**Original article:**

**Ultrasonography evaluation of benign and malignant neck masses**

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**Abstract:**

**Introduction:** Neck masses are any swellings or enlargements in the region between inferior border of mandible and clavicle. Neck masses are a common cause of diagnostic dilemma to clinicians.

**Material and methods:** The present is observational study with total 100 patients scanned on Ultrasound machine in supine position with slight neck extension after proper informed consent. FNAC was done for correlation.

**Results :**Out of 100 patients of neck lesion maximum 49 (49 %) cases showed thyroid lesions of which 30 were malignant and 19 were benign. Lymph node lesions were the second most common lesions i.e. 24 (24 %) of which 15 cases constitutes malignant followed by 9 which were benign. Sensitivity of USG in diagnosing Benign and malignant lesions was 81% with a Specificity 92 % PPV 94% NPV 78%. Therefore, the diagnostic accuracy was 86%**.**

**Conclusion:** Ultrasonography is a useful modality for diagnostic evaluation of neck masses in every age group. It is simple, non-invasive and inexpensive diagnostic imaging modality. It provides accurate and reproducible results.

**Keywords:** Neck mass , Ultrasonography

**Introduction:**

Neck masses are any swellings or enlargements in the region between inferior border of mandible and clavicle(1). Neck masses are a common cause of diagnostic dilemma to clinicians.(2) The differential diagnosis of swelling in the neck is broad and extensive and includes both malignant and benign aetiologies.(3,4) Sonography is the initial imaging modality after clinical examination for evaluation of neck masses.To permit early recognition of neck pathology, detailed anatomic correlation is mandatory. Current imaging permits a detailed analysis of the complex anatomy in this region and is the key to understanding many of its disorders including mass lesions.(5,6) The present study aims to determine the role of USG in diagnosing patients with neck soft tissue swellings as well as differentiating benign and malignant swellings with the help of FNAC correlation.

**Material and methods:**The present observational study has been carried out in department of Radiodiagnosis at tertiary care centre. Approval from institutional ethics committee was taken prior to the commencement of the study. Informed consent was taken from each participating patient. Patients were scanned in supine position with slight neck extension from the level of mandible to clavicles in transverse and longitudinal plane.

**Study population:**

Patient with complaints of neck swelling.

**Sample size:**

A total of 100 patients diagnosed with various neck swellings attending the OPD of multidisciplinary tertiary care center.

**Method of selection of study population:**

All the patient with the complaints of neck swelling and fulfilling the following criteria.

**Inclusion criteria:**

1. All patients with palpable neck swelling.
2. Patients of all age groups.

**Exclusion criteria:**

1. Swelling caused by trauma or fracture
2. Primary swellings arising from bone.
3. Apical chest lesions with extension into neck.

**Aims and objectives:**

1. To characterize the neck mass as benign and malignant.
2. To determine the accuracy of ultrasound in diagnosing neck masses.

**Results:**

Maximum patients were found amongst the age group of <30 years with 31 (31 %) patients followed by age group 41 to 50 years with 26 (26%) patients. Most of the patients were females (58%) followed by males (42%)

**Table No. 1: Distribution of cases according to Site of Mass**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Sr. No. | Site of Mass | Total  N(%) | Benign  N | Malignant  N |
| 1 | **Thyroid** | 49(49 %) | 19 | 30 |
| 2 | **Parathyroid** | 2(2%) | 2 | 0 |
| 3 | **Lymph Node** | 24(24%) | 9 | 15 |
| 4 | **Anterior cervical space** | 1(1%) | 1 | 0 |
| 5 | **Submandibular space** | 12(12%) | 9 | 3 |
| 6 | **Interfacial plane of neck** | 1(1%) | 1 | 0 |
| 7 | **Suprasternal location** | 1(1%) | 1 | 0 |
| 8 | **Floor of mouth** | 1(1%) | 1 | 0 |
| 9 | **Supraclavicular** | 1(1%) | 1 | 0 |
| 10 | **Parotid** | 4(4%) | 3 | 1 |
| 11 | **Carotid space** | 2(2%) | 2 | 0 |
| 12 | **Midline neck within strap muscle** | 1(1%) | 1 | 0 |
| 13 | **Visceral Space** | 1(1%) | 0 | 1 |
|  | **Total** | 100 | 50(50%) | 50(50%) |

**Table No. 1** shows Distribution of cases of neck lesion according to Site of Mass. Out of 100 patients of neck lesion maximum 49 (49 %) cases showed thyroid lesions of which 30 were malignant and 19 were benign. Lymph node lesions were the second most common lesions i.e. 24 (24 %) of which 15 cases constitutes malignant followed by 9 which were benign .

**Table No. 2 USG characteristics of benign lesions**

|  |  |  |
| --- | --- | --- |
| Sr. No | USG characteristics of benign lesions | N |
| 1 | **Number of lesions** |  |
|  | Solitary | 30 |
|  | Multiple | 16 |
| 2 | **shape of lesion** |  |
|  | Taller than Wide | 0 |
|  | Wider than Tall | 16 |
| 3 | **Margin** |  |
|  | Well defined | 37 |
| 4 | **Consistency** |  |
|  | Predominant Solid | 20 |
|  | Predominant cystic | 17 |
| 5 | **Echogenecity** |  |
|  | Anechoic | 20 |
| 6 | **Calcifications** |  |
|  | Macrocalcifications | 3 |
|  | Microcalcifications | 0 |
|  | Absent | 38 |

**Table No. 2 USG characteristics of malignant lesions**

|  |  |  |
| --- | --- | --- |
| Sr. No | USG characteristics of malignant lesions | N |
| 1 | **Number of lesions** |  |
|  | Solitary | 24 |
|  | Multiple | 26 |
| 2 | **Shape of lesion** |  |
|  | Taller than Wide | 4 |
|  | Wider than Tall | 26 |
| 3 | **Margin** |  |
|  | irregular | 5 |
| 4 | **Consistency** |  |
|  | Predominant Solid | 47 |
|  | Predominant cystic | 1 |
| 5 | **Echogenecity** |  |
|  | Hypoechoic | 7 |
|  | Heterogenous | 10 |
| 6 | **Calcifications** |  |
|  | Microcalcifications | 7 |
|  | Macrocalcifications | 4 |
|  | Absent | 34 |

**Table No. 3 Distribution of benign pathologies**

|  |  |  |
| --- | --- | --- |
|  | Benign pathologies | N |
| 1 | Abscess and other inflammatory lesions | 12 |
| 2 | Colloid nodule | 5 |
| 3 | Thyroid adenoma | 3 |
| 4 | Benign thyroid nodules | 9 |
| 6 | Benign neoplastic lesion |  |
|  | Pleomorphic adenoma | 3 |
|  | Warthins tumor | 1 |
|  | Nuerogenic | 2 |
| 7 | Lymph nodes |  |
|  | Reactive | 5 |
|  | Tuberculous | 4 |
| 8 | Cystic lesions |  |
|  | Lymphatic malformations | 3 |
|  | Plunging ranula | 1 |
|  | Thyroglossal duct cyst | 1 |
|  | Dermoid cyst | 1 |

**Table No. 3 Distribution of malignant pathologies**

|  |  |  |
| --- | --- | --- |
| Sr no. | Malignant pathologies | N |
| 1. | Suspicious thyroid lesions | 30 |
| 2 | Ca thyroid | 2 |
| 3 | Metastatic lymphadenopathy | 14 |
| 4 | Lymphoma | 1 |
| 5 | Ca esophagus | 1 |
| 7 | Other neoplastic lesions extending to neck | 3 |

**Table no. 4 Correlation of USG and FNAC Findings**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Sr. No. | USG Finding | FNAC Finding | | Total |
| **Benign** | **Malignant** |
| 1 | **Benign** | 47 | 3 | 50 |
| 2 | **Malignant** | 11 | 39 | 50 |
| Total | | 58 | 42 | (100 %) |

**Discussion:**

In the present research we studied 100 patients, clinically diagnosed with neck swelling attending to the tertiary care centre and medical college where the study was conducted. In our study , out of 100 patients with neck lesion maximum patients were found amongst the age group of <30 with 31 (31 %) no. of cases followed by 26 (26 %) cases were found amongst age group 41 to 50. The results are corresponds to study by Subramanyam.N et al(7) and another study by Md Atik bijapur et al (8)

Out of 100 patients of neck lesion maximum 49 (49 %) cases showed thyroid lesions follwed by lymph node lesion in 24 (24 %), these observations are comparable to study by Md Atik bijapur et al (8) .

Out of 100 Patients 4 (4 %) cases were Taller than Wide, 42 (42 %) were Wider than Tall lesion, All 4 cases with Taller that wider shape were malignant. In study done by Manoj kumar et al(7) they showed significant number of cases with taller than wider were malignant and it was a significant criterion in differentiating malignant from benign nodules.

Out of 69 cases with well defined margins 37 were benign and 32 were malignant. All cases with irregular margins and with local invasion were malignant. In as similar study done by Naaz F et al (3), 90% of the examined swellings had regular margin while only 10% had irregular margins.

In our study amongst the benign cases 20 cases were predominant solid and 17 cases were predominant cystic; whereas maximum no. of cases i.e. 47 were predominant solid in malignant category. This Corresponds to study done by Aparna et all(7)

All of the 20 cases in the present study of anechoic lesion were found to be benign whereas 10 heterogenous lesions were malignant.these observations are comparable to study by Naaz F et al(6)

Calcifications were absent in 38 cases of benign lesions and none of the benign lesions showed microcalcifications. All the 4 cases showing microcalcification were malignant in our study. In a similar study done by Akriti Rastogi et al(3) out 15 malignant cases 5 showed calcifications and in 10 cases calcifications were absent. Another similar study done by Naaz F et al(10) showed 78% (3 patients) evidence of calcification while 22% (11 patients) lacked calcification. Microcalcification helped in detecting 4 patients (8%) as having malignant features. Sensitivity of USG in diagnosing Benign and malignant lesions was 81% with a Specificity 92 % PPV 94% NPV 78%. Therefore, the diagnostic accuracy was 86%. Ajay K Goutam et al(11) in their study showed that Ultrasound made a correct diagnosis in 38 out of 50 cases, having a diagnostic accuracy of 76.0%.

**Conclusion:**

Lesions which are anechoic , wider than tall , well defined margins , with macrocalcifications and cystic in consistency are suggestive of benign lesions. The lesions which are hypoechoic or heterogenous in echogenicity, irregular margins, predominant solid consistency and with microcalcifications are suggestive of malignancy. However in our case shape of the lesion was not very helpful in differentiation benign from malignant lesions.

Ultrasonography is a useful modality for diagnostic evaluation of neck masses in every age group. It is simple, non-invasive and inexpensive diagnostic imaging modality. It provides accurate and reproducible results. It is also useful to guide the FNAC of neck lesions.

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For any images presented appropriate consent has been obtained from the subjects: NA

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