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ORIGINAL ARTICLE

Salivary Gland Lesions: A Clinico-Pathological Correlation

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Abstract
To study the usefulness of clinical features, histopathological and radiological features in diagnosis and management of salivary gland lesions. Prospective study conducted at the department of ENT of a tertiary care centre in central India. A total of 162 patients who were treated over a period of 2 years for salivary gland lesions were studied with regards to correlation between clinical diagnosis, cytological examination and radiological features with histopathological diagnosis. Mean age group was 23.94 (±15.43) years. There was slight male preponderance. Commonest presenting complaint was swelling. The most common gland involved was minor salivary glands followed by parotid gland. Sensitivity of clinical diagnosis, USG and FNAC for neoplastic lesions was found to be 80%, 95.65% and 79.61% respectively. Specificity of clinical diagnosis, USG and FNAC for neoplastic lesions was found to be 100%, 100% and 97.23% respectively. At the end of the study we concluded that combination of thorough clinical examination, radiological and cytological examination help in proper diagnosis, but it should always be confirmed on histopathology because some surprises are expected with regards to the nature of salivary gland lesions.

Keywords Salivary gland · Histopathology · Cytology · Ultrasonography · Clinico-pathological Correlation

Introduction

Salivary gland lesions had remained a matter of interest between medical professionals, oral surgeons, Pathologists and ENT specialists in particular due to number of peculiarities like diverse histological forms and unpredictable clinical behaviour. At first sight, the salivary glands seem to be relatively simple organs, yet the neoplasms that arise from them display a rich variety of microscopic appearances. Salivary glands, both major and minor, are susceptible to a wide variety of pathological conditions, including neoplastic and non-neoplastic, and there may be considerable overlap between them. Salivary gland tumours account for about 3% of all head and neck neoplasms, most being of epithelial origin [1]. About 90% of these neoplasms are located in the major salivary glands, the other 10% in the minor salivary glands [2, 3]. Imaging of the salivary gland can be done by using many different modalities. Ultrasonography is widely accepted as the first imaging method for assessment of soft tissue diseases of head and neck including salivary glands and lymph nodes. Likewise no imaging modality is perfect for diagnosing the salivary gland lesions. An irregular margin is the strongest indicator of malignancy but a smooth margin does not necessarily indicate that the lesion is benign. The radiologist must know the strength and weakness of different modalities and apply the various studies appropriately. FNAC is being increasingly used for evaluation of salivary gland swellings due to their superficial location and ease of access. FNAC helps in arriving at a rapid diagnosis but unlike histopathological examination, the whole tissue is not available for microscopic examination.

Proper management of these lesions requires accurate clinical assessment by clinician facilitated by pathological and radiological findings. Therefore before coming to final diagnosis in any salivary gland lesion, it is important to clinically correlate clinical diagnosis, radiological and cytological examination. Thus in this study, we attempt to evaluate the usefulness of clinical features, cytological and radiological features in diagnosis and management of salivary gland lesions and compare with the histopathological diagnosis wherever possible.

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Aims and Objectives

1. To study the demographic data, clinical and radiological characteristics of various salivary gland lesions.
2. To study and compare the preoperative cytology report with post-operative histopathology report wherever applicable.
3. To assess the usefulness of clinical features, histopathological and radiological features in diagnosis and management of salivary gland lesions.

Materials and Methodology

It was a Prospective study conducted from August 2017 to October 2019 in the Department of ENT at Indira Gandhi Government Medical College and Hospital Nagpur; a Tertiary Care Centre in Central India after obtaining permission from the institutional ethics committee. It was done in collaboration with department of Pathology and Radiology. 162 cases were included in the study and there was no age limitation for the study subjects. All patients of either sex who presented to ENT OPD with complaints of swelling in the head and neck region, confirmed to be of salivary gland origin on investigations and who underwent treatment either medical or surgical were included in the study. While those patients with non-salivary gland head & neck lesions, deep neck space infections and patients who did not give consent for enrolling in the study were excluded.

Detailed history regarding swelling over head and neck region, its onset, duration, progression, previous surgical treatment or significant medical history was asked. The associated symptoms like pain, difficulty in swallowing, increased or decreased salivation, facial asymmetry etc. were also enquired. Physical examination was carried out in all patients. Importance was given to the site, number, extent, surface, border, consistency and mobility of the lesion along with deep lobe enlargement, fixity to the surrounding structures, nerve involvement and regional lymphadenopathy. As per the need, radiological and cytological investigations were advised. USG and FNAC was done for all patients except patients with mucocoele or mucus retention cysts as it was very obvious. After a through clinical examination and specific investigations like USG and FNAC, plan of treatment was formulated. Those patients requiring surgical management were subjected to surgical procedure with prior written and informed consent and other patients treated conservatively with medical management.

All the data was collected in a specifically designed Case Record Proforma and statistical parameters were applied to study the correlation between clinical prediagnosis and the definitive diagnosis (histopathological report) as well as USG and FNAC results with the final HPR. Considering histopathology as a gold standard, sensitivity and specificity of clinical diagnosis, USG findings and pre-operative cytology (FNAC) was calculated.

Table 1 Correlation of clinical diagnosis with histopathological diagnosis (n = 97)

Histopathological diagnosis	No of cases	Clinical diagnosis			
		Consistent		Inconsistent	
		No of cases	%	No of cases	%
Non neoplastic	72	72	74.22	0	0
Benign neoplasm	20	20	20.61	0	0
Malignant neoplasm	05	00	00	5	5.15
Total	**97**	**92**	**94.83**	**5**	**5.15**

Results

A total of 162 patients were studied in the current study. The mean age of the study subjects was 23.94 years with standard deviation of 15.43 years. Youngest patient being 1year old and oldest patient 71 years old. The study population comprised of 86 males (53.09%) and 76 females (46.91%). Male: female ratio was 1.13:1 showing slight male preponderance. Commonest presenting complaint was swelling. In majority of the patients, duration of swelling prior to seeking medical advice was between less than one month to 6 months which mainly includes inflammatory (non-neoplastic) and benign neoplastic lesions. The most common gland involved was minor salivary glands (38.89%) followed by parotid gland (34.57%).

On clinical examination, patients were diagnosed to have either non neoplastic (inflammatory) or benign neoplastic or malignant neoplastic lesions depending on history or various clinical findings. Patients with sudden onset of salivary gland swelling associated with pain, fever and local rise of temperature were categorised as inflammatory. Lesions with slow growing pattern and less associated with signs and symptoms were included in benign neoplastic lesions. However rapidly growing lesions with hard swelling and associated with skin, nerve or lymph node involvement were included in malignant neoplastic lesions. Applying this criterion, clinically 84.56% lesions were non neoplastic, 15.43% were benign neoplastic and none of the lesion was clinically diagnosed as malignant. When correlated with histopathology, 94.83% patients were correctly diagnosed. Sensitivity of clinical diagnosis for neoplastic lesions was found to be 80% and specificity was 100% (Table 1).

Ultrasonography is helpful in diagnosing the non-neoplastic, benign and malignant lesions. However the features for non-neoplastic, benign neoplastic and malignant

Table 2 Correlation of USG with histopathological diagnosis (n = 34)

Histopathological diagnosis	No of cases	Radiological diagnosis			
		Consistent		Inconsistent	
		No of cases	%	No of cases	%
Non neoplastic	11	11	32.35	00	0
Benign neoplasm	18	18	52.94	00	0
Malignant neoplasm	05	04	11.76	01	2.94
Total	**34**	**33**	**97.05**	**01**	**2.94**

Table 3 Correlation of cytological diagnosis with histopathological diagnosis (n = 96)

Histopathological diagnosis	No of cases	Cytological diagnosis			
		Consistent		Inconsistent	
		No of cases	%	No of cases	%
Non neoplastic	72	70	72.92	2	2.08
Benign neoplasm	19	16	16.67	3	3.13
Malignant neoplasm	05	03	3.13	2	2.08
Total	**96**	**89**	**92.72**	**7**	**7.29**

neoplastic lesions may overlap on USG. 97.05% patients were correctly diagnosed on USG when correlated with histopathological examination. USG has a sensitivity of 95.65% and specificity of 100% for neoplastic lesions in present study (Table 2).

On FNAC, majority of the lesions were non-neoplastic i.e. mucocoele (62.44%) followed by benign neoplastic (19.39%) with pleomorphic adenoma being the largest group. One case proved to be mucoepidermoid carcinoma of parotid gland, which was diagnosed as pleomorphic adenoma on cytology. Another one proved to be adenocystoid carcinoma of submandibular gland, which was diagnosed as basal cell adenoma on cytology. One case which was suspected for epithelial malignancy on FNAC, later diagnosed as chronic sialoadenitis of submandibular gland on histopathological examination. FNAC had correctly diagnosed 92.72% cases when correlated with histopathological examination. Sensitivity of FNAC for neoplastic lesions was found to be 79.61% and specificity was 97.23% (Table 3). Overall most common lesion found was inflammatory - acute sialoadenitis (40.12%) whereas mucocoele (37.65%) of minor salivary gland was the most common non neoplastic lesion reported on histopathological examination. It occurred most frequently on the lower lip. Amongst the inflammatory lesions, acute sialoadenitis (40.12%) was observed more commonly than the chronic sialoadenitis with sialolithiasis (6.80%). Parotid gland (22.84%) was more frequently involved in acute sialoadenitis followed by submandibular gland (14.20%). However, chronic sialoadenitis with sialolithiasis was seen more commonly in submandibular gland (5.56%). Pleomorphic adenoma was the most common benign neoplasm, most commonly seen in parotid gland (6.79%) followed by submandibular gland (3.09%). Unusual sites of occurrence of pleomorphic adenoma were seen in minor salivary glands of nasal cavity and oropharynx. On the other hand, Warthin's tumour involved parotid gland exclusively. Malignant tumours were seen more frequently in parotid gland (2.47%) than submandibular gland (0.61%). Minor salivary gland malignancy was not reported in present study.

Extent of surgery depends upon the nature of the lesion and stage at the time of surgery. Excision of the mucocoele of minor salivary gland lesion (62.89%) was the most commonly performed surgery followed by superficial parotidectomy (16.49%). Majority of the patients (87.62%) had uneventful postoperative period. Temporary facial weakness (7.21%) was the most common complication of the surgery, but resolved completely after 4–6 weeks of follow up.

Discussion

Salivary gland seems to be a simple organ, but relative infrequency of salivary gland lesions makes their diagnosis and management quite confusing and intricate. Thus study of salivary gland lesions is an interesting topic yet difficult to understand. It requires active participation and coordination of various medical fields (radiologist, pathologist and ENT surgeon) for correct diagnosis that will benefit the patient and the clinician to the maximum and avoid unnecessary operative procedures and complications during the course of procedure.

On the basis of history and detailed clinical examination, clinical diagnosis was made and lesions were segregated as non-neoplastic, benign neoplastic and malignant neoplastic. Factors like age, sex and any relevant history were also considered in making clinical diagnosis. Amongst 162 patients, 137 patients were suspected to have non neoplastic lesions, 25 patients as benign neoplastic lesion and none of the patient was suspected to be malignant clinically. Correlation between clinical diagnosis and histopathological diagnosis was done for 97 patients. Out of 72 cases diagnosed to be non-neoplastic on clinical diagnosis, all 72 were confirmed on histopathology. Out of 25 cases clinically diagnosed as benign neoplastic, 20 were confirmed on histopathology as benign neoplastic while 5 cases were confirmed as malignant neoplastic with histopathology. To summarize, 94.83% cases were correctly diagnosed clinically when compared with histopathological examination. The Sensitivity of clinical diagnosis for neoplastic lesions was found to be 80% and specificity was 100%.

It should be noted that clinical diagnosis is an amalgamation of the clinician's experience and a general qualitative analysis of all the clinical parameters. These parameters are subject to the observer's judgement and are liable to be

inconsistent, prone for observer bias. In addition to this, salivary gland lesions can be deceptive in initial stages. Features suggestive of malignancy usually become apparent when there is extra glandular spread of the lesion. In our study, all the lesions were in initial stages with no extra glandular involvement, so none of the lesions was clinically suspected for malignancy. It should be kept in mind that, early malignancy in salivary gland can be missed clinically; so detailed histopathological examination is mandatory in cases of salivary gland tumours. Pre-operative diagnosis remains a challenge for clinical otolaryngologists and head and neck surgeons when salivary gland lesions are concerned. In a study by Wei-han lee et al. [4] clinical diagnosis was compared with the final pathological diagnosis to know the clinical diagnostic accuracy. They concluded that, final clinical judgment made by the clinician to distinguish between benign and malignancy was unreliable in submandibular tumors, with an accuracy of only 67%. The only reliable judgment made by the clinician in this study was associated with benign parotid tumors. This was comparable to our study.

Based on ultrasonographic features like size, echogenicity, echo texture, vascularity and margins of the lesion, presence of dilated duct, calcific foci and calculus etc., radiologist reported 76 lesions (76.76%) as inflammatory. 19 lesions (19.19%) as benign neoplastic and 4 lesion (4.04%) as malignant neoplastic lesions. All the benign neoplastic and chronic inflammatory lesions were correctly diagnosed on ultrasonography but out of 5 histopathologically proven malignancies, only 4 were detected as malignant on ultrasonography. Ultrasonographic features like – Focal oval to rounded lesions with lobulated or ill-defined margins, predominantly hypo echoic or anechoic cystic necrotic changes with or without calcification and moderate to raised vascularity, helped to differentiate the malignant lesions. However malignant tumours may also be homogeneous and well defined making the sonological diagnosis tricky. The internal structure of a malignant tumour at USG may be solid, cystic or cystic with a mural solid nodule. Malignant tumours may have a lobulated shape, similar to that of pleomorphic adenomas [5, 6]. Vascularization of malignant tumours is not pathognomonic [6, 7]. Schick et al. reported that high vascularization and high systolic peak flow velocity should raise the suspicion of malignancy. On the other hand, Bradley et al. [8] concluded that tumours demonstrating an increased intra-tumoral vascular resistance index have an increased risk of malignancy. The presence of metastatic-appearing lymph nodes accompanying a tumour in the salivary gland strongly suggests a malignancy [8].An important problem in USG is caused by small malignant neoplasms and metastases, less than 20 mm in diameter, and well-differentiated malignant neoplasms because they may demonstrate benign features: clear, even margins and homogeneous structure [7, 8]. On radio- histopathological correlation, 97.05% cases were correctly diagnosed. The sensitivity of ultrasonography for differentiating neoplastic lesions was found to be 95.65% and specificity was 100% (Table no 2).

In our study, 98 cases underwent cytological examination. Amongst 98 cases, majority of the cases; 61(62.44%) were non-neoplastic i.e. mucocoele. 19 (19.39%) were reported as benign lesion followed by 7 cases (7.14%) of chronic inflammatory lesion. 3 cases (3.06%) were reported as malignant on cytology, while 1 (1.02%) was reported as suspicious of malignancy. 2 cases (2.04%) were reported as acute inflammatory lesions. 5 out of 98 cases (5.10%) had inconclusive report on cytological examination due to no cellularity. Correlation was done between the cytological and histopathological diagnosis and evaluation of FNAC was done for its ability to differentiate between benign neoplasms and malignant neoplasms. In our study, FNAC had correctly diagnosed 92.72% cases when correlated with histopathological examination. Sensitivity of FNAC for neoplastic lesions was found to be 79.61% and specificity was 97.23% (Table no 3).

When we compared our findings with other similar studies (Tab. No. 4), we found that our sensitivity was less compared to other studies. This may be due to the fact that ours being a teaching institute with limited resources, there may be a wide variation in the expertise of the pathologist performing and/or reporting the aspiration cytology and more use of guided FNAC which is not always possible in our institute. Moreover, FNAC is usually performed from a representative area of the lesion/ representative node whereas histopathology evaluates the entire specimen.

Table 4 Comparison of sensitivity and specificity of FNAC with other similar studies

Series	Sensitivity	Specificity
Frable and Frable[9]	93.3%	99%
Boccato et al. [10]	98%	98%
Das et al. [11]	94.6%	75%
Stow et al. [12]	86%	96%
Present study	79.61%	97.23%

Conclusion

Salivary gland lesions are relatively infrequent and thus a fairly accurate clinical diagnosis by clinician assisted by radiological investigations and cytological examination helps in assisting with speedy and effective management of the underlying pathology. It is important to distinguish between non neoplastic, benign neoplastic and malignant neoplastic lesions at the earliest as it may radically alter the

prognosis and management protocol for the patient. Non neoplastic lesions of the salivary gland are more common than neoplastic diseases and their spectrum is wide. Present study also reconfirms that benign neoplastic lesions are more common as compared to malignant neoplastic lesions.

In our study, non-neoplastic lesions were more commonly seen than neoplastic lesions. Acute sialoadenitis involving parotid gland was the overall most common lesion. Mucocoele of minor salivary glands was the commonest lesion on histopathological examination. Among the neoplastic lesion benign tumours were more common than malignant tumours. Pleomorphic adenoma was the commonest benign tumour seen. Malignant tumours were more commonly seen in parotid than submandibular gland. Minor salivary gland malignancy was not reported.

It can be concluded that the combination of thorough clinical examination, radiological and cytological examination which should always be confirmed on histopathology because some surprises are expected with regards to the nature of salivary gland lesion. ENT surgeons, radiologist and pathologist as a team can diagnose and treat salivary gland lesion in a proper and definitive manner.

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Declarations

Conflict of Interest None of the authors have conflict of interest.

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