

# Role Of Ultrasound In The Assessment Of Benignity And Malignancy Of Salivary Gland Lesions

Dr.Raghav Soni<sup>1</sup>, Dr. Sameer Rajeev Verma<sup>2</sup>, Dr. Eshita Yadav<sup>3</sup>,  
Dr.Kalpna Pimoli<sup>4</sup>

Junior Resident, Department Of Radiodiagnosis SRMSIMS Bareilly  
Professor & HOD, Department Of Radiodiagnosis SRMSIMS Bareilly  
Junior Resident, Department Of Radiodiagnosis SRMSIMS Bareilly  
Junior Resident, Department Of Radiodiagnosis SRMSIMS Bareilly

---

## ABSTRACT

**Background and Aim:** Salivary gland lesions are myriad including benign and malignant tumors, inflammatory and infective conditions and ultrasound plays an important role in making the diagnosis. This retrospective study was done to determine accuracy of ultrasound in diagnosing benign and malignant lesions of salivary in view of cytohistopathological findings.

**Materials and Methods:** This retrospective study was conducted in a semi urban tertiary care teaching hospital and included thirty five patients with major salivary gland lesions who had undergone preoperative ultrasonogram and cytohistopathological evaluation in last two years from April 2021 to April 2023. Based on ultrasonography and color doppler findings retrieved from electronic records in HIS, the lesions were categorized as benign or malignant. The cytohistopathological findings were also noted from the HIS records. The diagnostic efficacy of USG in predicting salivary gland lesion as benign or malignant was expressed in terms of sensitivity, specificity and accuracy.

**Results:** Among the 35 patients included in the study, 25 cases (71.42%) had benign lesions and in 10 cases (28.57%) malignant lesions were detected on cytohistopathology. USG diagnosed 30 benign lesions (25 lesions were confirmed as benign while 5 lesions were confirmed as malignant), while 5 cases were diagnosed as malignant (4 cases were confirmed malignant and one case as benign). The ultrasound had accuracy of 83% for benign lesions (sensitivity 96% and specificity of 44%) while accuracy in diagnosing malignant lesions was 85% (sensitivity 50% and specificity 95%).

**Conclusion:** Ultrasound along with color Doppler has high diagnostic accuracy in diagnosing both benign and malignant lesions of salivary glands although the sensitivity of ultrasound in detecting malignant lesions is low.

**Keywords:** salivary gland lesions, ultrasonography, histopathology.

---

Date of Submission: 02-05-2023

Date of Acceptance: 12-05-2023

---

## I. Introduction

Salivary glands comprise various and numerous lesions like tumoral, cystic, degenerative, inflammatory and traumatic<sup>1,2</sup> its incidence in the world varies from 0.5 to 13.5% per 1 lakh population<sup>3</sup>. While neoplasms of salivary glands constitute less than 3% of all tumors in the body.<sup>4</sup> Assessment and diagnosis include: clinical examination, imaging techniques such as (plain film, sialography), ultrasonography, computed tomography, magnetic resonance imaging, and scintigraphy), fine-needle aspiration (FNA) biopsy, core-biopsy and among these, ultrasonography (US) plays an an important role.<sup>1,2,5</sup> Ultrasound is one of the preliminary investigations of choice that helps clinical diagnosis. It is a simple easily assessable, non-invasive, low-cost imaging technique that can be repeated, if necessary.<sup>6,7</sup> The only disadvantage of ultrasonography is its subjective interpretation which depends upon radiologist's expertise.<sup>8</sup> In Europe and Asia, USG is widely accepted as the first imaging method for assessment of lymphatic system and soft tissue diseases in the head and neck, including major salivary glands.<sup>9-12</sup> Fine needle aspiration cytology (FNAC) or post-operative histopathological evaluation is more definitive in order to determine nature of the lesion, whether it is benign or malignant.<sup>13</sup> This study was done to determine accuracy of ultrasound in diagnosing benign and malignant lesions of salivary in view of cytohistopathological findings.

## II. Material and methods

This retrospective study was conducted in Shri Ram Murti Smarak Institute of Medical sciences and included thirty five patients with major salivary gland lesions who had undergone preoperative ultra-sonogram

and cyto-histopathological evaluation in last two years from April 2021 to April 2023. Different characteristics of the lesions including dimensions, shape (oval, lobulated or irregular), margins (circumscribed, spiculated or illdefined), echogenicity (anechoic, hypoechoic, isoechoic or hyperechoic, extra glandular lesion extension and presence of adjacent cervical lymphadenopathy on grey scale ultrasonography and color doppler findings related to vascularization of the lesion were retrieved from the HIS electronic databank. Based on ultrasonography findings the lesions were categorized as benign or malignant. The cyto-histopathological findings were noted from the patient records in HIS. The diagnostic efficacy of USG in predicting salivary gland lesion as benign or malignant was expressed in terms of sensitivity, specificity and accuracy.

### III. Results

Among the 35 patients included in the study, 25 cases (71.42%) had benign lesions and in 10 cases (28.57%) malignant lesions were detected on cytohistopathology. USG diagnosed 30 benign lesions (25 lesions were confirmed as benign while 5 lesions were confirmed as malignant), while 5 cases were diagnosed as malignant (4 cases were confirmed malignant and one case as benign).

One benign mass that was misdiagnosed as malignant mass in fact was abscess. Malignant masses that were misdiagnosed as benign masses were NHL, mucoepidermoid carcinoma, adenocarcinoma and metastasis. The ultrasound had accuracy of 83% for benign lesions (sensitivity 96% and specificity of 44%) while accuracy in diagnosing malignant lesions was 85% (sensitivity 50% and specificity 95%).

**Table I Association of USG diagnosis and pathological diagnosis**

| Lesions                   | USG Diagnosis | Pathological Diagnosis |
|---------------------------|---------------|------------------------|
| <b>Benign</b>             | 30 (85%)      | 25 (71.42%)            |
| Pleomorphic adenoma       | 9             | 6                      |
| Abscess                   | 4             | 5                      |
| Chronic sialolithiasis    | 5             | 4                      |
| Sialolithiasis            | 3             | 3                      |
| Lipoma                    | 2             | 2                      |
| Warthin's tumor           | 3             | 2                      |
| Epithelial inclusion cyst | 1             | 1                      |
| Vascular malformation     | 2             | 2                      |
| Hemangioma                | 1             | 0                      |
| <b>Malignant</b>          | 5 (14.28%)    | 10 (28.57%)            |
| Non- Hodgkin lymphoma     | 1             | 2                      |
| Mucoepidermoid Carcinoma  | 2             | 4                      |
| Epithelial malignancy     | 0             | 1                      |
| Metastasis                | 1             | 1                      |
| Adenocarcinoma            | 1             | 2                      |

### IV. Discussion

Salivary gland tumours are not very common. More so over only 5-10% of all these tumours are malignant. It is beneficial for the patient if these tumours are diagnosed preoperatively. Ultrasound is the first modality of choice in evaluating salivary gland lesions.<sup>14</sup> However histopathological evaluation still remains the gold standard.

In this study we have tried to determine the accuracy of ultrasound in categorizing lesions as benign and malignant based on grey scale and color Doppler findings. Ultrasonography features such as poor peripheral vascularization, sharp borders, lobulation and homogeneity are specific for benign lesions.<sup>17</sup> Among 35 patients, 25 (71.42%) benign lesions and 10 (28.57%) malignant lesions were detected on cytohistopathology.

In this study, the most common benign parotid tumour was pleomorphic adenoma and the most frequent malignant tumour was mucoepidermoid carcinoma which was consistent with various other studies<sup>18-22</sup>.

Based on USG findings, 30 (85%) lesions were categorized as benign and 5 (14.28%) as malignant lesions. The ultrasound had accuracy of 83% for benign lesions (sensitivity 96% and specificity of 44%), and accuracy in diagnosing malignant lesions was 85% (sensitivity 50% and specificity 95%) which is in agreement with studies done by Chandak et al<sup>22</sup> and Yonetsu et al<sup>23</sup>, while it is in partial agreement with the study by Wu et al<sup>24</sup> who reported low diagnostic accuracy of ultrasound for malignant lesions.

## V. CONCLUSION

Ultrasound along with color Doppler has high diagnostic accuracy in diagnosing both benign and malignant lesions of salivary glands although the sensitivity of ultrasound in detecting malignant lesions is low. A larger study is warranted for corroboration of findings of this study.

## References

- [1]. Burlibaşa C. Patologiaglandelorsalivare. În: Burlibaşa C (red). Chirurgieoralăşimaxilofacială. Ed. Medicală, Bucureşti, 1999, 1115–1166.
- [2]. Bucur A, Dincă O, Ionescu H. Patologiaglandelorsalivare. În: Bucur A (ed). Compendiu de chirurgieoro-maxilo-facială. Q Med Publishing, Bucureşti, 2009, 715–771.
- [3]. Scher RL, Oostingh PE, Levine PA, Cantrell RW, Feldman PS. Role of fine needle aspiration in the diagnosis of lesions of the oral cavity, oropharynx, and nasopharynx. *Cancer* 1988; 62(12): 2602-6.
- [4]. Weissman JL, Carrau RL. Anterior facial vein and submandibular gland together: predicting the histology of submandibular masses with CT or MR imaging. *Radiology* 1998; 208:441–446.
- [5]. Carlson E, Ord R. Textbook and color atlas of salivary gland pathology: diagnosis and management. Wiley–Blackwell, Singapore, 2008, 3–216.
- [6]. Lee YY, Wong KT, King AD, Ahuja AT. Imaging of salivary gland tumours. *Eur J Radiol*. 2008;66:419-436.
- [7]. Welkoborsky HJ. Current aspects in ultrasonography of the salivary glands. *HNO* 2011;59(2):155–165.
- [8]. Tessa PJ, Jayalekshmy PS, Cicy PJ, Poothode U. Fine needle aspiration cytology of salivary gland lesions with histopathological correlation:A two year study. *Int J Healthc Biomed Res* 2015; 3(4): 91-9.
- [9]. Alyas F, Lewis K, Williams M, Moody AB, Wong KT, Ahuja AT, Howlett DC. Diseases of the submandibular gland as demonstrated using high resolution ultrasound. *Br J Radiol* 2005 Apr;78(928):362-369.
- [10]. Ridder GJ, Richter B, Disko U, Sander A. Gray-scale sonographic evaluation of cervical lymphadenopathy in catscratch disease. *J Clin Ultrasound* 2001 Mar-Apr;29(3):140-145.
- [11]. Ying M, Ahuja A, Metreweli C. Diagnostic accuracy of sonographic criteria for evaluation of cervical lymphadenopathy. *J Ultrasound Med* 1998 Jul;17(7):437-445.
- [12]. Ying M, Ahuja A. Sonography of neck lymph nodes. Part I: normal lymph nodes. *ClinRadiol* 2003 May;58(5):351-358.
- [13]. Băciuţ M, Badea R. Glandelesalivare. În: Badea R, Ducea S, Mircea P, Zdrenghea D. *Tratat de ultrasonografieclinică*. Vol. II, Ed. Medicală, Bucureşti, 2010, 45–70.
- [14]. Klein K, Türk R, Gritzmann N, Traxler M. The value of sonography in salivary gland tumors. *HNO* 1989; 37(2):71–75.
- [15]. Mazaher H, Kashany SS, Sharifi an H. Diagnostic accuracy of triplex ultrasound in malignant parotid tumours. *Iran J Radiol* 2007;4:169–174.
- [16]. Bradley MJ, Durham LH, Lancer JM. The role of colour flow Doppler in the investigation of the salivary gland tumour. *ClinRadiol* 2000;55:759-762.
- [17]. Dumitriu D, Ducea S, Badea R, Botar-Jid C, Băciuţ G, Băciuţ M. B mode and colour Doppler ultrasound features of salivary gland tumours. *Med Ultrason* 2008;10:31–37.
- [18]. Lin CC, Tsai MH, Huang CC, Hua CH, Tseng HC, Huang ST. Parotid tumors: a 10-year experience. *Am J Otolaryngol* 2008; 29:94–100.
- [19]. Drivas EL, Skoulakis CE, Symvoulakism EK, Bizaki AG, Lachanas VA, Bizakis JG. Pattern of parotid gland tumors on Crete, Greece: a retrospective study of 131 cases. *Med Sci Monit* 2007; 13: CR136–140.
- [20]. Musani MA, Sohail Z, Zafar S, Malik S. Morphological pattern of parotid gland tumours. *J Coll Physicians Surg Pak* 2008; 18:274–277.
- [21]. Takahama A Jr, Almeida OP, Kowalski LP. Parotid neoplasms:analysis of 600 patients attended at a single institution. *Braz J Otorhinolaryngol* 2009; 75: 497–501.
- [22]. Chandak R, Degwekar S, Bhowte RR, Motwani M, Banode P, Chandak M, Rawlani S. An evaluation of efficacy of ultrasonography in the diagnosis of head
- [23]. Yonetsu K, Ohki M, Kumazawa S, Eida S, Sumi M, Nakamura T. Parotid tumors: differentiation of benign and malignant tumors with quantitative sonographic analyses. *Ultrasound Med Biol* 2004; 30: 567–574.
- [24]. Wu S, Liu G, Chen R, Guan Y. Role of ultrasound in the assessment of benignity and malignancy of parotid masses. *DentomaxillofacRadiol*, 2012, 41(2):131–135.