



## ROLE OF ULTRASONOGRAPHY IN HEAD AND NECK SURGERY:REVISITED

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## ABSTRACT

**INTRODUCTION:** Diagnostic ultrasonography uses the reflection of high-frequency sound waves by anatomic structures to generate cross-sectional images. This modality has been utilized for decades by a number of medical specialties both as a diagnostic tool and to help with localization during interventional procedures. In the field of otolaryngology—head and neck surgery, ultrasound (US) evaluation of thyroid disease has been a standard procedure.

**MATERIAL AND METHODS:** A cross sectional study was conducted in the department of Otorhinolaryngology PATNA MEDICAL COLLEGE AND HOSPITAL during the period of SEPTEMBER 2017 TO JULY 2019. Patients reaching to our ENT out patient department with complain of head and neck swelling were put through thorough clinical examination. A complete history was obtained regarding the occurrence of swelling. A detailed local examination of neck swelling was done and diagnosis was correlated and confirmed by ultrasonography and fine needle aspiration findings. Written informed consent was taken from all patients prior to the examination.

**RESULTS:** Ultrasonography is a great tool for diagnosing head and neck pathology and the accuracy is improved with the findings of fine needle aspiration cytology.

**KEYWORDS :** Ultrasonography, neck, swellings, lump, fine needle aspiration

## INTRODUCTION

Diagnostic ultrasonography uses the reflection of high-frequency sound waves by anatomic structures to generate cross-sectional images. This modality has been utilized for decades by a number of medical specialties both as a diagnostic tool and to help with localization during interventional procedures. In the field of otolaryngology—head and neck surgery, ultrasound (US) evaluation of thyroid disease has been a standard procedure. Today, the application of US imaging to diseases of the head and neck is benefiting from the markedly improved resolution, low cost when compared to other radiologic modalities, portability of the equipment, patient convenience, absence of preparatory procedures required, efficiency and lack of known adverse effects associated with the technique. It can be used to enhance precision of interventions, such as to guide fine needle aspiration of suspicious lesions or for targeted drainage of infections. With the clarity of soft tissue head and neck anatomy on US images approaching, and resolution being even greater than that of a computerized tomography (CT) scan image. The aim of this research work was to assess the role of ultrasonography in the diagnosis of neck mass and to correlate it with clinical diagnosis along with confirmation of USG diagnosis by FNAC and histopathology.

## MATERIAL AND METHODS

A cross sectional study was conducted at the department of Otorhinolaryngology PATNA MEDICAL COLLEGE AND HOSPITAL during the period of SEPTEMBER 2017 TO JULY 2019. 100 patients coming to the OPD in department of Otorhinolaryngology were enrolled for the study.

## INCLUSION CRITERIA

- Patients of both the sexes
- Age between 1 to 60 years
- Patients willing and giving consent to study upon them

## EXCLUSION CRITERIA

- Obvious fluctuant abscess,
- children less than one year of age
- patients not willing to undergo ultrasonography and fine needle aspiration cytology

In all patients, a detailed history regarding the occurrence of swelling was obtained. A comprehensive local examination of neck swelling was done and confirmed by ultrasonography

and fine needle aspiration cytology. Written informed consent was taken from all patients prior to the examination. USG of neck was done in supine position. A general and detailed clinical examination pertaining to otorhinolaryngology was done in all patients. Basic blood investigations were done in all patients. USG Neck was done in all cases prior to FNAC examination. FNAC were conducted in department of pathology. All excised specimens were sent for histopathological examination. The cytological features of all cases were reviewed with corresponding histopathology features. Final diagnosis of the swelling was made by fine needle aspiration cytology and histopathologic examination of excision and incision biopsy.

## RESULTS

In this study total numbers of male subjects were 48 and females were 32. Fig 1 The age of patients ranged from 1 year to 60 years. Maximum number of cases were between 30-39 year age group. Fig 2 Only one case each was in the age group of 0-9 years and 70-79 years. The distribution of neck swellings were seen maximum in midline followed by submandibular area and deep cervical region. Fig 3

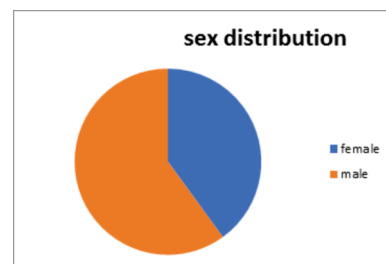


FIG 1:SEX DISTRIBUTION

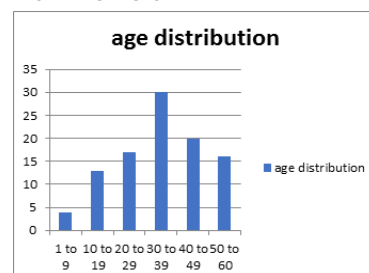
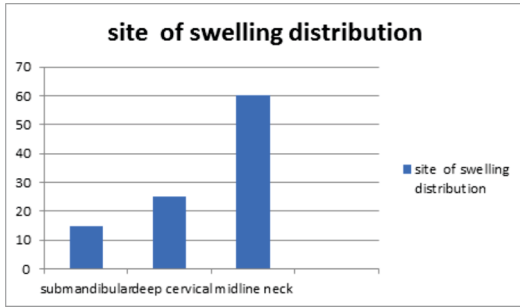


FIG 2: AGE DISTRIBUTION

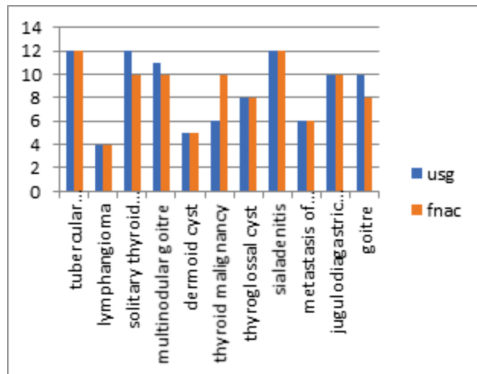


**Fig 3 DISTRIBUTION OF SWELLING**

Maximum number of patients in the had swelling in the region of midline neck followed by upper deep cervical and submandibular area. Based on clinical examination and ecogenicity on ultrasonographic finding diagnosis was made which was correlated and confirmed by fine needle aspiration cytology.fig 4 Final diagnosis was made based on the findings of ultrasonography and FNAC.fig5

clinical diagnosis	USG	FNAC
tubercular lymphadenitis	12	12
lymphangioma	4	4
solitary thyroid nodule	12	10 HASHIMOTO THYROIDITIS 2 COLLOID GOITRE 8
multinodular goitre	11	12 COLLOID GOITRE
dermoid cyst	5	5
thyroid malignancy	6	10 Suspicious follicular carcinoma 2 Papillary carcinoma 10
thyroglossal cyst	8	8
sialadenitis	12	12
metastasis of unknown origin	6	6
jugulodiagastric adenitis	10	10
goitre	10	Colloid goitre 8

**FIG 4: Correlation Of Clinical Diagnosis Based On Ultrasonographic And Fine Needle Aspiration findings**



**FIG 5: Ultrasonographic And Fine Needle Aspiration Findings**

**DISCUSSION**

Basic understanding of the principles of ultrasonography is essential to practitioners utilizing this tool. Ultrasound waves used in head and neck imaging are considered "high frequency", ranging from 7.5 MHz to 15 MHz (MegaHertz or millions of Hertz) to provide best tissue resolution In brightness-mode (B-mode) ultrasound, the brightness or echogenicity of the image is proportionate to the amplitude of reflected sound. Using a gray-scale ranging from black to white, structures will appear as hyperechoic (bright or white)

to hypoechoic (less bright or darker gray) to anechoic (black). The lumen of arteries is anechoic and pulsation can be appreciated during dynamic examination<sup>1,2</sup>.

A systematic approach is crucial for thorough examination of the head and neck, and helps prevent overlooking potentially significant clinical findings.

Identification, precise localization and characterization of lymph nodes that may not be palpable are among the most important contributions Nonpathologic nodes are hypoechoic, oval or kidney bean shaped, with a fatty central hilum . Benign node is usually at least twice as long as it is wide, with possibly the exception of the nodes in the submandibular and submental region which have a more round shape. A short to long axis ratio greater than 0.5 should raise suspicion that the node is involved with cancer. Ultrasound-guided fine needle aspiration (FNA) of suspicious lymph nodes improves the accuracy and yield of the cytologic diagnosis Ultrasonography plays a central role in thyroid gland imaging, largely due to the gland's superficial positioning and distinctive echo-texture. Normal thyroid tissue is homogenous and of intermediate echogenicity, but hyperechoic compared to muscle. The gland is surrounded by an echogenic, thin white line on US, representing the investing cervical fascia.

Ultrasound-guided FNA increases diagnostic yield compared to palpation-guided sampling, and is recommended for suspicious nodules that are not palpable,Benign thyroid lesions are often associated with a circumferential hypoechoic halo, representing a capsule. Absence or blurring of this margin may be suggestive of malignancy. Nodule shape can be predictive as well, with irregularly shaped, lobulated or spherical nodules, and nodules that are taller than wide, being more likely to be malignant<sup>3</sup>. Calcifications on the periphery (rim) of a nodule are typically considered a benign feature resulting from previous hemorrhage or degenerative changes. Coarse internal calcifications and microcalcifications, however, are strongly suggestive of malignancy.

Identification and localization of parathyroid adenomas prior to surgical exploration allows for a targeted approach with significantly lower risks of complications than four-gland parathyroid exploration. With intraoperative parathyroid hormone level measurements, focused unimally invasive parathyroidectomy results in decreased operative time and reduced morbidity. US imaging plays a central role in the work-up and management of parathyroid disease. Sensitivity of ultrasonography decreases to 60% in the case of secondary hyperparathyroidism where parathyroid glands are diffusely enlarged.<sup>4</sup> US also has limitations in the setting of multinodular goiter, mediastinal parathyroid disease, and morbid obesity.

Due to their superficial anatomic position and their fairly homogeneous soft tissue density, the major salivary glands lend themselves well to US examination. When performed at initial evaluation for a salivary gland disorder, in many cases US can obviate the need for magnetic resonance imaging (MRI) or CT imaging.

Lymphadenopathy, branchial cleft anomalies and thyroglossal duct cysts are thoroughly évaluable with US, with appropriate surgical planning to follow. Vascular and lymphatic malformations can similarly be evaluated with ultrasonography. Ultrasonography can even be used to assess dynamic vocal cord function and papilloma status in children, as well as to confirm endotracheal tube positioning Ultrasound guidance has been shown to enhance the diagnostic accuracy of FNA biopsy. Ultrasound-guided

injections can be performed for therapeutic purposes<sup>5,6</sup>. Botulinum toxin (BT) can be used to treat sialorrhea when injected into salivary gland parenchyma<sup>7</sup>. Sclerotherapy of benign lymphoepithelial cysts of the parotid gland has been performed using US-guided injection of doxycycline or ethanol<sup>8</sup>.

## CONCLUSION

By combining an understanding of acoustic properties of tissues in the head and neck with the basic principles of US physics, surgeons can correlate their knowledge of anatomy with what they see on an ultrasound screen. With the extensive use of ultrasonography in management of maladies of the head and neck the advantages of this technology are easily appreciated. To further increase the ease of use, smaller US machines are being developed, with laptop-sized units being common today. The imaging quality of ultrasonography is bound to continue to improve, allowing for an even greater degree of utilization of this versatile tool in the diagnosis and management of disorders of the head and neck. Clinician-based ultrasonography has been surprisingly delayed in otolaryngology, compared to other medical specialties, but its value is now rapidly gaining recognition.

## REFERENCES

1. Liao LJ, Wang CT, Young YH, et al. Real-time and computerized sonographic scoring system for predicting malignant cervical lymphadenopathy. *Head and Neck*. 2010;32:594-8.
2. Sofferan RA. Interpretation of ultrasound. *Otolaryngol Clin North Am*. 2010;43(6):1171-202, v-vi.
3. Frates MC, Benson CB, Doubilet PM, et al. Prevalence and distribution of carcinoma in patients with solitary and multiple thyroid nodules on sonography. *J Clin Endocrinol Metab*. 2006;91:3411-7.
4. Bhansali A, Masoodi SR, Bhadada S, et al. Ultrasonography in detection of single and multiple abnormal parathyroid glands in primary hyperparathyroidism: comparison with radionuclide scintigraphy and surgery. *Clin Endocrinol (Oxf)*. 2006;65(3):340-5.
5. Bajaj Y, Singh S, Cozens N, et al. Critical clinical appraisal of the role of ultrasound guided fine needle aspiration cytology in the management of parotid tumors. *J Laryngol Otol*. 2005;119:289-92.
6. Kim BM, Kim EK, Kim MJ, et al. Sonographically guided core needle biopsy of cervical lymphadenopathy in patients without known malignancy. *J Ultrasound Med*. 2007;26:585-91.
7. Steffen A, Rotter N, König IR, et al. Botulinum toxin for Frej/s syndrome: a closer look at different treatment responses. *J Laryngol Otol*. 2012;126(2):185-9.
8. Smith RB. Ultrasound-guided procedures for the office. *Otolaryngol Clin North Am*. 2010;43(6):1241-54, vi