Original Research Paper

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Radio-Diagnosis

AN OBSERVATIONAL STUDY TO ASSESS THE ROLE OF ULTRASOUND AND CONTRAST ENHANCED COMPUTED TOMOGRAPHY IN EVALUATION OF SALIVARY GLAND LESIONS

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ABSTRACT Salivary gland lesions, particularly tumours account for only 3% of all tumour in the body. Imaging plays a major role in differentiating inflammatory lesions from benign and malignant lesions. Ultrasound, due to its easy availability, low cost and lack of radiation is generally first line imaging modality. It can classify lesions as focal or diffuse and benign vs malignant nature can be done by evaluation of edges. On using contrast enhanced CT, different enhancement patterns can differentiate various lesions and tumours. This study attempts to provide pre-operative information on whether a lesion is inflammatory or benign or malignant and help surgeon in preventing delay of treatment in case of malignancy, avoiding surgery for inflammatory disease.

KEYWORDS : Pleomorphic adenoma, Warthin's tumor, Abscess, USG, CECT etc.

INTRODUCTION:

The salivary glands constitute a diverse group of anatomic structures that can give rise to a wide variety of unique pathology. There are three pairs of major salivary glands- parotid, submandibular and sublingual glands. Minor salivary glands are about 800- 1000 located throughout the oral cavity in the buccal, labial mucosa, lingual mucosa, soft palate, lateral parts of hard palate and floor of mouth. Imaging of salivary glands include ultrasound, sialography, non-enhanced and contrast-enhanced computed tomography, non-enhanced and contrast-enhanced magnetic resonance imaging. Usg is the initial imagingmodality for any swelling of salivary glands. CT is considered the best single method for assessment of inflammatory diseases and MRI is considered the best single method for assessment of tumors. Salivary gland lesions form 2-5 percent of all Head and neck neoplasms.

Age incidence varies widely, extending from children to adults over 80years of age. In this study, USG and Contrast enhanced CT modalities were being used to accurately differentiate inflammatory, congenital, benign from malignant lesions with pathological correlation.

Goals Of This Study: To study the spectrum and characterise salivary gland lesions on USG and CECT with pathological correlation. To study the effectiveness of USG and CECT in differentiating neoplastic from non-neoplastic lesions. To locate the exact site, size, multiplicity and extension of lesion and help the clinician in its management.

METHODOLOGY:

The source of data for our study are patients from OSMANIA GENERAL HOSPITAL, MNJ cancer hospital and NILOUFER hospital which are affiliated to OSMANIA MEDICAL COLLEGE. Study's total sample size was 45. Study was done over the course of 18 months.

Inclusion Criteria: Patients referred to the radiology department for evaluation of lesions of salivary glands, those patients presented with pain, swelling, restricted mouth opening, lymphadenopathy to the clinician.

Exclusion Criteria: All pregnant women and patients with abnormal RFT

Method Of Collection Of Data: Informed written consent of participating individual will be taken. Data will be collected using SAMSUNG RS80A ULTRASOUND MACHINE after informed consent, patient is placed in supine position with neck extension on the couch and salivary glands are examined. Data will also be collected using 128 SLICE CT (Make: HITACHI) (Model: SCENARIA) using contrast, after informed consent the patient will be placed in supine position on the CT table and IV injection of 80 ml of non-ionic contrast (omnipaque 350) will be administered at 3ml/sec.MD CT acquisition will be performed in the arterial phase and in the venous phase at a rotation speed of 0.8 sec.

The lesion will be characterized based on the size, density and appearances in both arterial and venous phase. The lesion will be characterized based on size, shape, echotexture, margins and color doppler findings.

RESULTS:

Table 1- Age Distribution Of Salivary Gland Lesions

Age In Years	No. Of Cases	Percentage
<1	1	4%
1 - 20	4	9%
21 - 40	27	60%
41 - 60	12	27%

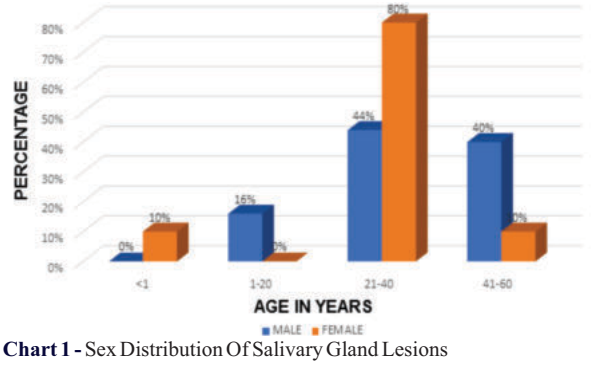

Chart 1 - Sex Distribution Of Salivary Gland Lesions

Table 2- Site Of Salivary Gland Lesions

Location	No. Of Cases	Percentage
Parotid Gland	30	67%
Submandibular Gland	9	20%
Sublingual Gland	1	2%
Minor Salivary Glands	2	4%
Parotid + Submandibular	3	7%

Table 3- Laterality Of Salivary Gland Lesions

Laterality	No. Of Cases	Percentage
Unilateral	35	78%
Bilateral	10	22%

Table 4 – Distribution Of Benign Lesions Of Parotid Gland

Pathology	No. Of Cases	Percentage
Pleomorphic Adenoma	6	55%

Warthin's Tumor	3	27%
Lipoma	1	9%
Infantile Hemangioma	1	9%

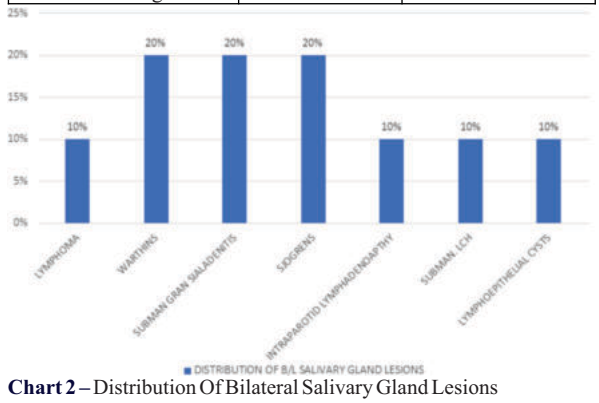

Chart 2 – Distribution Of Bilateral Salivary Gland Lesions

Table 5 – Distribution Of Malignant Lesions Of Parotid Gland

Pathology	No. Of Cases	Percentage
Mucoepidermoid Carcinoma	3	33%
Adenoid Cystic Carcinoma	2	22%
Carcinoma Ex Pleomorphic Adenoma	2	22%
Lymphoma Deposits	1	11%
Rhabdomyosarcoma	1	11%

Table 6 – Distribution Of Parotid Gland Pathologies

Type Of Pathology	No. Of Cases	Percentage
Infective	4	13%
Inflammatory	2	7%
Congenital	3	10%
Benign Tumors	11	36%
Malignant Tumors	9	30%
Traumatic	1	3%

Table 7 – Distribution Of Submandibular Gland Lesions

Type Of Pathology	No. Of Cases	Percentage
Infective	2	22%
Inflammatory	2	22%
Congenital	0	0
Benign Tumors	3	33%
Malignant Tumors	2	22%

In the present study, benign lesions were common in submandibular gland (n=3, 33%) which were pleomorphic adenomas.

Table 8 – Type Of Enhancement Pattern On CECT

Type Of Enhancement	No. Of Cases	Percentage
Homogenous Enhancement	11	24%
Heterogenous Enhancement	10	22%
Peripheral Enhancement	5	11%
Hyper Enhancement	5	11%
Hypo Enhancement	9	20%
No Enhancement	5	11%

In the present study, homogenous enhancement pattern of focal lesion on CECT was common (n=11, 24%), which is noted in pleomorphic adenoma; followed by heterogenous enhancement pattern (n=10, 22%), which is noted in both inflammatory and malignant pathologies.

Table 9 – Comparision With Hpe Diagnosis

Types	No. Of Cases	Concordant Cases	Discordant Cases
Benign	13	12	1
Malignant	13	9	4
Non- Neoplastic	19	17	2
Total	45	38	7

When compared with histopathological diagnosis, there were 7 discordant cases in this study. One case of Warthin tumor was diagnosed as infected/complex cyst on USG and CECT. Two cases of adenoid cystic carcinoma were diagnosed as mucoepidermoid carcinoma and two cases of mucoepidermoid carcinoma were diagnosed as adenoid cystic carcinoma. Submandibular Langerhans cell histiocytosis case was misdiagnosed as malignant etiology on USG and CECT.

Statistical Analysis Of This Study

Table 10 – Statistical Analysis Of Benign Salivary Gland Lesions

Statistics	Usg And Cect In Benign Salivary Gland Lesions
Sensitivity	92%
Specificity	93%
Positive Predictive Value	85%
Negative Predictive Value	96%

Table 11 – Statistical Analysis Of Malignant Salivary Gland Lesions

Statistics	Usg And Cect In Malignant Salivary Gland Lesions
Sensitivity	69%
Specificity	96%
Positive Predictive Value	90%
Negative Predictive Value	88%

Table 12 – Statistics Of Non- Neoplastic Salivary Gland Lesions

Statistics	Usg And Cect In Non-Neoplastic Salivary Gland Lesions
Sensitivity	89%
Specificity	96%
Positive Predictive Value	94%
Negative Predictive Value	92%

DISCUSSION:

Among the salivary glands, the parotid gland is the most frequently involved site followed by the submandibular gland with a frequency of 42.3% to 70% in parotid gland and 6.8% to 11% in the submandibular gland.

In the present study, USG and CECT applications in salivary gland lesions were investigated to facilitate diagnosis using imaging data. Parotid gland (n=30, 67%) was the most commonly involved salivary gland followed by submandibular gland (n=9, 20%) in the present study (n=45) This is concordance with study done by Dana Dumitru et. al (n=74), where parotid gland was most commonly involved (n=63, 85%) and submandibular gland was second common involved gland (n=11, 15%). This is also in concordance with another study by S. Kakoty et.al (n=50) where parotid gland pathologies were more common (n=31, 62%) and submandibular gland pathologies constitute 32% (n=16).

Most common pathology was Pleomorphic adenoma, followed by Warthin tumor among benign neoplasms of all salivary glands. Most common benign and malignant neoplasms in parotid gland in this study were Pleomorphic adenoma (n=6, 55%) and Mucoepidermoid carcinoma (n=3, 33%) respectively. This is in concordance with study done by Houdog Zuo et. al (n=94) where pleomorphic adenoma was most common benign tumor (74%) and mucoepidermoid carcinoma was most common malignancy (n=40%) in parotid gland. This is also in concordance with studies of S. Kakoty et. al and Dana Dumitriu et. al where pleomorphic adenoma constitutes 49% and 44% respectively.

Second most common pathology identified in this study was Sialadenitis and major gland affected was submandibular gland (n=4, 44%). This is concordance with S. Kakoty et. al where Sialadenitis was seen in 22%.

Among combined minor salivary gland and sublingual gland pathologies, adenoid cystic carcinoma was more common (67%) which was observed in minor salivary glands region. Only one pathology was found to be involving sublingual gland, which was Ranula.

Males were affected more common with salivary gland lesions in present study (n=25, 56%). Most common age distribution was 3rd to 4th decade (21-40 years) and female predominance (n=16, 80%) was observed in this age group. Benign neoplasms and sialadenitis were more commonly observed in females and Malignancies were more common in males in present study.

On CECT, most commonly encountered enhancement pattern was Homogenous enhancement pattern, which was observed in pleomorphic adenomas. All Warthin tumors did show hyper enhancing

pattern in early phases. All malignancies shown heterogenous pattern of enhancement due to heterogeneity of the lesions. 29% of cases shown extension to adjacent to neck spaces on CECT most commonly Masticator space. Most common additional finding on CECT was Cervical Lymphadenopathy (53%).

Limitation: Small sample size and inclusion of all type of pathologies. MRI was not included in this study due to non-availability for every patient. Hence neural involvement by malignancies was not accurately detected in present study.

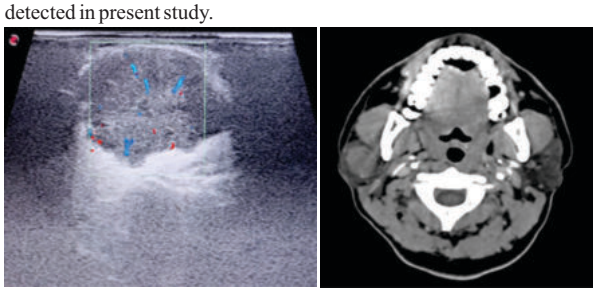

Figure 1: A 35-year-old female presented with painless swelling in region of right parotid gland. On USG, well defined lobulated homogenously echogenic lesion with internal vascularity in superficial lobe of parotid gland. Lesion shows homogenous enhancement on CECT – PLEOMORPHIC ADENOMA

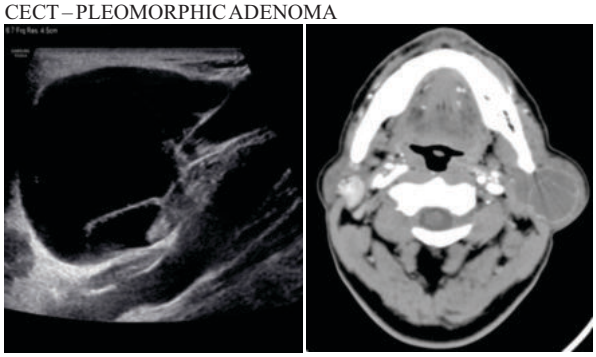

Figure 2: A 42-year-old male who is a smoker presented with left parotid swelling. On USG, well defined cystic lesion with septations seen which are showing hyperenhancement on CECT – WARTHIN'S TUMOR

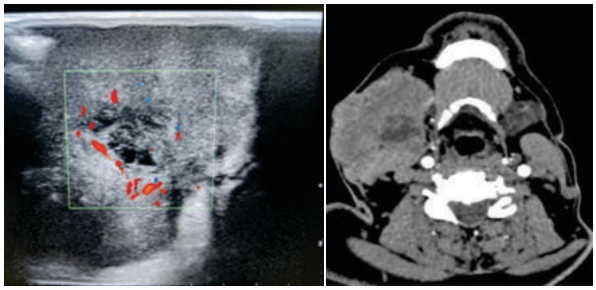

Figure 3: A 46-year-old male presented with painful right submandibular region. On USG, ill-defined heterogenous echogenic lesion with internal cystic areas showing heterogenous enhancement on CECT – MUCOEPIDERMOID CARCINOMA

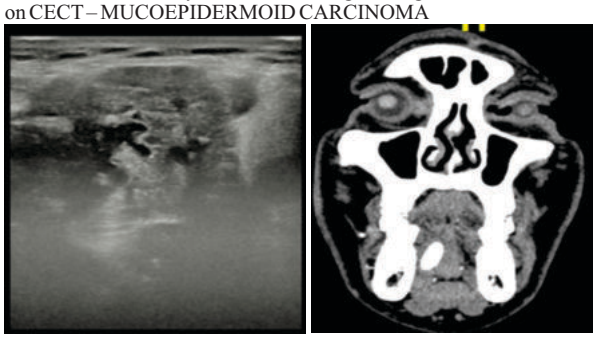

Figure 4: A 28-year-old female painful swelling in right submandibular region. On USG, right submandibular gland is enlarged and hypoechoic in echotexture with few dilated ducts with in. On CT, calculus is seen in right submandibular ductal opening – SIALADENITIS DUE TO SIALOLITH.

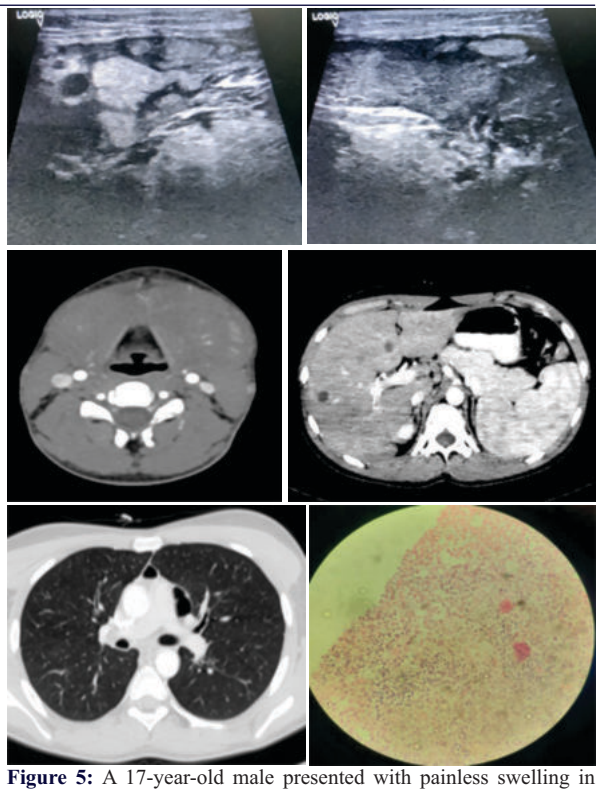

Figure 5: A 17-year-old male presented with painless swelling in bilateral submandibular region. B/L submandibular glands appear enlarged and heterogenous on USG and are hypo enhancing on CECT, also showing hypodense lesions in liver and lung cysts. On HPE, abundant histiocytes are seen - LANGERHANS CELL HISTIOCYTOSIS

CONCLUSION:

This study highlights the importance and easy availability of USG and CECT in evaluation of salivary gland lesions. USG and CECT show sensitivity of 92% and specificity of 93% in detection of benign neoplasms with positive and negative predictive values of 85% and 96% respectively. Sensitivity of 69% and specificity of 96% in detection of malignant neoplasms with positive and negative predictive values of 90% and 88% respectively. Even without help of MRI, USG and CECT can accurately detect malignancies based on margins, enhancement pattern and extension to adjacent neck spaces thus helping in planning of management.

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