



Research Article

ROLE ASSESSMENT OF ULTRASONOGRAPHY AND FINE NEEDLE ASPIRATION CYTOLOGY IN EVALUATION OF NECK SWELLINGS-A STUDY AT A TERTIARY CARE TEACHING HOSPITAL IN NORTH INDIA

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ARTICLE INFO

Article History:

Received 16th June, 2024

Received in revised form 19th June, 2024

Accepted 27th July, 2024

Published online 28th July, 2024

Key words:

Neck swelling, FNAC, Malignant, Sensitivity.

ABSTRACT

Background: Ultrasonography of neck swellings is helpful, cost effective and radiation hazard free modality. The routine use of fine needle aspiration cytology (FNAC) in the assessment of thyroid nodules has reduced the number of patients subjected to thyroidectomy for benign diseases. **Methods:** A cross-sectional study was conducted at the department of Otorhinolaryngology of ASCOMS Jammu, 60 patients with clinically palpable neck swellings who presented to the OPD were enrolled for the study. Patients of both sexes consenting for the study with clinically palpable neck swellings and also willing to (USG) and (FNAC) were included in the study. Patients with clinically undetectable neck swellings, previous history of neck trauma or neck surgeries, Swellings obscured by jaw bone were excluded. **Results** In this current study total numbers of male subjects were 22(36.6%) and females were 38 (63.4%). Patient age group above 21 years of age were included in the study Maximum number of cases were between 41–50-year age group followed by 31–40-year age group. Our study showed a total of 41 benign lesions in the neck and USG correctly diagnosed 37 of them. The Sensitivity, Specificity, PPV and NPV of US in this case was 96.5%, 90.3%, 87.6% and 97.1% respectively. The sensitivity of US in diagnosing malignant lesions of the neck in 60 patients with neck swellings was 86.5% with a specificity of 97.7%, PPV 92.3% and NPV 96.5%. Sensitivity of US in detecting thyroid malignancy in the present study was 84.3%. The sensitivity of US in diagnosing malignant lymph nodes in this study was 88.5%. **Conclusions:** Ultrasound is the prime modality for initial imaging for neck swellings. Thereafter according to requirement and Ultrasound findings, one can opt for further haematological investigations, Fine Needle Aspiration Cytology and Radiological investigations

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INTRODUCTION

Neck swellings are frequently encountered by Otolaryngologists in their day-to-day clinical practice. The swellings can develop from different structures in the neck such as the thyroid gland, major and minor salivary glands, lymph nodes, soft tissues, blood vessels and neural structures that leads to lots the ambiguity in the diagnosis. These swellings can present as inflammatory or non-inflammatory lesions. The age and gender of the patient, location, size, onset, duration and progression of the swelling gives an important idea in making the differential diagnosis from the clinical point of view. Neck sonography was first introduced in 1966-1967 [1]. It has been widely practiced since the 1970 and is now one of the most popular radiological investigations of choice in diagnosing neck disease [2]. Ultrasound (US) with or without fine needle aspiration cytology (FNAC) will make the diagnosis in majority of the cases.[3] Distinguishing normal structures from lymphadenopathy and non-nodal

pathologies is an important step in differential diagnosis.[3] Additional cross-sectional imaging may be required to characterise deep-seated disease, markedly inflammatory or infiltrative processes, and stage malignancy [3]. Ultrasonography provides precise information regarding the form and content of cervical masses [4,5]. It differentiates solid from cystic lesions. It may alert us of the probabilities of malignant versus benign nature of neck swellings [6]. In view of the above-mentioned role of USG and FNAC a study was conducted in the Department of ENT and HS in ASCOMS, a tertiary care teaching hospital in North India 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 classify the neck swellings based on age group, gender and nature of lesion whether benign or malignant.

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MATERIAL AND METHODS

The present study was carried out in the Department of ENT, ASCOMS Hospital, Jammu between 1 August 2023 to 31 March 2024. Sample size taken was 60 patients.

Mode of selection: 60 patients with clinically palpable neck swellings who presented to the OPD in department of Otorhinolaryngology were enrolled for the study.

Inclusion criteria: Patients of both sexes consenting for the study with clinically palpable neck swellings and also willing to undergo ultrasonography (USG) and fine needle aspiration cytology (FNAC) of the neck swellings were included in the study.

Exclusion criteria: Patients with clinically undetectable neck swellings, previous history of neck trauma or neck surgeries, Swellings obscured by jaw bone were not included.

Study design: Cross Sectional Study.

Patients with neck swellings were included in the study. A prior informed consent from all patients was obtained. In all patients, A detailed history and local examination of neck swelling was recorded and clinical examination was carried out. A detailed local examination of swelling was done. In inspection- situation, colour, shape, size, border, surface and overlying skin over the swelling were noted. In palpation- consistency, tenderness, temperature, fluctuation, compressibility and fixity of skin over the swelling was recorded. USG Neck was done in all cases before FNAC examination. General physical examination was done and local examination was done. In palpation- consistency, tenderness, temperature, fluctuation, compressibility and fixity of skin over the swelling was recorded.

The following features were considered in describing the USG images of swelling in the head and neck in accordance with Shimizu et al. [7]

- Shape: oval, lobular, round, polygonal, irregular;
- Boundary: very clear, relatively clear, partially unclear, ill defined;
- Presence of necrosis: eccentric, central;
- Presence of calcification: macrocalcification, microcalcification;
- Echo intensity: anechoic, isoechoic, hypoechoic, hyperechoic, mixed;
- Ultrasound architecture of lesion: homogeneous, heterogeneous; , microcalcification;
- Posterior echoes: enhanced, unchanged, attenuated; and
- Ultrasound characteristic of tissues: cystic, solid, mixed

Finally, the patient was subjected to either FNAC With 24-gauge needle attached to the 10ml plastic disposable syringe FNAC were conducted in department of pathology. Ultrasound and FNAC diagnosis were correlated. After provisional diagnosis, patients underwent preliminary investigations which consisted of haemoglobin, total leucocyte count, differential leucocyte count and erythrocyte sedimentation rate. Patients with thyroid swellings also underwent thyroid function tests (Serum T3, T4 and TSH). A final diagnosis was made based on clinical and ultrasound examination

RESULTS

In this current study total numbers of male subjects were 22(36.6%) and females were 38 (63.4%). Patient age group above 21 years of age were included in the study Maximum number of cases were between 41–50-year age group followed by 31–40-year age group. (Table-1,2).

Table 1 Showing Gender distribution

Gender	Number of Patients	Percentage (%)
Male	22	36.6
Female	38	63.4
Total	60	100

Table 2 showing age group distribution

Age (in years)	Number of Patients	Percentage (%)
21-30	12	20
31-40	15	25
41-50	19	31.6
51-60	7	11.7
61-70	2	3.4
>70	5	8.3
Total	60	100

On USG, 10 swellings were found to be inflammatory, 41 were benign neoplasms and 7 were malignant in nature. (Table-3) These neck swellings USG findings were confirmed by FNAC.

Table 3 Ultrasound diagnosis of neck swellings

Types of neck swellings	USG diagnosis
Inflammatory	10
Benign	41
Malignant	7

Majority of the neck swellings (i.e. 36) were thyroid swellings. Out of these thyroid swellings 21 patients were diagnosed as benign thyroid disease. 8 patients were diagnosed as Hashimoto’s thyroiditis. 7 patients were diagnosed with suspicion of malignancy of thyroid. (Table:4,5).

Table 4 Malignant Thyroid swellings

Diagnosis	No. of cases of thyroid swellings of neck	USG/FNAC Correlation
Papillary carcinoma	5	50 %
Follicular carcinoma	1	50 %
Anaplastic carcinoma	1	50 %

Table 5 Benign thyroid swellings

Diagnosis	No. of cases of thyroid swellings of neck	USG/FNAC Correlation
Thyroid Nodular Goitre	21	100%
HASHIMOTOS Thyroiditis	8	100%

Maximum number of patients in the study i.e 36 patients had swelling in the region of thyroid. The study revealed that out of 36 thyroid swellings of neck, 4 were malignant and 32 were benign on USG. While FNAC of 36 (100%) thyroid swellings showed 29 benign and 7 malignant lesions. In case of other swellings of neck like cervical lymphadenitis, thyroglossal cyst, cystic hygroma, submandibular adenitis, the features of the swellings of FNAC were in sync with features of USG

Table 6 Correlation between clinical diagnosis, USG diagnosis and FNAC findings of neck swellings

Types of Neck Swellings	USG diagnosis (no. of patients)	FNAC diagnosis	FNAC findings of neck swellings
Cervical lymph adenitis	10	10	Inflammatory lesions, Epithelial cell granulomatous lesion
Solitary thyroid nodule	15	18	(5) Colloid nodule with cystic change (8) Hashimoto thyroiditis (5) Colloid goitre
Multi nodular goitre	7	10	(6) Colloid goitre with cystic change (4) Colloid goitre
Malignancy of thyroid	4	7	(1) Follicular carcinoma (5) Papillary carcinoma (1) Suspicious of anaplastic carcinoma
Dermoid cyst	3	3	Nucleated and non- nucleated squamous epithelium with keratin debris
submandibular adenitis	4	4	Reactive lymphoid cells
Thyroglossal cyst	7	7	Macrophages and polymorph nuclear neutrophils

Our study showed a total of 41 benign lesions in the neck and USG correctly diagnosed 37 of them. The Sensitivity, Specificity, PPV and NPV of US in this case was 96.5%, 90.3%, 87.6% and 97.1% respectively. Table- 7 compares the sensitivity analysis of Clinical diagnosis and Ultrasound diagnosis for benign swellings.

Table 7 Sensitivity analysis of benign neck swellings

Sensitivity analysis	Clinical diagnosis (%)	USG diagnosis (%)
Sensitivity	93.6	96.5
Specificity	53.8	90.3%,
PPV	54.3	87.6
NPV	93.1	97.1

In this study the sensitivity of US in diagnosing malignant lesions of the neck in 60 patients with neck swellings was 86.5% with a specificity of 97.7%, PPV 92.3% and NPV 96.5%. Sensitivity of US in detecting thyroid malignancy in the present study was 84.3%. The sensitivity of US in diagnosing malignant lymph nodes in this study was 88.5%. Table-8 compare the sensitivity analysis of clinical diagnosis and ultrasound diagnosis for malignant swellings.

Table 8 Sensitivity analysis of malignant neck swellings

Sensitivity analysis	Clinical diagnosis (%)	USG diagnosis (%)
Sensitivity	42.8	86.5
Specificity	97	97.7
PPV	97	92.3
NPV	89.3	96.5

DISCUSSION

Otolaryngologists most often see neck swellings presenting to them in all age groups. It is important to take a careful history regarding the patients age, sex, lo-cation, size and duration of the mass should along with detailed clinical examination. A comprehensive knowledge of the neck and its structures such as fascia, muscles, glands, lymphatics, vessels etc. is vital as it aids in understanding the nature and origin of the neck swellings. Ultrasonography and fine needle aspiration cytology forms the investigation of choice and prime modality among the several methods available as of now for evaluating the neck swellings. Congenital masses such as cystic hygroma, branchial anomalies, thyroglossal duct cysts, must be kept in mind as the differential diagnosis. Inflammatory and infectious causes of neck masses, such as cervical adenitis are common in young adults. Females mostly present with thyroid swellings and neoplasms (benign and malignant) are more common in adult males who present with neck swellings. For numerous clinical disorders sonography is the principal imaging modality in the evaluation of cervical soft tissue lesions. In the present study males constituted 36.6% and female 63.4% in the ratio of 1:1.75 which is in contrast with Goyal et al 1.4:1 [6] and Rauf et al 1:1 [8] and Jafri et al 1.2:1. [9] The female preponderance in the present study was because of the fact that majority of the cases were thyroid swelling and thyroid swellings were common in females. In the present study majority of the patients presented at age between 41-50 years when compared to Goyal et al which was 21-30 years [6]. This difference in the age at presentation which is more in the present study does not affect the results of the study significantly. In the present study 10 swellings were found to be inflammatory, 41 were benign neoplasms and 7 were malignant in nature. & These neck swellings USG findings were confirmed by FNAC. In our study total of 41 benign lesions in the neck and USG correctly diagnosed 37 of them. The Sensitivity, Specificity, PPV and NPV of US in this

case was 96.5%, 90.3%, 87.6% and 97.1% respectively. Table-7 compares the sensitivity analysis of Clinical diagnosis and Ultrasound diagnosis for benign swellings. In this study the sensitivity of US in diagnosing malignant lesions of the neck in 60 patients with neck swellings was 86.5% with a specificity of 97.7%, PPV 92.3% and NPV 96.5%. Sensitivity of US in detecting thyroid malignancy in the present study was 84.3%. The sensitivity of US in diagnosing malignant lymph nodes in this study was 88.5%. Table-8 compare the sensitivity analysis of clinical diagnosis and ultrasound diagnosis for malignant swellings. In a study conducted by Chandak et.al. [10] in which USG showed a sensitivity and accuracy of 98.5%, which were higher in comparison to our findings. In another study done by Venkatachalapathy et.al. [11] the sensitivity and specificity of USG was 73% and 85.3% respectively which was comparable to our findings. In another study done by Soni et. al. [12] had an overall sensitivity of 83.01% and specificity of 78.94%. Out of the 59 patients, 28 were of neck nodes, 14 were thyroid, 13 were of salivary gland origin and 4 were other types of neck masses. These findings were in contrast to our present study. The use of ultrasonography and FNAC has helped not only to determine the true nature of the swellings but also their relation to vital adjacent structures.

CONCLUSION

Ultrasonography can differentiate solid from cystic and malignant from benign neck swellings. USG for such a neck mass has to be done as a primary investigation modality since it is non-invasive, cost effective and easily reproducible. It can diagnose lesions of thyroid, salivary glands and lymph nodes as well as distinguish between abscess and cellulitis. It is superior to clinical examination in diagnosing all types of neck swellings. US findings correlate well with FNAC. In the present study USG of thyroid clearly provides conformity on benign pathology and prediction regarding malignant nature. From the present study it can be concluded that for proper diagnosis of thyroid lesion, FNAC is the main diagnostic modality.

Consent for Study

Informed consent was taken from all participants.

Conflict of interest

The authors have no conflict of interest to declare.

Funding Source

The study was conducted with no funding, and the authors have not received any financial support for this study.

ACKNOWLEDGEMENTS

We hereby express our gratitude to all of the staff and management of the hospital participating in this research, who helped us in the course of this research.

How to cite this article:

Pallavi Saroch¹., Priyanka Mahajan., Nitika Mehta. (2024). Role assessment of ultrasonography and fine needle aspiration cytology in evaluation of neck swellings-a study at a tertiary care teaching hospital in north india. *International Journal of Current Advanced Research*.13(07), pp.3194-3197.

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