Risk of Pneumothorax in Post Lung Biopsy Patients: Is Short-Term Monitoring Necessary?

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Authors: R. Hayter, T. Berkmen; New Haven, CT/US
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Pneumothorax is the most common complication of CT guided percutaneous transthoracic needle biopsy (TTNB). The incidence is 10-60% (1-7). Approximately 5-15% of post TTNB patients require chest tube insertion (8). It is standard practice to monitor patients and obtain post biopsy chest radiographs to help avoid pneumothorax complications. Some authors suggest obtaining radiographs at 1 and 4 hour intervals following TTNB to capture small leaks (2, 9). Pneumothoraces are considered delayed when they are only detected on chest radiographs taken 3 hours or more post TTNB. Less than 2% of patients who develop a delayed pneumothorax require intervention (1). No investigation has questioned the utility of short-term monitoring of post TTNB patients in the absence of a pneumothorax on post biopsy CT. The purpose of this investigation is to evaluate the efficacy of post biopsy short-term monitoring.
Methods and Materials

Unpublished data from a retrospective investigation of 360 post TTNB monitored patients suggested immediately discharging patients without a pneumothorax on the post biopsy CT scan and further questioned the efficacy of short-term monitoring. As a result, prospective investigation of 30 post TTNB monitored patients was performed and compared to 30 post TTNB non-monitored patients. The clinical and radiology records of 360 retrospective patients and 60 prospective patients who underwent CT-guided TTNB for lung lesions were analyzed. All TTNBs were performed by an experienced staff thoracic or interventional radiologist, or resident under close staff supervision. All biopsies were done under CT guidance (Somatom Plus 4 Volume Scanner. Siemens, Erlangen). Prior to each procedure, the risks and benefits of TTNB were discussed and informed consent was obtained. Core biopsies were obtained with 18 or 20 gauge needles with corresponding 17 or 19 gauge introducer needles (Tenmo, Cardinal Health, Sydney, Australia). Fine needle aspiration was performed with 20 or 22 gauge needles (BD Wescott Biopsy Needle, Becton Dickinson, Madrid, Spain). Biopsies were performed in a variety of patient positions depending on the location of the lesion. Needle path was chosen to traverse the least amount of lung parenchyma. Mediastinal and hilar biopsies were performed as described in the literature (10). A limited CT of the chest through the region biopsied was obtained on each patient immediately following the procedure. PA radiographs in expiration were taken hourly until discharge. A delayed pneumothorax was defined as any pneumothorax not detected on the initial post biopsy chest CT and detected on chest radiographs taken 3 hours or more post TTNB. Thirty monitored and 30 non-monitored post
TTNB patients without a pneumothorax on post biopsy CT were compared to determine if early return to activities of daily life would raise the incidence of developing a delayed pneumothorax. Monitored post TTNB patients were defined as patients without a pneumothorax on post biopsy CT kept within a nurse supervised radiology holding area with continuous vital sign monitoring while awaiting a chest radiograph. Non-monitored post TTNB patients were defined as patients without pneumothorax on post biopsy CT kept within the main radiology waiting room. Nonmonitored post TTNB patients remained NPO and were allowed to ambulate while awaiting a chest radiograph. Chest radiographs were typically performed at one hour intervals for the monitored group and prior to discharge for the nonmonitored group.
Results

Patient age ranged from 40-94 years old with a mean of 71.
Of the 360 post TTNB monitored retrospective patients, 155 patients developed a pneumothorax (43.1%). 152 (98.1%) of these 155 were detected on immediate post biopsy CT scan and 24 (15.5%) required a chest tube. Three (2.0%) of 155 pneumothoraces were detected on post biopsy chest radiographs only, none of these required a chest tube. Only 1 (0.3%) out of 360 developed a pneumothorax not detected on the immediate post biopsy CT scan or the post biopsy chest radiograph, but presented 4 days later with a pneumothorax that required a chest tube.
None of the 30 monitored and 30 non-monitored post TTNB prospective patients developed a delayed pneumothorax and none required a chest tube. The total incidence of pneumothorax in 420 patients was 156 (37.1%) and the incidence of delayed pneumothoraces was 1 (0.2%) (Table 1).
Two hundred sixty five (63.1%) patients did not have a pneumothorax on the immediate post biopsy CT scan spent an average of 1.7 hours in the hospital following the procedure. Five hundred six chest radiographs were taken in this group that had no effect on management.
Three monitored retrospective patients who developed a pneumothorax detected on post biopsy radiographs only were imaged between 104-128 minutes.
Fig. 0: Hospital of Saint Raphael

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Conclusion

No guidelines currently exist for the short-term monitoring of post TTNB patients. The latest guidelines for image guided lung biopsies recommend obtaining a chest radiograph one hour following the biopsy (11). However, others recommend as many as 3 post biopsy radiographs even in the absence of a pneumothorax (5,12). The total pneumothorax incidence in this investigation was 156 (37.1%), similar to that reported in the literature (5,7). Although the incidence of delayed pneumothorax is low, similar to a recent investigation on 934 TTNB patients, some of these patients do require chest tubes (13). One monitored patient with an unremarkable immediate post biopsy CT and delayed chest radiograph required a chest tube for pneumothorax 4 days later. Choi et al. reported 3 of 458 patients experienced a delayed pneumothorax (56, 57, and 120 hrs) when there was no evidence of pneumothorax on 3hr post biopsy radiographs (3). Traill et al. report a similar experience in two patients (14). Brown et al. reported three pneumothoraces in post FNAB patients found within 3 days (15). Some authors suggest delayed pneumothoraces may be the result of strenuous coughing, fibrinolysis, or slow pleural air leak (3).

A prospective investigation of 506 TTNB patients stated that early discharge is associated with little morbidity and no mortality (4). These retrospective data are in concordance with our prospective data of 30 monitored and 30 nonmonitored post TTNB patients in suggesting that post biopsy short-term monitoring does not change management in patients with no detectable pneumothorax on immediate post biopsy CT. Short-term monitoring and delayed chest radiographs increase cost, radiation exposure, number of studies, need for nursing support, and time spent in the hospital. Clinical symptoms of a pneumothorax in post TTNB patients can be
considered an effective indicator of a delayed pneumothorax when considering discharge.
Personal Information

Authors:

R. Hayter, T. Berkmen, M. Johnson, L. Pan; New Haven, CT/US