

PNEUMOTHORAX AFTER CT GUIDED TRANSTHORACIC NEEDLE ASPIRATION BIOPSY OF LUNG MASSES

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The purpose of this study was to analyse the rate of pneumothorax after CT guided transthoracic needle aspiration biopsy (TNAB) of lung masses, using variable needle sizes. A total of 70 patients underwent this procedure, among them, 18 patients (26%) developed pneumothorax, with 18G needles 24 patients underwent FNA and seven of them (25%) developed pneumothorax, with 20G needle, 26% developed pneumothorax and with the 22G needle 25% developed Pneumothorax. As a 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.

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. Previously days, open biopsy of the lung mass was done to reach a diagnosis but as the medicine is going into newer modalities are there to image the body and guide the invasive radiologist, open lung biopsy has become almost obsolete procedure. Computed Tomography (CT) assisted Fine Needle Aspiration Biopsy (FNAB) of the lung masses is now used very frequently in cases where the diagnosis depends on histopathology. CT images guide the radiologist towards the area of interest and then the procedure is performed. Percutaneous transthoracic needle aspiration biopsy (TNAB) of the lung is a well-established method for obtaining pulmonary tissue for pathological examination.¹⁻⁶ Accuracy for the diagnosis of benign and malignant diseases is greater than 80% and 90%, respectively⁴⁻⁶.

Fatal complications due to systemic air embolism, haemorrhage, or pericardial tamponade have been described^{3,7-10}, however these complications are rare. Other serious complications, such as seeding of malignant cells into the needle track¹¹, lung torsion¹², and empyema^(?), also are rare and should not alter 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 these data pertain to fluoroscopically guided TNAB. Overall, TNAB performed with computed tomographic (CT) guidance may be associated with a higher frequency of pneumothorax than fluoro-

scopically guided TNAB, probably because CT requires more time, and 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 affect 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 given through the pleura are perhaps some of the important ones which have been studied in quite detail²⁷. 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 the factors which have some sort of influence on the development of pneumothorax after CT guided FNAB of chest masses.

PATIENTS AND METHODS

This was a descriptive study. As regard the selection of subjects, the patients having a chest mass and required a biopsy to reach a definitive diagnosis. A total of 70 patients were selected. They were referred from chest medicine, chest surgery and medical departments. Convenient sampling was done.

The study was carried out in the department of Radiology Mayo Hospital, Lahore; and was conducted over a period of 10 months from June 2002 to April 2003.



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

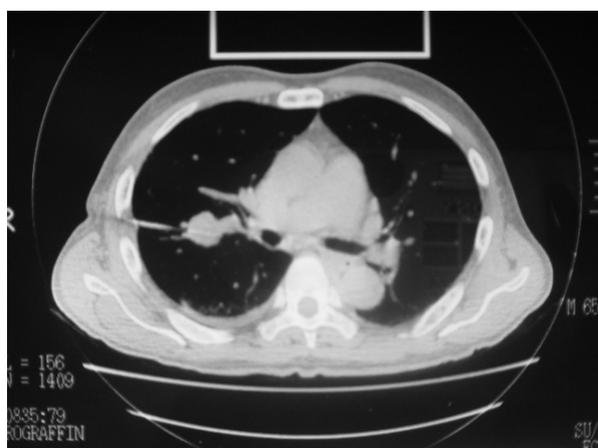


Fig. 2: Needle insertion into the lesion close to hilum, no pneumothorax.

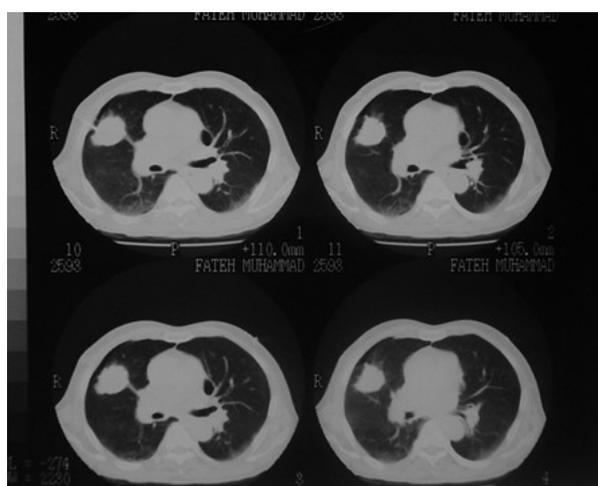


Fig. 3: Pneumothorax during the procedure of TNAB.

Inclusion Criteria:

1. Patients between 15 and 75 years of age.
2. The patients had a control X ray chest and CT chest before the FNA was performed.
3. All patients had PT/ APTT done for any bleeding disorder.

Exclusion Criteria:

1. It was because of the complications that could arise from the procedure, only indoor patients were included in the study.
2. Already diagnosed cases were not considered.
3. Patients who were not having proper advice form from the respective consultant also were not considered.

Methodology

The Fine Needle Aspirations (FNA) were carried out under the guidance of CT scan machine of Toshiba Spiral CT Xvision/Ex. The FNA was conducted via 18G, 20G or 22G needles. Size of the lesion, distance of the lesion from the pleura and the number of punctures through the pleura recorded and documented in the form of a proper proforma. Immediate post procedure CT slices of 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 size of needle, size of lesion, distance of lesion from the pleura and the number of punctures through the pleura on the rate of pneumothorax after CT guided FNA of chest masses, were evaluated using proportions, frequencies (%).

RESULTS

Total numbers of patients included in the study were 70, eighteen of these developed pneumothorax after the procedure.

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	

In a total of 70 patients, 24 underwent FNA through 18G needle, 23 by 20G and 23 by 22G needle. With 18G needle 7 (25%) out of 24 patients developed pneumothorax. With 20G needle 6 (26%) out of 23 developed pneumothorax and with 22G needle 5 (26%) out of 23 had post procedure pneumothorax.

DISCUSSION

The most common complications of percutaneous transthoracic lung biopsy are pneumothorax and bleeding. Pneumothorax has a broad frequency range of 8 to 64%.²⁷ Bleeding occurs less often (range, 2 to 10%) but is more frequently fatal. Many reports have evaluated the relationship between specific variables and the complications of percutaneous lung biopsy. Complications are evaluated according to variables related to the patient, the lesion, and the biopsy procedure.³ The rate of pneumothorax is also dependant on the lung parenchyma i.e the condition of the lung fields. Careful evaluation for Chronic Obstructive Airway disease is an important aspect for this complication. There is a significant rise in the rate of pneumothorax if intervention is done in patients with emphysema and other lung cycts, the rate can rise upto 60%.²⁴ The frequency of pneumothorax has been studied very extensively using multiple variables, the size of the needle being one. Also the lesion size, depth of the lesion, number of punctures required to obtain adequate samples, the dwell time and the angle of the needle in relation to the pleura have been studied by various authors.¹⁶⁻¹⁸ Perhaps the most commonly used variable is the needle size. The radiologists who are not aware of the fact that the size of the needle does not influence the rate of pneumothorax during the procedure are very reluctant to use the larger bore needle. This has been elaborated by various workers.²⁰⁻²² The present study shows that the rate of pneumothorax is independent of the size of the needle bore, three bores were used i.e; 18G, 20G and 22G, the frequency of pneumothorax remained more or less the same during the procedure. All the cases selected were not attached to the pleura and the lesions were of the lungs therefore the pleura had to be punctured. Our study also showed the frequency of pneumothorax during the procedure of TNAB 20%. Although it sounds a rather alarming frequency but only one of these 26% patients required a chest tube intubation and the remaining resolved at its own.

In **conclusion** the study shows that the rate of pneumothorax after CT guided FNA of chest masses remains the same even if the size of needle lumen increases.

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