

# Sonographic Evaluation of Salivary Gland Tumors – A Hospital Based Study

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## Abstract

**Background:** As stated anatomically there are three paired major Salivary glands, the Parotid, Submandibular and Sublingual. Including other diseases salivary glands are also prone for neoplastic involvement though rarely. As a rule smaller the gland the chances of malignancy are more there. Salivary gland tumors mostly emerge in Parotid gland. After clinical evaluation, ultrasound is the most preferred imaging modality to differentiate benign from malignant conditions. The aim of this study is to find out the incidence of salivary gland tumors among various neck pathologies and the most preferred radio-imaging modality to differentiate between benign and neoplastic salivary gland tumors.

**Methods:** This study was carried out in hospital of Teerthankar Mahaveer Medical College & Research Centre, Moradabad, in which all group of patients were included, following total research protocol as admissible in the research and ethical division of the institute. Ultrasound with frequency of 7–12 MHz, was employed for the study.

**Result:** Out of 40 patients with lumps in the neck 4 patients (10%) were found to have salivary gland tumors in the neck, out of which 5% were malignant and 5% were benign in nature as demonstrated by ultrasonography.

**Conclusion:** Ultrasonography is the most preferred choice of investigation for salivary gland tumors identification, though MRI is the most preferred modality for staging of malignancies of salivary gland tumors.

**Keywords:** Salivary glands, Ultrasonography & Malignancy

## INTRODUCTION

There are three pairs of salivary glands, namely Parotid, Submandibular and Sublingual. Parotid gland is located in the retro-mandibular fossa, Submandibular under the body of the mandible, & the Sublingual in the sublingual space lying lateral to the genioglossus muscle.

Salivary gland tumors are predominantly benign (80%). About 70% of the tumors are located in the parotid gland, 10% in the submandibular gland, and the remainder in the sublingual salivary glands. The size of the salivary gland is inversely proportional to the tumor detected being malignant.<sup>1</sup>

On histological basis, some benign and malignant salivary gland tumors share overlapping cytological features.<sup>2-4</sup>

Identifying the nature of swelling benign or malignant is next to impossible clinically and to rule out any confusion various

imaging modalities are available like Sialography, Computerized Tomography, MRI and Ultrasound. Ultrasound is the first imaging modality of choice for the salivary gland swellings. The advantage of Ultrasound in salivary gland enlargements is that it is comparatively easy to use, non ionizing, & less expensive. In the present study, sonography based differentiation of benign and malignant salivary gland lesions is done.

Although benign and malignant salivary gland tumors often have a similar sonographic appearance, several sonographic features, including a heterogeneous echotexture, indistinct margins, regional lymph node enlargement, and absence of distal acoustic enhancement, have been reported to be more frequently associated with malignancy.<sup>5</sup>

## MATERIAL & METHODS

This study is being carried out in the department of Radio-diagnosis Teerthankar Mahaveer Medical College & its associated

hospital. Forty patients were evaluated for neck swelling in the neck out of which four patients were identified as having salivary gland swelling. A routine protocol was maintained while evaluating the salivary gland lesions, which included informed consent (in patients under 18 yrs of age consent was taken from guardians), presence of female attendant in case of examination of female subject, Institutional research and ethical committee approval was taken before hand.

Patients were subjected to routine laboratory investigations and then taken for Ultrasound examination with the help of Ultrasound system present in the department.

The ultrasound scanner was placed on the skin immediately below the mandible, allowing the visualization of the salivary glands.

Out of forty patients in all 22 patients were male and 18 females. Age group between 21-30 yrs was found to be most susceptible for neck swellings. Ultrasound was performed using linear-array broadband transducer with a frequency of 7-12 MHz.

Bilateral examination of salivary glands was done as it is must do protocol.

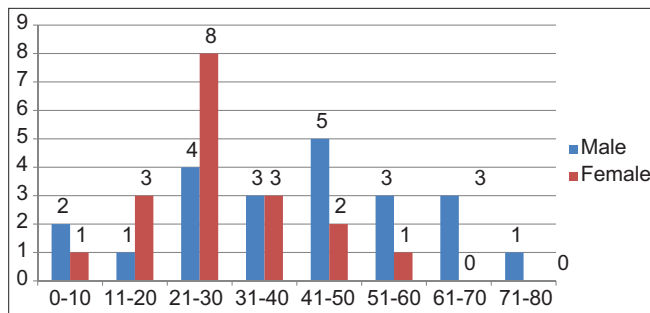
**Sampling Method**

Convenience sampling technique was used in this study.

Age and Sex distribution of patients with Neck Masses (Table 1 and Figure 1)

**Table 1: Age and Sex distribution of patients with neck masses**

Age group (In years)	Male	Female	Total
0-10	2	1	3
11-20	1	3	4
21-30	4	8	12
31-40	3	3	6
41-50	5	2	7
51-60	3	1	4
61-70	3	-	3
71-80	1	-	1
Total	22	18	40

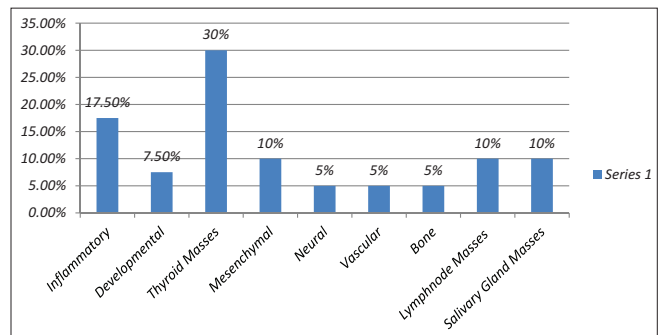


**Figure 1: Age and sex distribution of patients with neck masses**

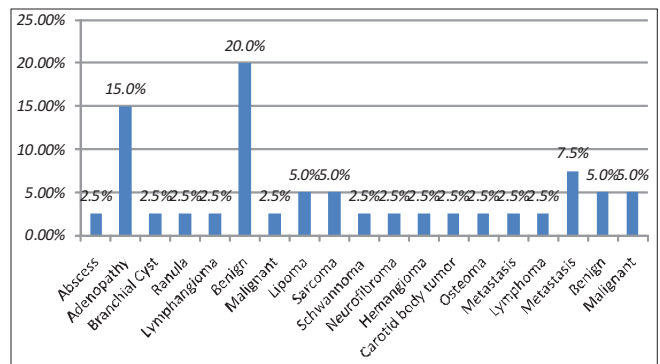
**RESULTS**

**Table 2: Distribution of neck Masses according to the nature of the lesion**

Nature of the lesion	No. of cases	Percentage of total cases
Inflammatory		17.5%
Abscess	1	2.5%
Adenopathy	6	15%
Developmental		7.5%
Branchial Cyst	1	2.5%
Ranula	1	2.5%
Lymphangioma	1	2.5%
Thyroid Masses		30%
Benign	8	20%
Malignant	4	10%
Mesenchymal		10%
Lipoma	2	5%
Sarcoma	2	5%
Neural		5%
Schwannoma	1	2.5%
Neurofibroma	1	2.5%
Vascular		5%
Hemangioma	1	2.5%
Carotid body tumor	1	2.5%
Bone		5%
Osteoma	1	2.5%
Metastasis	1	2.5%
Lymphnode Masses (non inflammatory)		10%
Lymphoma	1	2.5%
Metastasis	3	7.5%
Salivary Gland Masses		10%
Benign	2	5%
Malignant	2	5%
Total	40	100%



**Figure 2: Distribution of various neck pathologies**



**Figure 3: Showing occurrence of salivary gland tumors in range of 10%**

## SALIVARY GLAND LESIONS

Four cases (10%) of neck masses in the present study were of salivary gland origin. Two of these were benign (50%) and two (50%) malignant.

### Benign Lesions of Salivary Glands

Benign lesions consisted of a pleomorphic adenoma and a Warthin's tumor.

The Pleomorphic adenoma appeared as a well defined hypoechoic lesion in the right parotid gland.

### Ultrasonographic Findings Obtained are as under (Figure 4)

- Size Approximately 28.1 Mm.
- Limits Were Well Defined
- Contour Was Lobulated
- Internal Structure Was Homogenous
- Calcification Was Almost Absent
- Acoustic Enhancement Seen.

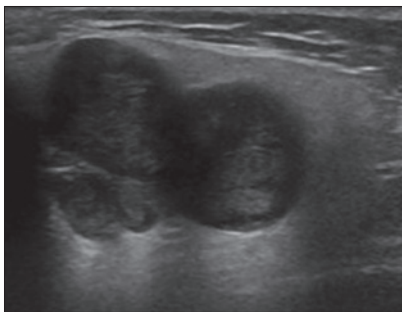


Figure 4: Hypoechoic lesion in the right parotid gland

### Ultrasonographic Findings of Warthin's Tumor (Figure 5)

- Size Approximately 28.9 Mm. And Located In Parotid Gland
- Limits Were Well Defined
- Contour Was Non-Lobulated
- Internal Structure Was Mostly Heterogenous
- Calcification Was Almost Absent
- Acoustic Enhancement Seen

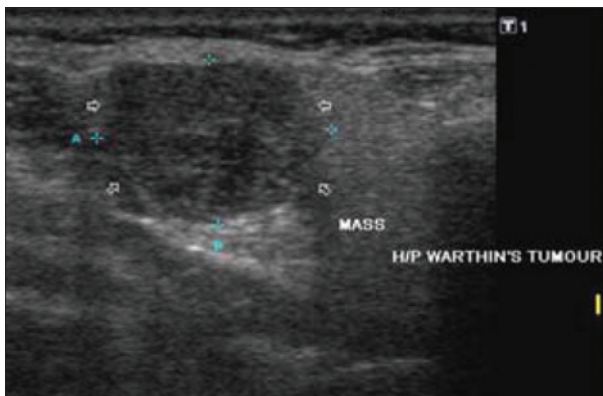


Figure 5: H/P Warthin tumor

One was present in parotid gland and other was in sublingual gland.

### Sonographic Findings of Malignant Lesion of Parotid Gland

- Heterogeneous Hypoechoic Ovoid Mass
- Punctate Calcifications
- Well-Defined Margin
- Posterior Echogenicity
- Enhancement and Distinct Edge Refraction.



Figure 6: Heterogeneous hypoechoic ovoid mass

### Adenoid Cystic Carcinoma of Salivary Gland – Sublingual Gland

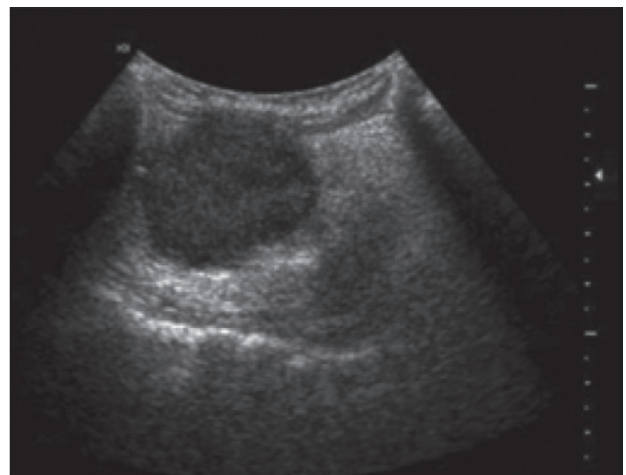


Figure 7: Hypoechoic mass of sublingual gland

## DISCUSSION

Salivary gland tumors are not very common<sup>6</sup> and more so over neoplastic (malignant) lesions are seen in 5–10% of cases.<sup>7</sup>

It will be good for patients if these tumors are diagnosed pre-operatively without going into surgical intervention.

Therefore, many clinical researchers have tried to evaluate the ability of sonography to differentiate benign and malignant tumors.

Sonography is a powerful tool for characterizing salivary gland tumors. Different imaging techniques are valuable in assessing salivary gland disease, out of which the choice of modality depends on local protocol, clinical features and, importantly, the site of suspected pathology. Technical advances, in many imaging centers have made ultrasound nowadays the investigation of choice for major salivary gland disease. It allows a quick, cheap and thorough assessment without the use of ionizing radiation. Ultrasound is able to simultaneously evaluate gland parenchyma and large ducts as well as demonstrate duct dilatation.

Tumors of the salivary glands are not common, representing about 3% of all head and neck tumors. Histopathology of salivary gland tumors is very varied, with a large number of both benign and malignant tumors. Out of this Pleomorphic adenomas are the most common, representing 70-80% of all salivary gland tumors<sup>1</sup> most frequently located in the parotid gland. Cytological examination often faces difficulty in differentiating adenoid cystic carcinoma from Pleomorphic adenoma.<sup>7,8</sup> It is seen histopathologically both lesions contain myxoid material.<sup>9-11</sup> A number of ultrasonographic features are considered typical for pleomorphic adenomas: sharp borders, lobulations of the contour, homogeneous structure, poor vascularization, acoustic enhancement.<sup>12,13</sup> which well correlates with the ultrasonographic pictures of our present study.

Warthin's tumour is the second common salivary neoplasm, typically occurring in older male patients, with a propensity for smokers. It arises from parotid intraglandular lymphoid tissue, typically in the tail, and is multiple or bilateral in approximately 15% cases.

Ultrasound shows an ovoid hypoechoic mass. In our study it was present unilaterally and patient didn't give history of smoking. Sublingual gland tumors are rare and account for only 0.4–2.6 of all salivary gland tumors.<sup>14,15</sup>

However, most of the recorded literature assert that Pleomorphic adenoma is more common than Adenolymphoma.<sup>7,16</sup> Only Schick et al<sup>17</sup> recorded an equal number of cases of Pleomorphic adenoma and Warthin's tumour (7:7), which is also seen in our study.

The majority of sublingual gland tumors are malignant<sup>18</sup> and ACC is the most common. As can be seen in our study out of two malignant lesions one is of Adenoid Cystic Carcinoma, which very well correlates with the study of Anderson LJ et al.<sup>19</sup>

## CONCLUSION

Before going into any type of radiological investigation histological grading of salivary gland tumor is a preliminary step in clinical setting, though not alone.

A variety of radio-imaging modalities may be employed in salivary gland imaging in which Ultrasound has emerged as the technique of choice for major salivary gland disease and forms a useful aid for FNA/biopsy. MRI is of particular value for staging salivary gland malignancy.

As a simple guide If ultrasound is able to differentiate as a benign pathology there is no need to go further imaging.

Through our experience we now know that sonographic features are most accurate but we should keep other modalities in our mind for improving the diagnostic accuracy.

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