



ORIGINAL RESEARCH PAPER

Radiology

ROLE OF HIGH RESOLUTION USG & CT IN EVALUATION OF MAJOR SALIVARY GLAND LESIONS WITH HISTOPATHOLOGICAL CORRELATION

KEY WORDS:

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ABSTRACT

Aims & Objectives of Study: To study the role of USG & CT in evaluation of major salivary glands lesions with HPE correlation wherever possible.

Materials and methods: 54 patients with salivary gland lesions were subjected to USG (TOSHIBA APLIO-500; 7.5 to 10 MHz linear transducer) & CT scan (SIEMENS SOMATOM SPIRIT SCANNER. CT scan) and imaging findings were recorded. The findings were correlated with HPE.

Results: Of the 54 salivary gland lesions, 26 (48.1 %) were non-neoplastic, 22 (40.7 %) were benign and 6 (11.2 %) were malignant. Sensitivity and Specificity of USG in differentiating Benign and Malignant Tumors were found to be 90.4 %, 80.0 % respectively whereas for CT it was 93.3 % and 80.0 % respectively.

Conclusion: For superficial salivary gland lesions, USG is better. CT should be used to see the deep extension of lesion and for assessment of bony destruction if any.

INTRODUCTION

Salivary glands are exocrine glands that produce saliva. There are three pairs of salivary glands, namely Parotid, Submandibular and Sublingual. A variety of disease processes affect the salivary glands, including inflammatory, systemic, obstructive and neoplastic. Incidence of neoplastic pathology of salivary glands is extremely low however diversity of benign and malignant salivary neoplasia is probably greater than that of any other organ system. Imaging is useful tool for diagnosis & planning definitive treatment and hence, avoid unnecessary surgery. In proven cases of salivary gland tumors, imaging helps in delineating the extent of the lesion and invasion of adjacent cervical spaces, skull base mandible, and nerves/meninges.

MATERIAL & METHODS

The present study was conducted in the Department of Radio-diagnosis, Assam Medical College and Hospital, Dibrugarh, Assam during the period from July 2017 to June 2018. 54 patients with clinically suspected salivary gland lesions were studied irrespective of age and sex. USG was done in all of them. CT scan was performed in only those cases where USG was non informative to arrive at a diagnosis or patient came to us for CT scan. Out of 54 cases CT scan was done in 24 cases. Final diagnosis was made on correlation with HPE/ FNAC/ surgery/ Follow up. Taking HPE as gold standard, diagnostic performance of US and CT was calculated.

Inclusion criteria:

- Patients of all age groups referred to the Department of Radio-diagnosis, AMCH, Dibrugarh with clinical suspicion of Salivary gland lesions.

Exclusion criteria:

- Post-Operative cases.

Ultrasound scan were performed by using **TOSHIBA APLIO-500 ULTRASOUND** machine with 7.5 to 10 MHz high frequency linear transducer. Colour-flow imaging was a useful adjunctive tool and performed whenever inflammation or a mass is seen on gray scale ultrasound. Lesions were studied for different parameters like size, shape, margin, echogenicity, echotexture, vascularity and lymph nodal involvement. Based on the US features of salivary gland lesions reviewed in literature and diagnosed as non-neoplastic and neoplastic (benign or malignant).

SOMATOM SPIRIT SCANNER. Contiguous thin sections, 3-5mm thick were obtained in axial planes routinely. Suitable sagittal and coronal reconstructions were done.

Contrast examination was done in normal renal function patients for further characterization of the lesions if required. The images were analyzed with special concerns on the following features for CT scans: (a) the contour and margin of the mass; (b) the enhancement pattern; (c) the presence of cystic change; (d) necrosis, hemorrhage & calcification. Then lesions were classified as non-neoplastic, benign or malignant as reviewed in literature.

These diagnoses were correlated with histopathological reports wherever possible and final diagnosis was made on the basis of histopathological reports.

STATISTICAL ANALYSIS:

Histopathological results were considered as the standard of reference. Statistical analysis was performed using SPSS-16 software. Independent sample t-test was used in comparison of continuous variables between benign and malignant groups. Sensitivity & specificity of USG and CT scan were obtained.

RESULT AND OBSERVATIONS

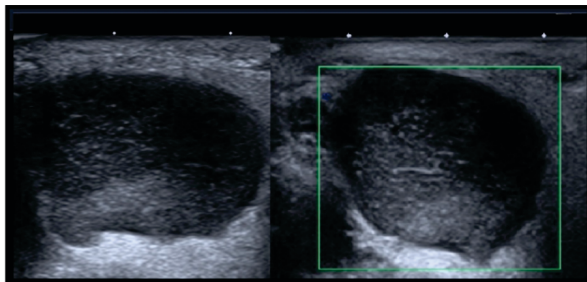
- We categorized the lesion as non-neoplastic and neoplastic on the basis of clinical, radiological and HPE findings. Out of 54 cases studied we found 19 cases of pleomorphic adenoma, 14 cases of sialadenitis, 7 cases of sialolithiasis, 5 cases of abscess, 4 cases of mucoepidermoid carcinoma, 2 cases of Warthin's tumor, 1 case of hemangioma, 1 case of adenoid cystic carcinoma and 1 case of lymphoma.
- Salivary gland lesions were most common in 3rd and 4th decade with mean age: 34.54 ± 15.09SD years, range 5-75 years & were more common in males than females. Male:Female ratio was 1.57:1.
- 26 cases of non-neoplastic lesions (48.1 %) and 28 cases of neoplastic lesions were seen (51.9 %). Out of 28 neoplastic lesions 22 cases of benign tumors and 6 cases of malignant tumors were seen.
- Among non-neoplastic lesions most common lesion was sialadenitis (25.9 % of total cases) followed by sialolithiasis (12.9 % of total cases). Abscess was seen in 5 cases (9.3 % of total cases).
- Among Benign tumors pleomorphic adenoma was most common comprises 35.2 % of total cases and 86.3 % of

CT scan evaluation was carried out using a SIEMENS

benign cases. 2nd most common benign tumor was Warthin's tumor comprises 9.1 % of benign tumors. One case of hemangioma was also found comprises 4.6 % of benign cases.

- Among malignant neoplasm most common was mucoepidermoid carcinoma comprises 7.4 % of total cases. One case of Adenoid cystic carcinoma and Lymphoma were seen and each comprises 1.9 % of total cases.
- Salivary gland lesions were most common in Parotid gland (74 %) followed by submandibular gland (24 %). One case was seen involving both parotid and salivary glands (1.9 %). In our study no lesion was seen in sublingual gland.
- Among non-neoplastic Sialadenitis and abscesses were more commonly seen in parotid gland however sialolithiasis was more common in submandibular gland (71.4 % of total cases of sialolithiasis). 16 out of 19 cases of pleomorphic adenoma were seen in parotid gland and all 4 cases of mucoepidermoid carcinoma were seen in parotid gland.

CASE- PLEOMORPHIC ADENOMA



Gray Scale And Colour Doppler Ultrasonographic Images:

Table 1: Distribution Of Cases According To Specific Diagnosis

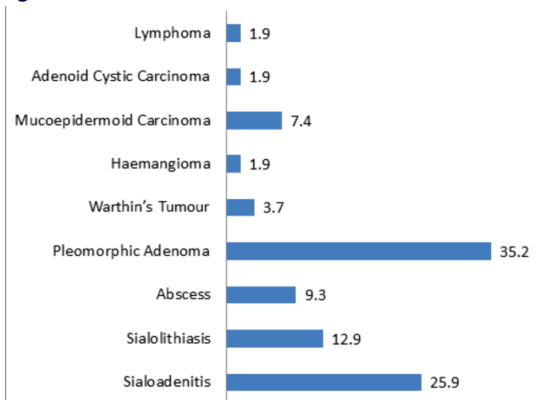
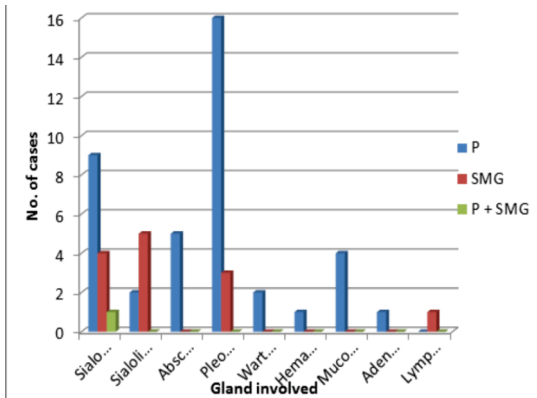


Table 2: Gland Wise Distribution Of Specific Salivary Gland Lesions



DISCUSSION

Normally, the echo-texture of the salivary gland is homogeneous and increased echogenicity than the surrounding muscles or fatty tissues on USG.

In our study most common non neoplastic lesion was sialadenitis, whereas most common benign and malignant lesions were pleomorphic adenoma and mucoepidermoid carcinoma respectively. Similar findings were also noted in studies done by **Jain S & Jain SK¹**, **Gupta A et al²**, **Patange NA et al³** & **Petrovan C et al⁷**

In inflammatory conditions, On USG, salivary glands were enlarged with multiple hypoechoic areas showing increased vascularity on Colour Doppler study and on CT scan, glands were bulky, heterogeneously enhancing with fat stranding in surrounding area. When abscesses are seen, the echo-texture is usually cystic or hypoechoic lesion with reactive vascularity of surrounding parenchyma. CT scan shows peripheral enhancement on post contrast scan.

Sialolithiasis was most frequently observed in the submandibular gland. **Mohan H et al⁵**, **Jain S & Jain SK¹** and **Gupta A et al²** & **Gritzmann N et al⁶** also described the same findings.

Neoplastic lesions were study for size, shape, margin, echogenicity, echotexture, vascularization pattern and lymphadenopathy on USG and found that shape, margin, echotexture, vascularization were the significant parameter for differentiating benign and malignant tumors whereas on CT scan heterogeneity, calcification, necrosis, haemorrhage and post contrast enhancement pattern were the significant criteria for differentiating between malignant and benign tumors.

On USG, pleomorphic adenomas are hypoechoic, well-defined, lobulated tumors with posterior acoustic enhancement and may contain calcifications. Vascularization in pleomorphic adenomas is often poor or absent. CT scan findings of pleomorphic adenoma are sharply margined, spherical tumors that enhances minimally on contrast studies. Few of the lesions are heterogenous in appearance, with areas of cystic changes within.

Mucoepidermoid carcinoma of the salivary glands was mostly associated with heterogeneous echo-texture, indistinct margins, irregular shape, and absence of distal acoustic enhancement. They sometimes showed cystic areas, calcifications, regional lymph node enlargement, or were well vascularised on Doppler. The CT findings of mucoepidermoid lesions vary with the grade of the tumor. Low-grade lesions are benign in appearance with apparently well delineated, smooth margins. Cystic areas may be present, with a low attenuation, whereas high grade tumor are associated with ill defined margin, heterogenous enhancement with calcification, infiltration to surrounding structure and lymphadenopathy. Deep neck extension and bony destruction can also be detected by CT scan. Similar findings are described by **Som PM et al (2011)⁷**.

Sensitivity & specificity of USG and CT scan were obtained.

Sensitivity & Specificity of USG in detecting Benign Tumors of salivary glands were 86.3 % and 90.9 % respectively. In similar study **Jain S & Jain SK¹** found sensitivity of 100 % and specificity of 87.5 %. **Petrovan C et al⁷** and **Klein K et al⁹** found sensitivity of 80 % & 83 % in similar study.

Sensitivity & Specificity of USG in detecting Malignant Tumors of salivary glands were found to be 67.6 % and 92.5 % respectively. In similar study **Jain S & Jain SK¹** found sensitivity of 87.5 % and specificity of 100 %. **Petrovan C et al⁷**

and Bradley MJ et al¹⁰ found sensitivity of 75 % & 75.5 % in similar study.

These findings suggest that ultrasonography has better sensitivity for benign tumors and better specificity for malignant tumors which was well correlated with findings of Jain S & Jain Sk¹.

Sensitivity & Specificity of CT in differentiating benign and malignant tumors were found to be 93.3 % & 80.0 % respectively.

CONCLUSION:

High resolution ultrasound with colour Doppler sonography should be first line imaging modality in diagnosing salivary gland pathologies. CT scan should be used when USG cannot delineate the mass properly. It is useful for evaluating intraglandular component of mass especially in deep lobe of salivary glands and extensions of the lesions that are inaccessible to ultrasound but there is risk of radiation exposure to the patient with CT scan therefore it should be used with caution. However, for the final diagnosis, histopathology is necessary.

REFERENCES

1. Jain S, Jain SK. To Know the Diagnostic Accuracy of Ultrasonography for Major Salivary Gland Masses and Its Correlation with Histopathological Examination.
2. Gupta A, Gupta A, Sharma K. A prospective study to assess the reliability of ultrasonography as a diagnostic aid in various salivary gland pathologies. JOURNAL OF EVOLUTION OF MEDICAL AND DENTAL SCIENCES-JEMDS. 2015 Feb 26;4(17):2890-7.
3. Patange NA, Phatak SV. Ultrasound and Doppler evaluation of salivary gland pathology. International Journal of Research in Medical Sciences. 2016 Dec 19;5(1):79-82.
4. Petrovan CE, Nekula DM, Mocan SL, Void zan TS, Co arc AD. Ultrasonography-histopathology correlation in major salivary glands lesions. Rom J Morphol Embryol. 2015;56(2):491-7.
5. Mohan H, Tahlan A, Mundi I, Punia RP, Dass A. Non-neoplastic salivary gland lesions: a 15-year study. European Archives of Oto-Rhino-Laryngology. 2011 Aug 1;268(8):1187-90.
6. Gritzmann N. Sonography of the salivary glands. American Journal of Roentgenology. 1989 Jul.
7. Som PM, Curtin HD. Head and Neck Imaging E-Book. Elsevier Health Sciences; 2011 Apr 12.
8. Howlett DC, Kesse KW, Hughes DV, Sallomi DF. The role of imaging in the evaluation of parotid disease. Clin Radiol 2002;57:692-701.
9. Klein K, Türk R, Gritzmann N, Traxler M. The value of sonography in salivary gland tumors. HNO, 1989, 37(2):71-75
10. Bradley MJ, Durham LH, Lancer JM. The role of colour flow Doppler in the investigation of the salivary gland tumour Clin Radiol, 2000, 55(10):759-762.