

Role of USG & CT in Evaluation of Salivary Gland Tumours

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Abstract: ***Background:** The salivary glands are classified as major and minor. The algorithm for imaging the salivary glands depends on the clinical scenario with which the patient presents to the clinician. The large range of differential diagnoses influences not only prognosis but also treatment. This study aims at evaluating the role of Ultrasound and CT in diagnosis of salivary gland tumors. **Materials and Method:** 20 patients referred to the radiology department with any with complaints suggestive of salivary gland tumors or even those with already diagnosed cases of salivary gland tumors which needed follow up radiological investigations were evaluated with both ultrasound and CT scan. **Results:** USG and CT scan are both comparable in their ability to diagnose Salivary gland tumors. Although USG has a slightly inferior specificity rate compared to CT, but it is still a very compelling option for the initial imaging of the Salivary gland tumors. It can differentiate intraglandular from extraglandular lesions, classify salivary gland lesions as focal or diffuse and differentiate benign from malignant disease by means of assessing the architecture of the tumor, its vascularity and associated lymphadenopathy. CT was better than ultrasound in specificity and shows a specificity of 92.3% as compared to ultrasound which showed a specificity of 85.7%. Pleomorphic adenoma was the most common tumor affecting the salivary gland in my study with an overall incidence rate of over 60%. Among the benign, the most common is pleomorphic adenoma with an incidence rate of 78%. The second most common benign tumor was Warthin tumor with an incidence rate of 9%. The most common malignant tumour was Mucoepidermoid carcinoma with an incidence rate of over 60%. **Conclusion:** USG should always be considered as the initial imaging modality in salivary gland tumours, as it is easily accessible and has no risk of any radiation exposure. CT Scan helps to identify spread of tumor in inaccessible areas like para-pharyngeal spaces, defines the tumor's size and extent better and gives more detailed information about the involvement of surrounding structures. Thus CT is more specific than Ultrasound in diagnosing salivary gland tumors. By the above diagnosing modalities we can provide a firm aid to the clinician for management of the tumors and their metastasis.*

Keywords: Salivary Gland Tumors, Ultrasonography, CT scan, Pleomorphic adenoma, Warthins tumor

1. Introduction

The salivary glands are classified as major and minor. The major salivary glands consist of the parotid, submandibular, and sublingual glands. The minor glands include small mucus-secreting glands located throughout the palate, nasal and oral cavity. Salivary gland cancer is rare, with 2% of head and neck tumors forming in the salivary glands, the majority in the parotid.

In most cases of palpable tumours the differentiation between benign and malignant is not possible by clinical examination only. In patients with swelling of the submandibular gland a tumour of the floor of the mouth has to be ruled out. Cancer arising in the anterior floor of the mouth can obstruct Wharton's duct and cause retro-obstructive submandibular sialadenitis mimicking inflammatory disease of the gland or metastatic adenopathy.[1]

The algorithm for imaging the salivary glands depends on the clinical scenario with which the patient presents to the clinician. Many of the disease processes may not require imaging of any kind. Still others may be readily evaluated with palpation and direct visualization either endoscopically or transorally.

Ultrasonography is the 1st line radioimaging modality for localization and characterization of lesions in the major salivary glands. It can differentiate intraglandular from

extraglandular lesions. Depending upon the location and size of a mass, ultrasound may also provide high quality resolution and tissue characterization while being timely and cost effective for imaging the parotid, submandibular, and sublingual glands [4,5]

Color Doppler demonstrates intratumor vascular resistance which if found to be increased, suggests an increase in the risk of the lesion being malignant.

CT scan and MRI are useful for evaluating intraglandular component of mass especially in deep lobe of parotid, mass extending to para-pharyngeal space that is inaccessible to ultrasound. Further MRI can access facial nerve involvement.

Temporal bone or mandibular destruction is best identified by CT, while MRI permits more detailed evaluation of soft tissue infiltration, perineural invasion, and intracranial extension [7].

Aims and Objectives

- To study the role of Ultrasonography & CT in evaluation of salivary gland tumours.
- To locate the site, size & extent of the lesion and classify the tumours and thus help the clinician in treatment.

2. Materials and Methods

20 patients referred to the radiology department with complaints suggestive of salivary gland tumors or even those who were already diagnosed cases coming for follow up. Radiological investigations were evaluated with Usg (LOGIC P5 and LOGIC P9 having 7.5-10 MHz transducer) and CT (Siemens emotion 16 slice MDCT)

2.1 Selection of subject

Inclusion criteria

- Only those patients who are willing to participate in study were included.
- Patients referred to the radiology department for evaluation of lesions suggestive of salivary gland tumors were included in this study. Already diagnosed cases which need follow up ,and are referred to our department were included in study.
- Patients accidentally found to have salivary gland tumors, were also included in this study.

Exclusion criteria

- All patients unwilling were excluded from this study.
- All patients already diagnosed, treated and not needing follow up were excluded from this study.

Sample Size: 20.

2.2 Study Protocol

This is a prospective observational study of 20 patients referred to the radiology department with complaints suggestive of salivary gland tumors or even those who were already diagnosed cases coming for follow up. Compilation of all the observational data of Dhiraj General Hospital was done in the form of frequencies and percentage which has been depicted in the form of pie-charts and graphs.

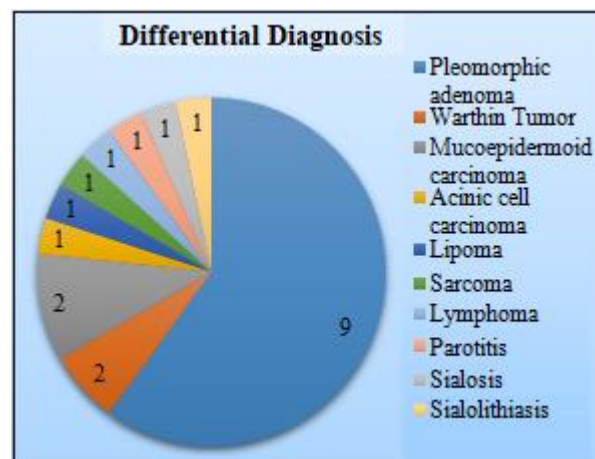
3. Results and Analysis

USG and CT scan are both comparable in their ability to diagnose Salivary gland tumors. Although USG has a slightly inferior specificity rate compared to CT, but it is still a very compelling option for the initial imaging of the Salivary gland tumors.

It can differentiate intraglandular from extraglandular lesions, classify salivary gland lesions as focal or diffuse and differentiate benign from malignant disease by means of assessing the architecture of the tumor, its vascularity and associated lymphadenopathy.

CT scan is more useful for evaluating intraglandular component of mass especially in deep lobe of parotid and mass extending to para-pharyngeal space that is inaccessible to ultrasound.

CT was better than ultrasound in specificity and shows a specificity of 92.3% as compared to ultrasound which showed a specificity of 85.7%.



Pleomorphic adenoma was the most common tumor affecting the salivary gland in my study with an overall incidence rate of over 60%.

Among the benign, the most common is pleomorphic adenoma with an incidence rate of 78%. The second most common benign tumor was Warthin tumor with an incidence rate of 9%.

The most common malignant tumour was Mucoepidermoid carcinoma with an incidence rate of over 60%.

Comparison of Benign vs Malignant Salivary Gland Tumors

Tumor	Number of Cases	Percentage
Benign	16	80%
Malignant	4	20%
Total	20	100

80% of all tumors affecting the parotid glands were benign and only 20% of the tumors were malignant

Distribution of Tumors in Major Salivary Glands

Gland	Number of Cases	Percentage
Parotid	14	73.6%
Submandibular	5	26.4%
Total	19	100

4. Discussion

The 2005 World Health Organization (WHO) classification of Salivary gland tumors comprises 10 benign and 23 malignant entities of epithelial origin. Non epithelial neoplasms are rare, representing about 2-5% of Salivary gland tumors. They include, among others, haemangioma, lymphangioma, schwannoma, neurofibroma, lipoma, sarcoma, lymphoma, and metastatic lesions (which develop preferentially in the parotid glands, and are most often of squamous cell origin).[2,3]

Among the benign salivary gland tumors encountered in my study, the most common is pleomorphic adenoma. The second most common benign tumor was Warthin tumor.

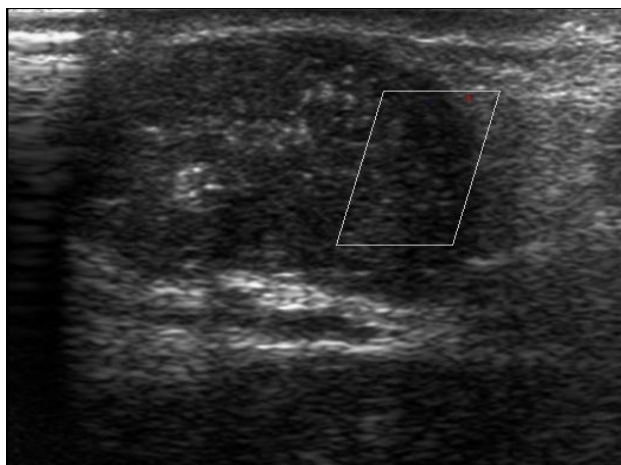
The most common malignant tumor in my study was Mucoepidermoid carcinoma with an incidence rate of 60% amongst the malignant tumors and 13% in overall salivary gland tumors including both benign and malignant tumors.

Distant metastases most frequently localize to the lung, followed by bone and liver⁶.

In my study Salivary gland tumors were unilateral in 76% and bilateral in 23%, with Pleomorphic adenoma being the most common unilateral tumor and Warthin's tumor being the most common bilateral tumor.

Following are the few sonographic and ct images of the commonest tumours of salivary glands:

1) Pleomorphic Adenoma



There is a well defined, hypoechoic mass lesion with solid consistency involving the right parotid gland.

The lesion shows areas of calcification within and has posterior acoustic enhancement.



2) CT Findings

Lobulated soft tissue mass of size 3.1 X 2.0 cm in the right side in the salivary gland lateral to the right parotid gland. No evidence of calcification seen. There is no significant enhancement after contrast study

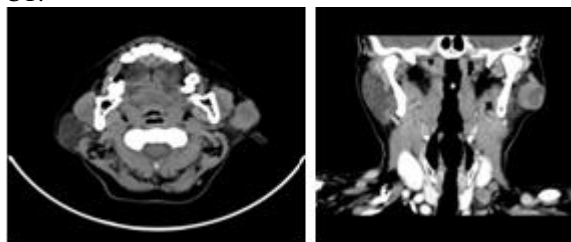
3) Warthins tumour:



Well defined, mixed density, predominantly hypoechoic mass lesion is seen involving the left parotid gland with internal cystic area.

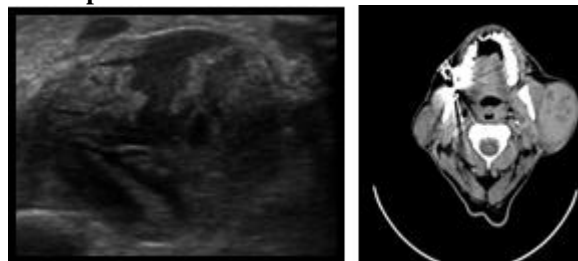
No evidence of calcification noted.

On CT:



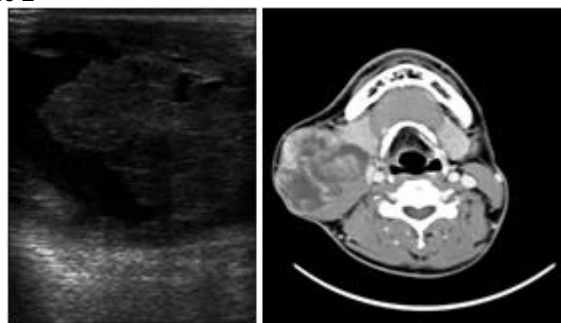
Irregular soft tissue mass measuring 2.7x1.7x2.5 cms seen in left parotid gland with solid and cystic component. After contrast there is homogenous enhancement of solid component and rim enhancement of the cystic component.

4) Mucoepidermoid Carcinoma



Well-defined heterogeneously contrast enhancing soft tissue mass lesion of size measuring 6.8 x 4.5 x 6.4 cm involving superficial lobe of left parotid gland and extending upto the deep lobe with internal areas of necrosis abutting masseter muscle anteriorly

Case 2



Large lobulated lesion ,centrally hypodense ,necrotic peripherally inhomogenous and a marked enhancing tumour seen in neck on right side, involving right parotid gland with metastatic nodes.

Major neck vessels are compressed medially.

No evidence of calcification seen in tumour

5. Conclusion

Salivary gland tumors account for only 3% of all tumors in the body and it is estimated that about 1% of all head and neck malignant neoplasm's arise in the salivary glands.

USG should always be considered as the initial imaging modality in salivary gland tumours, as it is easily accessible and has no risk of any radiation exposure.

CT Scan helps to identify spread of tumor in inaccessible areas like para-pharyngeal spaces, defines the tumor's size and extent better and gives more detailed information about the involvement of surrounding structures. Thus CT is more specific than Ultrasound in diagnosing salivary gland tumors.

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