagar *et al*.[17] in their study reported a female predominance with a male to female ratio of 1:1.36[17]. Sando *et al*.[18] found 56% females and 44% males with SGTs in their study[18].

In the present study, the most common presentation overall was that of a slow growing painless mass. Facial nerve involvement was seen in a total of 3 cases, of which 1 case was that of secretory carcinoma and the other two were reported as salivary duct carcinoma. Recurrence was seen in a single case of pleomorphic adenoma. In the present study majority of the tumors presented as solid masses.

Similar findings were also reported by Saldanha *et al*.[19]. It was reported that 74% of the cases presented as slow growing masses. Only 18% cases were associated with pain. Similar to this study, it was also reported that only 2% of the cases presented as cystic masses while the rest were reported to be solid masses. They did not report adherence to surrounding structures, facial nerve involvement or metastasis in any of the tumors studied by them. They also reported recurrence of the tumor in a single case of pleomorphic adenoma similar to the present study.

Pleomorphic adenoma, also called benign mixed tumour, can occur in the deep lobe of the parotid gland and can extend into the parapharyngeal space, which makes it the commonest type of parapharyngeal space tumour constituting 40% of tumours. Pleomorphic adenomas need to be managed diligently due to their tendency to recur and also undergo malignant transformation.

In the present study, out of 48 salivary gland tumors majority were reported in parotid gland, followed by submandibular and minor salivary gland among. Also 68.8% SGTs were benign and 31.3% were malignant. Pleomorphic adenoma was the most commonly occurring benign neoplasm while the most commonly occurring malignant tumor was Mucoepidermoid carcinoma.

Similar reports were presented by Vasconcelos *et al*.[20] Among the 109 cases of SGTs, 74.3% were located in major salivary glands, of which 66.9% in parotid gland and 7.3% in submandibular gland and 25.7% were in minor salivary glands. They reported the most common benign tumor to be

pleomorphic adenoma and the most common malignant tumor as adenoid cystic carcinoma in their study.

Comparable results to the present study were reported by Kumar *et al*.[16]. They reported the parotid gland to be the most common site of incidence of the benign entity pleomorphic adenoma as well as the malignant tumor mucoepidermoid carcinoma.

In a study conducted by Bobati *et al*.[14] it was reported that the benign tumors were noted in 69.16% cases whereas malignant tumors were seen 22.39% cases amongst tumors occurring at the parotid gland. Among all the benign tumors the commonest tumor was pleomorphic adenoma while adenoid cystic carcinoma was the mostprevalent malignant tumor.

A 3 fold higher incidence of benign tumors was reported by Ghartimagar *et al*.[17] than malignant and Pleomorphic adenoma was reported to be most common like in the present study. Pleomorphic adenoma is the commonest salivary gland tumor in both children and adults, accounting for most of the salivary gland neoplasms. This tumor occurs across all ages but is most common in the third to sixth decades of life. The average age of presentation is approximately 45 years with a female-to-male ratio of 2:1.

The most common tumor was reported to be pleomorphic adenoma among benign as well as overall tumors by Sando *et al*.[18], while the cystic adenoid carcinoma was the most frequent malignant tumor, followed by the mucoepidermoid carcinoma and adenocarcinoma.

Hence the findings of our study corroborated with the results of other similar studies.

CONCLUSION

It can be concluded from the present study that salivary gland tumors exhibit a spectrum of histological patterns and hence histopathological examination remains the most important method in evaluation of these tumors due to the profound impact diagnostic accuracy has on further patient management and prognosis.

ACKNOWLEDGMENTS

We thank our colleagues and the Department of Pathology, Bharati Vidyapeeth Deemed University Medical College Pune and Bharati Hospital and Research Centre Pune for all the valuable resources and support that have contributed to the success of this study.

REFERENCES

1. Carpenter, G.H., 2013. The secretion, components and properties of saliva. Annual Rev. Food Sci. Technol., 4: 267-276.
2. Feller, L., M. Altini, R.A.G. Khammissa, R. Chandran, M. Bouckaert and J. Lemmer, 2013. Oral mucosal immunity. Oral Surg., Oral Med., Oral Pathol. Oral Radiol., 116: 576-583.
3. Mengi, E., 2020. Salivary gland tumors: A 15-year experience of a universıty hospital in Turkey. Northern Clin. Istanbul, 116: 366-371.
4. Horn-Ross, P.L., B.M. Ljung and M. Morrow, 1997. Environmental factors and the risk of salivary gland cancer. Epidemiology, 8: 414-419.
5. Dong, C. and K. Hemminki, 2001. Second primary neoplasms among 53 159 haemato lymphoproliferative malignancy patients in Sweden, 1958-1996: A search for common mechanisms. Br. J. Cancer, 85: 997-1005.
6. Sun, E.C., R. Curtis, M. Melbye and J.J. Goedert, 1999. Salivary gland cancer in the United States. Cancer Epidemiol. Biomarkers Prev., 8: 1095-1100.
7. Valstar, M.H., M. de Ridder, E.C.V. Broek, M.M. Stuiver and B.A.C. van Dijk *et al*., 2017. Salivary gland pleomorphic adenoma in the Netherlands: A nationwide observational study of primary tumor incidence, malignant transformation, recurrence and risk factors for recurrence. Elsevier BV, Oral Oncol., 66: 93-99.
8. Speight, P. and A. Barrett, 2002. Salivary gland tumours. Oral Dis., 8: 229-240.
9. El-Naggar, A.K., J.K.C. Chan, T. Takata, J.R. Grandis and P.J. Slootweg, 2017. The fourth edition of the head and neck world health organization blue book: Editors' perspectives. Hum. Pathol., 66: 10-12.
10. Eng, C.Y., A.S. Evans, M.S. Quraishi and P.A. Harkness, 2006. A comparison of the incidence of facial palsy following parotidectomy performed by ENT and non-ENT surgeons. J. Laryngology Otology, 121: 40-43.
11. Guntinas-Lichius, O., B. Gabriel and J.P. Klussmann, 2006. Risk of facial palsy and severe frey's syndrome after conservative parotidectomy for benign disease: Analysis of 610 operations. Acta Oto-Laryngologica, 126: 1104-1109.
12. Wang, Y.L., D.S. Li, H.L. Gan, Z.W. Lu and H. Li *et al*., 2012. Predictive index for lymph node management of major salivary gland cancer. Laryngoscope, 122: 1497-1506.
13. Galdirs, T.M., M. Kappler, W. Reich and A.W. Eckert, 2019. Current aspects of salivary gland tumors: A systematic review of the literature. DGPW, Vol. 8.

14. Bobati, S., B. Patil and V. Dombale, 2017. Histopathological study of salivary gland tumors. J. Oral Maxillofacial Pathol., 21: 46-50.
15. Shrestha, S., G. Pandey, C. Pun, R. Bhatta and R. Shahi, 2014. Histopathological pattern of salivary gland tumors. J. Pathol. Nepal, 4: 520-524.
16. Kumar, A.A., H.B. Rakshitha, N.K. Alva and S.R. Reginald, 2019. Histopathological spectrum of salivary gland neoplasms in a tertiary care center. Int. J. Clin. Diagn Pathol., 2: 243-246.
17. Ghartimagar, D., A. Ghosh, M.K. Shrestha, S. Thapa and O.P. Talwar, 2020. Histopathologic profile of salivary gland tumors among specimens from a tertiary care hospital: A descriptive cross-sectional study. J. Nepal Med. Assoc., 58: 729-735.
18. Sando, Z., J.V. Fogha, A.O. Mebada, F. Djomou, A. NDjolo and J.L. Essame, 2016. Epidemiological and histopathological patterns of salivary gland tumors in Cameroon. Pan Afr. Med. J., Vol. 23. 10.11604/pamj.2016.23.66.5105.w.
19. Saldanha, C., P. Yaranal and K. Upadhyaya, 2018. A clinicopathological study of salivary gland tumors. Trop. J. Pathol. Microbiol., 4: 532-538.
20. Vasconcelos, A.C., F. Nör, l. Meurer, G. Salvadori, I.B. De Souza, P.A. Vargas and M.D. Martins, 2016. Clinicopathological analysis of salivary gland tumors over a 15-year period. Braz. Oral Res., Vol. 30. 10.1590/1807-3107bor-2016.vol30.0002.