

The Effect of Size of the Needle on the Rate of Pneumothorax after CT Guided Transthoracic Needle Aspiration Biopsy of Lung Masses

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Purpose of Study: To analyze the rate of Pneumothorax after CT guided TNAB of lung masses, using multiple needle sizes

Patients and Method: Seventy patients underwent CT guided FNA of the chest masses.

Results: Out of seventy, 18 patients i.e.; 26 % developed Pneumothorax.

With 18G needle 24 patients underwent FNA and seven of them i.e; 25% developed Pneumothorax. With 20G needle, 26% developed pneumothorax and with the 22G needle 25% developed Pneumothorax.

Conclusion: The study shows that the rate of Pneumothorax after CT guided TNAB of Lung Masses remains almost the same regardless of the size of the needle.

Keywords: Pneumothorax, CT guided TNAB, Needle Size.

Introduction

Transthoracic percutaneous biopsy of the lung masses is a long known and time proven invasive procedure. To get to a diagnosis, the clinicians rely heavily on the radiological and pathological findings. In previous days, open biopsy of the lung mass was done to reach a diagnosis but as the medicine is evolving the newer modalities are there to image the body and guide the invasive radiologist. Open lung biopsy has become almost obsolete now. Computed Tomography (CT) assisted Fine Needle Aspiration Biopsy (FNAB) of the lung masses is now used frequently in cases where the diagnosis depends on histopathology. CT images guides the radiologist towards the area of interest and then enable him to perform the procedure. Percutaneous transthoracic needle aspiration biopsy (TNAB) of the lung is a well-established method for obtaining pulmonary tissue for pathologic examination.¹⁻⁶ The accuracy for the diagnosis of benign and malignant diseases is greater than 80% and 90%, respectively.⁴⁻⁶

Fatal complications due to systemic air embolism, hemorrhage, or pericardial tamponade have been described,^{3,7-10} but the incidence is rare. Other serious complications, such as seeding of malignant cells into the needle track,¹¹ lung torsion,¹² and empyema,⁷ are also rare and thus should not alter the indications for TNAB.

Pneumothorax is, by far, the most frequent complication of the procedure: Reported^{2,8,13-23} rates range widely, from 5% to 61%. Most of the data pertains to TNAB. Performed under fluoroscopic guidance in general the CT guided TNAB may be associated with a higher frequency of pneumothorax

than fluoroscopically guided TNAB, because CT requires more time, also the average size of the lesion is smaller. The reported rate of pneumothorax with CT-guided biopsy may also be slightly higher because CT is more sensitive for the detection of pneumothorax. The authors of several investigations^{1,13,24} have reported a 22%/45% risk of pneumothorax for CT-guided TNAB.

There are multiple factors or variables which effect the rate of pneumothorax in CT guided FNAB of chest masses.^{25,26} Size of the needle, size of the lesion, depth of the lesion from the pleural surface and the number of punctures that are done through the pleura are perhaps some of the important aspect which has been studied in detail.²⁷ Also the time for which the needle remains in the chest cavity, the dwell time and the angle of pleural puncture have been reported^{25,26} as factors which influence on the development of Pneumothorax after CT guided FNAB of Chest masses.

Purpose of Study

To analyze the rate of pneumothorax after CT guided FNA of chest masses, using multiple size of the needle.

Patients and Methods

Study Design: This was a descriptive study.

Sample Population: Patients having a chest mass who required a biopsy to reach the definitive diagnosis. These patients were referred from Chest Medicine, Chest Surgery and Medical departments. Convenient sampling was done.

Sample Size: Seventy patients

Place of study: Department of Radiology Mayo Hospital Lahore.

Duration of Study: This study was conducted over a period of 10 months from June 2002 to April 2003, in which 70 cases were evaluated.

Inclusion Criterion:

1. Patients between 15- 75 years age group.
2. The patients had a control radiograph chest and CT chest with them before the FNAB contrast.
3. All patients had PT/ APTT their bleeding and clotting profile done.

Exclusion Criterion:

1. Because of the complications that might arise from the procedure, only indoor patients were included in the study.
2. Already cases that were already diagnosed were not included in the study.
3. Patients not having proper advice from the respective consultant were not considered.

Methodology:

The fine needle aspiration (FNA) was carried out under the guidance of CT scan machine of Toshiba Spiral CT Xvision/Ex. The FNA was conducted via 18G, 20G or 22G. The size of the lesion, distance of the lesion from the pleura and the number of punctures through the pleura was recorded and documented in the form of a proper proforma. Immediate post procedure CT slices of the chest and 6 hours delayed Chest X rays were taken to analyze Pneumothorax.

Data Analysis:

In this descriptive study the data, i.e.; the effect of the size of the needle, the size of the lesion, the distance of lesion from the pleura and the number of punctures through the pleura incidence on the rate of Pneumothorax after CT guided FNA of Chest masses, were evaluated using Proportions and Frequencies (%).

Results

Total numbers of patients included in the study were 70. Eighteen out of those patients developed pneumothorax after the procedure.

Effect of Needle Size on the Rate of Pneumothorax After CT Guided FNA of the Chest Masses:

Out of total 70 patients 24 patients underwent FNA through 18G needle, 23 by 20G and 23 by 22G

needle. With 18G needle 7 out of 24 patients developed pneumothorax. With 20 G needle 6 out of 23 developed pneumothorax and with 22G needle 5 out of 23 had post procedure pneumothorax. Frequency of pneumothorax with needle sizes is as under.

18 G needle	25%
20 G needle	26%
22 G needle	26%

Discussion

The rate of pneumothorax has been studied very extensively using multiple variables, the size of the needle being one. As the lesion size, depth of the lesion, number of punctures required obtaining adequate samples; the dwell time and the angle of the needle in relation to the pleura have been studied.



Fig. 1: Marking of the lesion and localization before biopsy.

The most commonly used variable is the needle size and the radiologist that unaware of the fact the size of the needle does not influence the rate of pneumothorax during the procedure are very reluctant to use the larger bore needles.

Our study shows that the rate of pneumothorax is independent of the size of the needle bore, three bores were used i.e; 18, 20 and 22, the frequency of pneumothorax remained more or less the same during the procedure.

All the cases taken included patient that had lesion which was not attached to the pleura of the lungs so the pleura had to be punctured.

Our study also showed the frequency of pneumothorax during the procedure of TNAB ie 26%. Although it sounds a pretty alarming

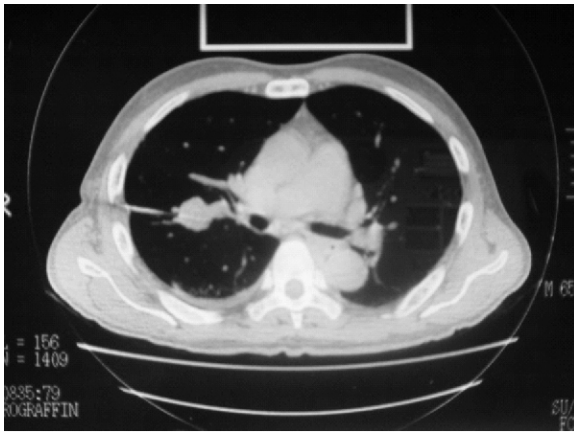


Fig. 2: Needle insertion into the lesion close to hilum, no pneumothorax.

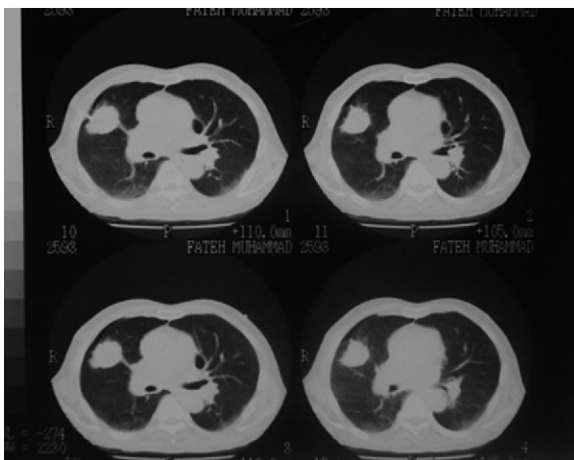


Fig. 3: Pneumothorax during the procedure of TNAB.

frequency but only one of these 26% patients required a chest tube intubations and the rest resolved by concentrative management.

Conclusion

In conclusion the study shows that the rate of

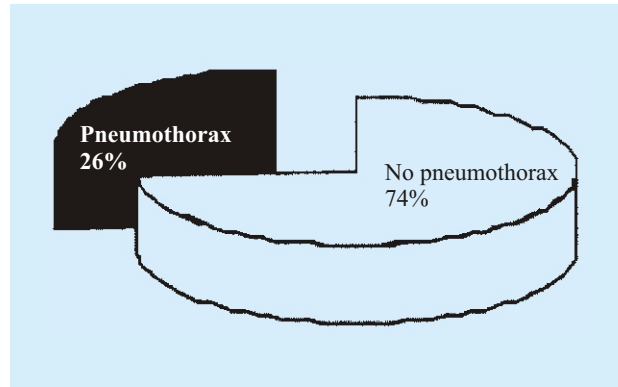


Fig. 4: Percentage of patient develops pneumothorax irrespective of needle size.

Table 1: Pneumothorax and needle size shows the frequency of pneumothorax after ct guided TNAB of lung masses in relation to needle size.

Sr No.	Needle Size	Total patients done	Pneumo-thorax	Frequ-ency
1.	18G	24	6	25%
2.	20G	23	6	26%
3.	22G	23	6	26%
Total		70	18	

pneumothorax after CT guided FNA of chest masses remains the same irrespective of the size of needle lumen increases.

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