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# Predictive Value of Ultrasonography in the Differential Diagnostics of Adult Neck Masses

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**ABSTRACT**

**Background:** The role of radiologists is to differentiate between conditions using imaging modalities such as, ultrasound, Computerized Tomography and Magnetic Resonance Imaging. Where appropriate the radiologist will stage lesions for management purposes and aid in guiding aspiration and biopsy, Proper evaluation of the adult neck masses is important and ultrasonography plays a very important role in neck mass differential diagnosis. **Objectives:** To asses the predictive value of ultrasonography in differential diagnostics of adult neck masses and to find out the frequency of the different types of neck masses among adult patients presenting in a tertiary teaching hospital. **Study Design:** Cross sectional study. **Study Setting:** Study was conducted in radiology department of a tertiary care, teaching hospitals Jinnah hospital Lahore. **Sample Selection:** 73 subjects with defined neck masses not undergone diagnostic biopsy were recruited for the study. **Results:** 73 subjects were recruited for the study. The Sonographic consistency of neck masses shows 65.8% solid masses 15.1% cystic masses and 19.2% are mixed consistency. Comparison of diagnostic accuracy of ultrasonography with FNAC (Gold standard) revealed that the infective neck masses diagnostic accuracy is 27.4% on sonography as compared to 24.7% on FNAC. Cystic neck mass diagnostic accuracy was 19.2% on both FNAC as well as sonography. The diagnostic accuracy in benign neck masses showed 26.0% on FNAC and 37.0% on sonography. The diagnostic accuracy in neoplastic neck mass was 17.8% on FNAC and 9.6% on sonography. The metastatic neck mass 12.3% FNAC and 6.8% is sonography. The screening value of ultrasonography for infective neck mass the sensitivity is 90.0%, specificity is 96.2%, for cystic mass showed a 100% sensitivity, specificity, for benign neck masses showed a sensitivity 100%, for neoplastic neck mass depicted a sensitivity 53.8%, specificity. **Conclusions:** The study results suggest that Modem ultrasound is highly valuable, useful, and reliable in the differential diagnosis of tumors in the preauricular area, submandibular area, and cheek. It enables precise localization, measurements, and assessment of the structure of lesions. It may be the first and last imaging method needed to formulate the final diagnosis, or it may guide fine-needle aspiration biopsy. In many cases, ultrasound may also suggest the nature of the tumor. The accuracy of ultrasound in detecting neoplastic lesion, and metastatic lesions turned out quite lower than expected.

**Key words:** Ultrasonography, neck masses, Differential diagnosis.

## INTRODUCTION

Ultrasound imaging also called ultrasound scanning or sonography is a method of obtaining images from inside the human body through the use of high frequency sound waves. The reflected sound wave echoes are recorded and displayed as real time visual images[1]. Ultrasound imaging is used extensively for the swellings of various parts of the body and is especially used for swellings of the neck.[2] As ultrasound provides real-time images, it can also be used to guide procedures such as needle biopsies[3]. In which needles are used to sample cells from organs or swellings for laboratory testing. Infant's children and adults with neck masses frequently approach the radiologists for further evaluation. The role of radiologists is to differentiate between conditions using imaging modalities such as, ultrasound with color Doppler, Computerized Tomography and Magnetic Resonance Imaging[4]. Where appropriate the radiologist will stage lesions for management purposes and aid in guiding aspiration and biopsy, Proper evaluation of the adult neck masses require the knowledge of the anatomy of the neck[5]. Out of the non-thyroid' neck masses in the adults 80% are neoplasms. 80% of salivary gland tumors are found in parotid glands. 80% of parotid gland tumors are benign and 80% are of mixed parotid variety[6]. The differential diagnosis of neck masses among adults range from common metastatic squamous cell carcinoma to thyroid cancer, lymphoma salivary gland cancer to sarcoma respectively. The differential diagnosis of benign neck masses among adults comprise of Lymphadenopathy, specific infections, vascular anomalies like hemangiomas and lymphangiomas. Soft tissue masses like paragangliomas, lipomas and neurofibromas, thyroid goiter or other thyroid masses, salivary glands and their changes include parotid cyst, parotitis, sialolithiasis and Sjogren's syndrome. Congenital lesions of the front and lateral aspect of the neck. Symptoms that help localize primary diagnosis. Habits with increased malignancy risk are essential in the proper evaluation of the neck masses.[7]

Physicians frequently encounter neck masses in adult patients. A careful medical history should be obtained, and a thorough physical examination should be performed. The patient's age and the location, size, and duration of the mass are important pieces of information. Inflammatory and infectious causes of neck masses, such as cervical adenitis and cat-scratch disease, are common in young adults. Congenital masses, such as branchial anomalies and thyroglossal duct cysts, must be considered in the differential diagnosis. Neoplasms (benign and malignant) are more likely to be present in older adults. Though Fine-needle aspiration and biopsy and contrast-enhanced computed tomographic scanning are the best techniques for evaluating these masses but ultrasonography is also a conventional method with good specificity especially in developing country like Pakistan. An otolaryngology consultation for endoscopy and possible excisional biopsy should be obtained when a neck mass persists beyond four to six weeks after a single course of a broad-spectrum antibiotic.

It must be emphasized that the radiological findings of the neck masses should always be interpreted in conjunction with patient's age, clinical history and findings on physical examination[8].

## LITERATURE REVIEW

More than 75% of lateral neck masses in patients older than 40 years are caused by malignant tumours, and the incidence of neoplastic cervical adenopathy continues to increase with age. It is difficult to make accurate statements about the percentage of masses that fall into one or other disease grouping as there are too many variables in published data. In one of the largest series (267 patients), 74% of enlarged cervical nodes had developed from head and neck primaries and only 11% had come from primaries outside that region.[9] In the absence of any overt signs of infection, therefore, a lateral neck mass in an adult is either a metastatic squamous cell carcinoma or a lymphoma until proved otherwise.

The possible adverse effects of excisional or incisional biopsy as a primary diagnostic tool in lateral neck masses is, and has been, strongly debated. In the event that the mass is a lymphoma, adenocarcinoma, sarcoma, metastasis from a primary outside the head and neck, or inflammatory node, few would argue that anything other than accelerating the diagnostic process had been achieved, even though fine needle aspiration cytology might have avoided the need for urgent open biopsy.[10]

Fine needle aspiration cytology offers an accurate, sensitive, inexpensive, and rapid method for evaluation of a cervical adenopathy or mass. In a study of the diagnostic reliability of 350 aspiration biopsies of lymph nodes, a sensitivity of 85% and a specificity of 99% were achieved.[11] The only aspirate giving a false positive result was from a reactive node mistaken for a lymphoma, and of the nine aspirates that gave false negative results only one was a carcinoma. A case can be made for performing fine needle aspiration cytology regardless of the clinical findings. Better results are always obtained if an experienced person aspirates the mass. Slide preparation is critical for accurate diagnosis, and immediate inspection in a specialized cytopathology clinic allows additional material to be acquired if the aspirate is acellular or if further material is required for immunocytochemistry or culture.[12] For patients with poorly defined or deep seated lesions, image or ultrasound guidance can be used.[13] Inevitably, there will be cases in which the validity of fine needle biopsy is called into question. In these circumstances an open biopsy may be the only way to determine the diagnosis.

Many imaging modalities have been used to assess the neck and improve detection of small metastases in head and neck cancer. In a neck without palpable nodes, imaging can help in detecting occult metastases or in increasing the confidence that the neck is really tumour negative and can be observed.[14] Depiction of suspicious non-palpable lymph nodes can convert selective neck treatment or a wait-and-see policy to more secure comprehensive treatment of all levels of the neck. Negative imaging results, on the other hand, can be used as an argument to refrain from elective treatment of the neck if the risk of radiologically occult metastases is considered to be low enough and close follow-up using either US or US-guided fine-needle aspiration cytology (FNAC) is guaranteed. So far, several authors have shown the applicability and reasonable prognosis using this approach. Another aspect is the assessment of the exact number of lymph node metastases and the levels involved. This is becoming more important as selective neck dissection and limited image-guided radiotherapy gain popularity. Unfortunately so far no imaging studies have been published relating to this important subject.[15]

## Ultrasound

In general, US is reported to be superior to palpation in detecting lymph node metastases. Whereas some authors report it to be superior to contrast-enhanced CT and MRI, others have found similar accuracies. The advantages of US over other imaging techniques are its price and low patient burden. Furthermore, US is the only available imaging technique that can be used for frequent routine follow-up.

Because irregular echogenicity as a sign of metastatic involvement is often not present in small lymph node metastasis, the size of lymph nodes plays an important role in assessing their nature. It is clear that size and shape criteria are not very accurate for the clinically N0 neck. The criteria used in the literature vary between 8 and 30 mm. Several studies have tried to define criteria by evaluating nodal size and the histopathological outcome in neck dissection specimens. Friedman found a maximal axial diameter of 1 cm optimal, whereas Giancarlo found a minimal diameter of 1 cm. By comparing three lymph node diameters we found that the minimal axial diameter is a better criterion than the more widely used maximal axial diameter or the longitudinal diameter. Don *et al.* found that 68 of 102 (67%) metastatic nodes had a longitudinal diameter smaller than 1 cm, whereas in our study we found that 102 of 144. As a consequence, the current size criterion of 1 cm or larger misinterprets the majority of all metastases. This is especially the case in clinically N0 patients. In an US study in clinically node-negative patients, it was found that for level 2 a criterion of 7 mm for the minimal diameter renders the best compromise, whereas for the rest of the neck, lymph nodes with a minimal diameter of 6 mm should be considered suspicious. During follow-up, an increase in size is a strong argument for metastasis.

As lymph nodes with metastases tend to become a rounder shape, shape is used as a criterion by several authors. In general, a round shape is considered more suspicious than an oval or flat shape. In reactive nodes, the ratio of the longest diameter over the shortest diameter is 2 or higher in 86% of cases. In stead of diameter or shape, the axial surface might be a better criterion. Umeda *et al.* showed that a surface area of 45 $mm^2$ correlated better with histopathology than using a minimal or maximal axial diameter.

## Fine needle aspiration cytology

Because many authors have found that borderline lymph nodes cannot be reliably characterized on US, CT, and MRI, and because radiological criteria are not as reliable as cytology, US-guided FNAC has gained popularity since its introduction some 20 years ago. In the United States this technique has received fewer acceptances because it is operator dependent. Although the technique is not difficult, considerable training is required to aspirate from lymph nodes as small as 4-5 mm and still obtain sufficient cells[25], and to select the most suspicious lymph nodes from which to aspirate. For this it is necessary to have clinical information on the primary tumour and knowledge about the patterns of lymphatic spread from this tumour. It has been shown that US-guided FNAC has a very high specificity, approaching 100% as epithelial cells in lymph nodes are seldom diagnosed falsely. To obtain a high enough sensitivity, lymph nodes as small as 4-5 mm in the first two echelons should be aspirated. Although aspirating smaller nodes will probably increase the sensitivity, it is difficult to obtain a diagnostic aspirate from nodes of 3 mm or smaller. In a previous report, we found that with use of this US-guided FNAC we obtained a sensitivity of 73% with a specificity of 100% in N0 necks. This was significantly better than CT or MRI. Only two other studies have compared US-guided FNAC to CT and MRI and found it to be superior as well. Also for melanoma metastasis it was found to be the most accurate technique. Recently, however, in a multicentre study using US-guided aspiration, Takes *et al.* reported a sensitivity of only 42% for the N0 neck. Righi *et al.* found a sensitivity of 50%, which was inferior to the 60% for CT; however, in Righi's study, most false negatives were found at the beginning of the study and some of these were irradiated patients or non-squamous cell carcinoma patients. False-negative US-guided FNAC results may be the result of aspirating the wrong node or the wrong part of the correct node (=sampling error). Furthermore, the cytopathologist may overlook single tumour cells. A technique which was supposed to increase the accuracy of US-guided aspiration is better selection of the node to aspirate by the sentinel node procedure. The concept of the sentinel node approach is based on the knowledge that nodal metastases progress in an orderly manner with the first site of metastases occurring in the sentinel node. Initial reports on sentinel node biopsy in oral cancer have shown promising results. However, it remains an invasive technique and lymph node metastases close to the primary tumour, *e.g.* level 1 node in oral cancer, can be difficult to detect using scintigraphy[29]. The sentinel node detection technique involves injecting around the primary tumour site with Tc-99m-labelled colloid. The localization of the sentinel node is then performed by planar scintigraphy and the use of a hand-held gamma camera. We have tried to combine the non-invasive US-guided FNAC procedure with lymphoscintigraphic detection of the sentinel node. Unfortunately, this combination of the sentinel node procedure and US-guided FNAC has not improved our results obtained without sentinel node scintigraphy. In these studies we could also show that the sensitivity of US-guided FNAC for the clinically N0 cases varied widely in relation to the patient population studied. In patients treated with elective neck dissection, the sensitivity was 71%, similar to previous studies. However, in the group of patients treated with transoral excision only and follow-up of the neck, the sensitivity was only 25%. The reasons for this lower sensitivity might be the unreliability of histopathological examination in the electively treated group.

## Objective

To asses the predictive value of ultra sonography in differential diagnostics of adult neck masses.

## Operational definitions

### Adult neck mass

Any obvious swelling visible to naked eye situated around the area of neck presented in hospital for treatment due to symptoms or due to cosmetic reasons by adults 18 years and above.

### Ultrasonography

Ultrasound using 5-7 MHz convex probe was performed in multiple planes through anterior, posterior and over the mass. Findings like number, size, consistency and texture with marginal definition was recorded on the specially designed proforma which is attached. FNAC was done (on Siemens ultrasound machine and 21G LP needle was used for FNAC) in every patient.

## Fine needle aspiration cytology

Commonly used short for this procedure is FNAC. This is done to retrieve a small amount of aspirate or a small piece of tissue from a mass or collection within the body. The purpose of the procedure is to see the type of cells retrieved. In our setting the imaging modality used was ultrasound. Under direct vision with the help of ultrasound the area of interest' approached and with the help of LP needle sample collected. This sample was either places on slide or sent to pathology department in a test tube.

## MATERIALS AND METHODS

**Study design**

Cross sectional study.

**Study setting**

The study was carried out in the Radiology department of Jinnah Hospital Lahore; a tertiary care hospital.

**Duration of study**

The study was completed in one year.

**Sample size**

Sample size for determination of proportion calculated from epi-info version 6.0

- Confidence level = 95 %
- Estimated true proportion = .05
- Maximum acceptable difference = .05
- The minimum estimated sample size = 73 subjects.

**Sampling technique**

Non-probability, convenience sampling.

**Sample collection**

**a) Inclusion criteria**

- Age 18 years and above of either sex
- Undiagnosed cases of neck masses presenting for first time for diagnosis and treatment.

**b) Exclusion criteria**

- Diagnosed cases of neck masses.
- Patients having diffuse swelling of the neck.
- Patient operated for neck masses with clinical or laboratory diagnosis.
- Patients below 18 years of age with neck swelling
- Any neck masses whose origin outside neck area.

**Data collection procedure**

The data was collected in a structured questionnaire. Duration of Data Collection was 12 month time period. The subjects were recruited from surgical and otolaryngology out patient department. Those who fulfill the inclusion criteria were recruited for the study after an informed written consent by the subject. The investigation and treatment protocol was discussed in detail with the consulting physician, researcher himself and head of department of radiology. The demographic profile including name, age, sex, address etc was recorded. Clinical history in terms of symptoms, signs, severity and duration was enquired. After taking informed consent for non invasive and invasive intervention the subjects were subjected to ultrasonography of the lesions. Diagnosis of Ultrasonography finding was established by the researcher himself with team of consultants in department of radiology. For final diagnosis fine needle biopsy performed by the researcher himself and specimen was sent to pathology department Allama Iqbal Medical College, Lahore. The detailed report of ultrasonography and FNAC was furnished to consulting physician and his team for treatment and follow up and information collected was used for assessing the role of ultrasonography in differential diagnostics of adult neck masses.

**Data analysis**

The data collected was entered in SPSS version 10.0 and was used for analysis.

Frequency tables were generated for demographic variables and the different groups of neck masses diagnosed on basis of ultra sonographic findings and fine needle aspiration cytology. Ratio and proportions were calculated. Cross tabulations were done for independent variables of interest like age, sex, size, consistency, location of lesions, fine needle aspiration biopsy (FNAC) diagnosis and dependent variable ultrasonography Diagnosis. Diagnosis of the neck mass on the basis of findings of ultrasound scan was validated' with the FNAC findings. Sensitivity, specificity, positive and negative predictive values for ultrasonography was calculated using fine needle aspiration cytology as Gold standard. All tables incorporated in one table.

## RESULTS

Seventy three subjects with neck masses were recruited for the study. 46.6% of the subjects were in age group 31–60 years. 43.8% of the subjects were in age group 18–30 years. 9.6% of the subjects were in age group 61–90 years. Mean age of subjects 37.81 years with a median age of 34 years and modal of 18 years suggesting a non normal distribution (Table 1). 46.6% of subjects were male and 53.4% were females. (Table 1) Symptom of dysphagia which is associated with neck mass shows 26.0% of the subjects had the symptom of dysphagia where as 74.0% did not have dysphagia (Table 1). The symptom of Dysponea was found in 13.7% of individuals and 86.3% did not show any symptom of Dysponea (Table 1) Change of voice, another symptom associated with neck mass shows that 15.1% of subjects had a voice change whereas 84.9% did not have a voice change (Table 1).

60.3% of the neck masses were less than 10cm$^2$ where as 16.4% were between 11- 20cm$^2$. 13.7% were from 21-30cm$^2$ and 9.6% were within the range of 31-40cm$^2$.Table:1(size of neck masses) 83.6% of the neck masses showed soft consistency whereas 16.4% were hard masses (Table 1) 23.3% masses in upper mid line region, 19.2% in the lower mid line region, 5.5% is left upper neck, 6.8% in left mid neck, 2.7% in left lower neck, 1.4% in left supraclavicular region, 1.4% in left posterior triangle, 19.2% in right upper neck 12.3% in right mid neck and 8.2% in right lower neck (Table 1). The Sonographic consistency of neck masses shows 65.8% solid masses 15.1% cystic masses and 19.2% are mixed consistency and sonographic texture of neck masses shows 37% echogenic masses, 43.8% hypoechoic masses and 19.2% mixed (Table 1), Comparison of diagnostic accuracy of ultrasonography with FNAC (Gold standard) revealed that the infective neck masses diagnostic accuracy is 27.4% on sonography as compared to 24.7% on FNAC. Cystic neck mass diagnostic accuracy was 19.2% on both FNAC as well as sonography. The diagnostic accuracy in benign neck mass showed a 26.0% on FNAC and 37.0% on sonography. The diagnostic accuracy in neoplastic

**Table 1: Characteristics of neck masses (n=73).**

| | Number | Percent |
|---|---|---|
| **Age of respondents** | | |
| Mean | 37.81 | |
| Std, Deviation | 18.001 | |
| 18 - 30 years | 32 | 43.8 |
| 3 1 – 60 years | 34 | 46.6 |
| 61 - 90 years | 7 | 9.6 |
| **Gender of subjects** | | |
| Male | 34 | 46.6 |
| Female | 39 | 53.4 |
| **Symptoms associated with neck mass** | | |
| **Dysphagia** | | |
| Yes | 19 | 26.0 |
| No | 54 | 74.0 |
| **Dysponea** | | |
| Yes | 10 | 13.7 |
| No | 63 | 86.3 |
| **Voice change** | | |
| Yes | 11 | 15.1 |
| No | 62 | 84.9 |
| **Size of neck mass (cm$^2$)** | | |
| <10 | 44 | 60.3 |
| II - 20 | 12 | 16.4 |
| 21 - 30 | 10 | 13.7 |
| 31 - 40 | 7 | 9.6 |
| **Consistency of neck masses** | | |
| Soft | 61 | 83.6 |
| Hard | 12 | 16.4 |
| **Location of neck mass on ultrasonography** | | |
| Posterior Auricular | 1 | 1.4 |
| Mid Jugular | 18 | 24.7 |
| Supra clavicular | 24 | 32.9 |
| Sub mental | 8 | 11.0 |
| Sub mandibular | 20 | 27.4 |
| Posterior triangle | 2 | 2.7 |
| **Ultrasonographic consistency of neck masses** | | |
| Solid | 48 | 65.8 |
| Cystic | 11 | 15.1 |
| Mixed | 14 | 19.2 |
| **Ultrasonographic texture of neck masses** | | |
| Echo | 27 | 37.0 |
| Hypo | 32 | 43.8 |
| Mixed | 14 | 19.2 |

neck mass was 17.8% on FNAC and 9.6% on sonography and for metastatic neck mass 12.3% for FNAC and 6.8% for sonography (Table 2).

**Table 2: Comparison of sonographic differential diagnosis with FNAC.**

| | Diagnosis by FNAC (Gold Standard) | | Diagnostic accuracy Ultrasonography | |
|---|---|---|---|---|
| | No. | % | No. | % |
| Infective neck mass | 18 | 24.7 | 20 | 27.4 |
| Cystic neck mass | 14 | 19.2 | 14 | 19.2 |
| Benign neck mass | 19 | 26.0 | 27 | 37.0 |
| Neoplastic neck mass | 13 | 17.8 | 7 | 9.6 |
| Metastatic neck mass | 9 | 12.3 | 5 | 6.8 |
| Total | 73 | 100.0 | 73 | 100.0 |

The screening value of ultrasonography for infective neck mass the sensitivity is 90.0%, specificity is 96.2%, Positive predictive value is 90.0% and negative predictive value is 96.2%. (Table 3). The screening value of ultrasound for cystic mass showed a 100% sensitivity, specificity, positive and negative predictive values (Table 3) Screening value of sonography for benign neck masses showed a sensitivity 100.0%, specificity 85.2%, PPV 70.4% and NPV 100% (Table 3) The screening value of ultrasound for neoplastic neck mass depicted a sensitivity 53.8%, specificity 90.0%, PPV 100% and NPV 100% (Table 3). The screening value of ultrasound for metastatic neck mass sensitivity is 55.6%, specificity is 93.8%, PPV is 100.0 % and the NPV is 100% (Table 3).

## DISCUSSION

The utility of ultrasonography in describing masses as its location, dimensions, shape, structure, and relationship to surrounding organs or tissues is well documented in many pathologic lesions in various parts of the body. With the use of ultrasound, sub clinical lesions may also be found. In the post operation study by Gritzmann et al, as many as 76% of clinically undetected Warthin tumors were detected by ultrasound. Also, the metastatic lymph nodes 5.5% was discovered during routine follow-up. In our study, 73 subjects were

**Table 3: Sensitivity, Specificity and predictive values of ultrasonography in differential diagnostics of neck masses.**

| Ultrasonography | Yes | No | Total |
|---|---|---|---|
| **Infective neck mass** | | | |
| Yes | 18 | 2 | 20 |
| No | 2 | 51 | 53 |
| Total | 20 | 53 | 73 |

Sensitivity = a / a + c * 100 = 18/20 * 100 = 90.0 % Specificity = d / b + d * 100 = 51/53 * 100 = 96.2 % PPV=a/a+b* 100=18/20* \00=90.0% NPV=d/c+d * 100=51 /53 * 100=96.2%

| Ultrasonography | Yes | No | Total |
|---|---|---|---|
| **Cystic Mass** | | | |
| Yes | 14 | 0 | 14 |
| No | 0 | 59 | 59 |
| Total | 14 | 59 | 73 |

Sensitivity = a / a + c * 100 = 14/14 * 100 = \00.0 % Specificity = d / b + d * 100 = 59 / 59 * 100 = \00.0 % PPV = a / a + b * 100 = 14 / 20 * 100 = \00.0 % NPV = d / c + d * 100 = 59 / 59 * \00 = \00.0 %

| Ultrasonography | Yes | No | Total |
|---|---|---|---|
| **Benign neck mass** | | | |
| Yes | 19 | 8 | 27 |
| No | 0 | 46 | 46 |
| Total | 19 | 54 | 73 |

Sensitivity = a / a + c * 100 = 19/ 19 * 100 = \00.0 %
Specificity = d / b + d * 100 = 46 /54 * \00 = 85.2 % PPV = a / a + b * 100 = 19/27 * 100 = 70.4 %
NPV = d / c + d * 100 = 46 / 46 * \00 = \00.0 %

| Ultrasonography | Yes | No | Total |
|---|---|---|---|
| **Neoplastic neck mass** | | | |
| Yes | 7 | 6 | 13 |
| No | 6 | 54 | 60 |
| Total | 13 | 60 | 73 |

Sensitivity = a / a + c * \00 = 7/ 13 * 100 = 53.8 % Specificity = d / b + d * 100 = 54 / 60 * 100 = 90.0 % PPV = a / a + b * 100 = 7/13 * 100 = \00.0 % NPV = d / c + d * 100 = 54 / 60 * \00 = \00.0 %

| Ultrasonography | Yes | No | Total |
|---|---|---|---|
| **Metastatic neck mass** | | | |
| Yes | 5 | 4 | 9 |
| No | 4 | 60 | 64 |
| Total | 13 | 60 | 73 |

Sensitivity = a / a + c * 100 = 5 /9 * 100 = 55.6 % Specificity = d / b + d * \00 = 60/64 * \00 = 93.8 % PPV = a / a + b * 100 = 5 /9 * \00 = 100.0 %
NPV = d / c + d * 100 = 60 / 64 * 100 = \00.0 %

recruited for the study. The sonographic consistency of neck masses shows 65.8% solid masses 15.1% cystic masses and 19.2% are mixed consistency (Table 1). The sonographic texture of neck masses shows 37% echogenic masses, 43.8% hypoechoic masses and 19.2% mixed. Table1.The accuracy of ultrasound for neoplastic neck mass shows a sensitivity of 53.8%, specificity 90.0%, PPV 100% and NPV 100% (Table 3). The screening value of ultrasound for metastatic neck mass. The sensitivity is 55.6%, specificity is 93.8%, PPV is 100% and the NPV is 100% (Table 3).

Ultrasonography is a useful technique to assess superficial parotid, submandibular, and sublingual masses. Gritzmann demonstrated in a blinded retrospective review that 287 (95%) of 302 space-occupying lesions of the major salivary glands (285 in the parotid, 13 in the submandibular, and four in the sublingual glands) could be completely delineated at Ultrasonography. All 302 neoplasms were hypoechoic to normal glandular tissue. Ultrasonography enabled correct assessment of whether a lesion was benign or malignant in 272 cases (90%) on the basis of definition of the margins of the tumor, but 28% of malignant lesions (16 of 58 lesions) were misinterpreted as being benign.

The limitations of Ultrasonography (even in the best of hands) include its inability to evaluate deep parotid masses, lesions obscured by the mandible, parapharyngeal extension, retropharyngeal and deep neck adenopathy, and the intracranial or skull base extent of a mass. Ultrasonography shows a lack of specificity for cystic lesions, and the relationship of a tumor to the facial nerve is hard for surgeons to appreciate on Ultrasonography images. Cervical mass due to lymphadenopathy is a common cause for consultation of an ENT specialist by patients. 133 lymph nodes were evaluated in the study. Lymphadenitis was demonstrated in 72 cases, whereas 61 of the lumps showed metastases of squamous cell carcinoma of the head and neck region. Three patients with primary malignant lymphoma were excluded from the study. The results of this study demonstrate an increase of the ultrasound specificity in differentiation of pathological cervical lymph nodes using color flow imaging. Unfortunately, this method does not enable the physician to correctly diagnose the findings in all patients. Therefore histological evaluation is mandatory in all doubtful cases.

## CONCLUSIONS

Modern ultrasound is highly valuable, useful, and reliable in the differential diagnosis of tumors in the preauricular area, submandibular area, and cheek. It enables precise localization, measurements, and assessment of the structure of lesions. It may be the first and last imaging method needed to formulate the final diagnosis, or it may guide fine needle aspiration biopsy. In many cases, ultrasound may also suggest the nature of the tumor. The accuracy of ultrasound in detecting neoplastic lesion, and metastatic lesions turned out is quite lower than expected.

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