

Accuracy of FNA and Radiological Imaging based on Histological Results of Patients with Neck Lumps: A Comparative Study

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Abstract: ***Objective:** This study aims to quantitatively compare results related to the accuracy of radiological modalities, FNACs, and histology findings during treatment among patients complaining of neck lumps. This is done to determine the accuracy and specificity of each investigation by classifying the results into two categories: benign and malignant lumps. **Methods:** Retrospective data were collected for a random selection of records collected from 77 patients at King Hussein Medical Center (KHMC) and Queen Alia Military Hospital (QAMH) in Jordan who were placed under the care of Jordanian Royal Medical Services. These patients complained of neck lumps, and their FNA, radiological imaging, and histology results were compared. **Results:** The comparison showed that the FNA results were more accurate than radiological modalities. **Conclusion:** Because of the critical roles of radiology modalities and FNAC during the diagnosis and treatment of patients with neck lumps, expert physicians must be involved in this process to increase the accuracy of radiology investigations.*

Keywords: FNAC, accuracy, specificity, CT

1. Introduction

A proper investigation is critical to ensure the overall efficiency of diagnoses, and systematic and organized plans increase trust in diagnoses while enhancing the relationship between medical personnel and patients. Currently available methods for studying neck lumps include radiological imaging [4, 5], fine needle aspiration (FNA) [6, 7], cytology (FNAC) [8], and histology studies [9 - 11].

FNA: FNA involves removing tissue or fluid with a thin needle for examination under a microscope [2]. After aspirating the specimen, it should be sent to the cytology department in the laboratory to be studied. Many factors can affect the accuracy of FNA results. Thus, the diameter of the lump should be greater than 1 cm—smaller samples could be rejected as they can be aspirated from the surrounding tissue more than from the lump. Moreover, FNA should be carried out easily if the lump is palpable. FNA must be carried out with ultrasound guidance deep lumps or lumps that are close to a vascular structure.

The experience of radiological physicians also plays an important role in FNA procedures. Physicians who are well-trained in using ultrasound guidance when performing neck lump FNAs tend to produce accurate results. A philosophy of teamwork is also important for FNA. When performing FNA, the medical team must consist of a radiologist, a surgeon, and a laboratory technician—each person's experience in their respective field is very important to the outcome.

A study published in 2019 states that “the FNA of head and neck masses has a high accuracy allowing a correct therapeutic management. However, this accuracy depends on the anatomic location of the mass. Overall sensitivity and specificity of FNAC for a malignant diagnosis were 92% and 94.4%, respectively.” [3].

Radiological imaging: Radiological imaging covers multiple disciplines including ultrasound imaging, CT scans, and MRI scans. Such tasks play a vital role in determining the severity of a lump. Radiology is crucial in describing a lump's shape, size, and any integration it might have with another vascular structure, especially if the lump is deep.

In general, radiological imaging is quick, and the patient does not need to undergo any special preparations beforehand. Moreover, the results of the radiological imaging are available immediately after the procedure, which means that the physician can easily determine the next step in a patient's treatment straightaway. In addition, remote consultations can be performed, especially if the lump has acute effects on the normal life of a patient.

CT scanning can require some caution and has contraindications, like pregnancy. Some patients who are advised to undergo a CT scan may need to be given an intravenous contrast, which can interfere with their kidney function [12].

Histology studies: Histology studies are considered the best way to determine the nature of lump tissue, though results take longer to confirm than when FNA or radiology are used. The process of histology starts by either excising a lump or carrying out a Tru - Cut of the tissue, after which the tissue is sent to the laboratory. The tissue is studied under the microscope, such that the results are 100% accurate. Due to the special preparation of the specimen slides and the experience of the technicians and physicians in the laboratory, histology results are considered extremely reliable. Thus, they can be used to prove or disprove the results of previous investigations. Also, the treatment of a patient can be altered depending on the results of a histology study.

2. Methodology

In this study, we compared the accuracy of FNA and radiological imaging results with the results of histology studies. This comparison was made based on retrospective data collected from 77 patients who had complained of neck lumps and had been placed under the care of Jordanian Royal Medical Services. Patient records from King Hussein Medical Center (KHMC) and Queen Alia Military Hospital (QAMH) in Jordan were selected randomly.

The area of data collection was Jordanian Royal Medical Services at KHMC and QAMH. The data source was the radiology department and laboratory department. Demographic data that were considered insignificant during sample selection were race, gender, date of visit, and marital status.

After collecting the data, the results were divided into three categories: FNA results, radiology results, and histology results.

The key shown in Table 1 is used to simplify our findings. Descriptions of each finding are provided below.

Table 1: Definitions of key terms used to compare the results

The key	Description
Confirmed	The histology results confirm the result of the investigation result, which is one of two results (benign or malignant).
False positive	The investigation results indicate that the lump is malignant, but the histology result shows that the lump is benign.
False negative	The investigation results indicate that the lump is benign, but the histology result shows that the lump is malignant.
Sensitivity	The percentage of patients with a disease who are correctly identified by the test (true positive).
Specificity	The percentage of patients without the disease who are correctly excluded by the test (true negative).

FNA results

All FNA results corresponded with histology results. Thus, the FNA accuracy was 100%.

Discussion: In investigating why the accuracy of FNA results was high, we found that an FNA sample could be rejected if the quantity of the tissue was not sufficient (QNS). The second reason is that the sample to be examined under the microscope undergoes various preparation steps beforehand—following the team approach, which avoids depending solely on the opinion of a physician, any person on the team could reject the sample if it did not meet specific requirements. Third, the final decision about the specimen was made not by a resident but by a laboratory consultant who is an expert in their medical field and is the same specialist who studies histology samples.

Radiological imaging results

The radiological imaging results are less accurate than the FNA results, as indicated by the mixture of confirmed, false positive, and false negative results (Table 2).

Table 2: Radiology modality results

Radiology results/histology results	Confirmed (sensitivity and specificity)	False positive	False negative
	45/77 (58%)	27/77 (36%)	5/77 (6%)

3. Discussion

We found that most of the results (58%) were “confirmed.” We also found spurious false positive results. However, such results are to be expected and are acceptable. These results were due to the shape of a lump and the radiological modality used with each lump. The experience of the physician also led to false positive results. This is because radiology residents are responsible for performing radiological procedures even though they are relatively inexperienced at interpreting the results. Therefore, they do not always correctly decide whether a lump is malignant. False negative results comprised 6% of all results, and most of the lumps that yielded such results had not undergone sufficient changes to look like malignant tissue. This is an acceptable result and is related to the change of the shape of lumps, specifically regarding their similarity to tumors.

4. Conclusion

By comparing our study’s results with those in the extant literature, we found that radiology modality results are significant. Specifically, they are very low. There is a need to create protocols that guide physicians and technicians to provide high - quality care to patients with neck lumps. Such protocols can reduce and manage errors based on personal judgments. The literature review did not indicate any available protocols related to the diagnosis of neck lumps.

In addition, more radiology physicians should be involved in each patient’s report to ensure that lumps are classified correctly. Further studies are required to help develop a well - defined policy that can introduce protocols for diagnosing neck lumps.

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