

The Role of Ultrasound-Guided Lung FNAC Exam in the Diagnosis of Bronchogenic Carcinoma

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الخلاصة

تبحث هذه الدراسة في الدور الذي يمكن أن يلعبه و القابلية التشخيصية العالية لفحص الرشف الابري الدقيق للأنسجة الرئوية تحت التوجيه بواسطة السونار بالنسبة للمرضى الذين يشك بإصابتهم بسرطان الرئة، خصوصاً مع ما يتمتع به هذا الفحص من سهولة و سلامة مقبولة لكل من الفاحص و المريض.

Abstract

Background: From June 2008 to August 2010, we were involved in the management of 166 cases with suspected bronchogenic carcinoma. Ultrasound-Guided Lung Fine Needle Aspiration Cytology (FNAC) exam was performed to 75 cases .

Aim: To assess the value and safety of ultrasound-guided lung FNAC exam in the diagnosis of bronchogenic carcinoma.

Methods: FNAC specimens from the lung were achieved under ultrasound guide from clinically fit patients with suspected pulmonary radiological shadows, immediate cytological study was performed after staining with Papanicoloua and Geimsa stain.

Results of the 75 patients with FNAC exam:

A) In 57 cases, the results were bronchogenic carcinoma, and the following management steps prove no controversy between the final diagnosis and the FNAC results, except in one case where the biopsy result from resected lobe was TB infection, whereas the FNAC result was SCC of the lung (false positive result).

B) In 18 cases, the results were as follows:

1. Six cases were with different benign looking results, but later investigations prove malignant nature of the case (false negative results).
2. Four cases were with benign looking results, and their clinical state and radiological changes all resolve after a complete course of pneumonia management. (true negative results).
3. Three cases were with TB results with response to anti TB measures (true negative results)
4. Five cases were with benign looking results but they didn't continue their management under our supervision.(discharged from the study).

Conclusions: Ultrasound Guided FNAC Exam from suspected pulmonary masses provides accurate diagnosis with minimal complications.

Introduction

Lung cancer is usually suspected on the basis of an abnormal radiographic imaging study, often in conjunction with symptoms caused by either local or systemic effects of the tumor. The modality selected to diagnose a suspected lung cancer is based on the size and location of the primary tumor in the lung, the presence of potential metastatic spread and the anticipated treatment plan⁽¹⁾.

The diagnosis of lung cancer by cytologic methods is of historic interest because they were early manifestations of malignancy as diagnosed by examining the exfoliated cells. Donne and Walsh noted that exfoliated respiratory cells including cancer cells occurred in sputum as early as 1845. the first major series in patients in which the examination of sputum led to a diagnosis of lung cancer was by Hamplen in 1919⁽²⁾.

After several years of quiescence, pulmonary cytology enjoyed a period of rapid development in the 1970s and 1980s. During this time, fine needle aspiration was validated as an alternative to open lung biopsy and technical advance in radiologic technique as well as improvement in the design of bronchoscopes permitted the imaging of small lesions and guidance of fine needle⁽³⁾.

A histologic or cytologic diagnosis may be obtained by sputum cytology, bronchoscopic wash, brush, and/or biopsy of the tumor, needle aspiration or biopsy of the primary tumor or of a metastatic site, and open-surgical biopsy may be required occasionally in a few patients, and histologic diagnosis may not be established until thoracotomy⁽⁴⁾.

Fine needle aspiration cytology is a well established method of diagnosing both neoplastic and inflammatory conditions of the lungs. Together with other cytological methods of diagnosis of lung diseases, it has resulted in a decrease in the performance of procedures that are more invasive in nature⁽⁵⁾.

Patients and Methods

From June 2008 to August 2010, we were involved in the management of 166 cases with suspected bronchogenic carcinoma, the suspicion was made depending on different clinical and radiological data.

In every case with suspected bronchogenic carcinoma, we tried to reach the definitive diagnosis with the most easily performed procedures like sputum cytology, pleural fluid cytology...etc. If the patient couldn't produce sputum, or the sputum result was negative for malignancy and there is no definitive benign diagnosis yet, we

shifted to more invasive tests, and here we needed CT scan of the chest to precisely determine the size and to localize the query area or mass, and then:

A) If the mass was peripheral or central with peripheral extension, we proceeded with FNAC exam of the lung under US guide which help us to precisely localize the mass and it's distance from the chest wall, And again if the result was negative and the suspicion is still available, we went ahead for diagnostic bronchoscopy or even open lung biopsy.

B) If the result of the CT scan was centrally located mass, the FNAC exam might be dangerous and bronchoscopic study was a better option.

C) In small group of patients with advanced disease and metastasis, our work was directed to get histopathological or cytological samples from metastases like cervical lymph nodes, liver secondaries, pleural biopsy...etc. in order to directly diagnose and stage the tumor.

The group of our study was the group to whom FNAC exam from the lung was performed (75 patients), others (91 patients) were managed without performing FNAC.

For those patients who were not admitted and their clinical symptoms were accepted e.g. mild dyspnoea, slight hemoptysis...etc. ,we performed the FNAC exam as a day case. In case of severe symptoms, we tried to stabilize the patient medically prior to performing the exam.

Those patients who are already admitted, the FNAC exam was part of hospital management.

Clinical checking is all what was performed post procedure with **no** routine investigations in case of **no** clinical deterioration.

Results:

- 1) the positive results were 57, only one of them proved to be false positive.
- 2) The negative results were 18 cases, five of them discharged from the study because they didn't continue their management, and six of the remaining cases proved to be malignant with other modalities of investigation, so 6\13 were false negative results.
- 3) The true negative results were 7, three of them were TB infection and the other four were simple chest infection.

The following table summarizes such results:

| Test result | Bronchogenic carcinoma | | |
|-------------|------------------------|--------|-------|
| | present | absent | total |
| +ive | 56 | 1 | 57 |
| _ive | 6 | 7 | 13 |
| total | 62 | 8 | 70 |

Table-1: results of FNAC regarding the diagnosis of bronchogenic carcinoma

According to table-1:

- a) The sensitivity of the test is: 90.3% ⁽⁶⁾.
- b) True positive test : 98.2%
- c) The specificity of the test is: 87.5% ⁽⁶⁾.
- d) True negative test: 53.8%

4) The true positive results were 56 cases, and the number of malignant cases according to cell type was as follows:

| Malignant cell type | Number of cases |
|---------------------------------------|-----------------|
| Squamous cell carcinoma | 35 |
| Adenocarcinoma | 17 |
| Large cell undifferentiated carcinoma | 2 |
| Small cell undifferentiated carcinoma | 2 |
| Combined squamous and adenocarcinoma | zero |

Table-2: malignant cell type distribution

The following diagramme shows the percentage of such distribution

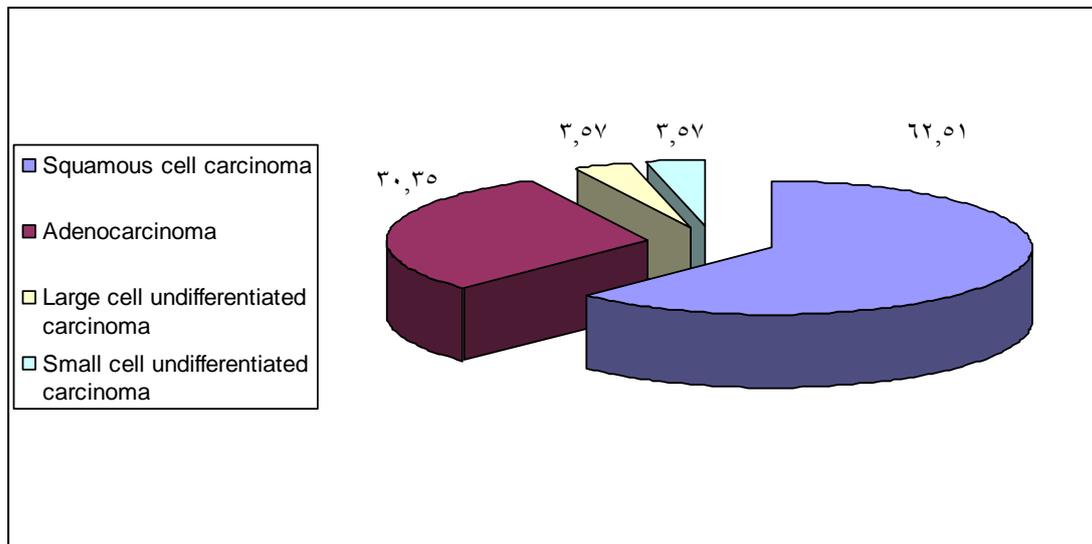


Diagramme-1: percentage of malignant cell type

5) The procedure was performed as a day case with very little complications, the most common complications were slight chest pain, dyspnoea and non significant hemoptysis.

6) Hospitalization needed in only tow cases, one because of pneumothorax, and the other because of significant hemoptysis, both of them were discharged after improvement.

Discussion

Fine needle aspiration for cytologic evaluation may be accomplished via the fiberoptic bronchoscope (transbronchial needle aspiration cytology) or percutaneously⁽⁷⁾. Our work is still using the percutaneous method because the transbronchial method is still not available.

The success of cytology in establishing the diagnosis of bronchogenic carcinoma is linked to several factors that include experience of the cytologist, the biological behavior and the morphological features of the tumor, adequacy of the sample and the technical quality of specimen processing. The overall results depend on the laboratory while negativity rates depend on the population served, the patient selection and the care taking in obtaining satisfactory specimens⁽⁸⁾. Our overall results can give us a great degree of confidence that all such determinant of success are available.

The accuracy of diagnosis of peripheral tumors with FNAC is in the range of 84-95%. False positive results are rare⁽⁷⁾. This is consistent with our results with 90.3% sensitivity (the sensitivity of a test is the probability of a positive test result given the presence of the disease)⁽⁶⁾ and 98.2% true positive result.

In indeterminate peripheral lesions that are initially considered to be benign or non diagnostic on FNAC, the incidence of tumor has been reported to be subsequently as high as 29%⁽⁷⁾. Our work results are also consistent with such data with specificity result was 87.5% (the specificity of a test is the probability of a negative test result given the absence of the disease)⁽⁶⁾ and true negative test result is 53.8% .

The proportion of each cell type tumor of bronchogenic carcinoma is squamous cell carcinoma 30-50%, adenocarcinoma 15-35%, large cell undifferentiated carcinoma 10-15%, Small cell undifferentiated carcinoma 20-25%, combined squamous and adenocarcinoma 1.5%⁽⁹⁾. We succeeded in reaching near figures to such proportions which can point to precise work and results, and our results were 62.51%, 30.35%, 3,57%, 3,57%, and zero% (respectively).

The most common complications of the procedure are pneumothorax and mild hemoptysis. Although the reported incidence of pneumothorax varies greatly, the rate of postprocedure pneumothoraces requiring intervention ranges from 1.6 to 17%^(10,11). Hemoptysis occurs in 5-10% of cases and is usually self-limited. Massive hemoptysis is extremely rare^(12,13). The safety of the procedure is so clear that encourage us to practice it as a day case procedure with nature and incidence of complications not different from that reported worldwide.

Conclusions

The role of cytopathology in the diagnosis of bronchogenic carcinoma is great despite few false positive or false negative results⁽¹⁴⁾. This is the case with the teacher, and still the case with the students.

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