



Contents lists available at ScienceDirect

## Journal of Radiology Nursing

journal homepage: [www.radiologynursing.org](http://www.radiologynursing.org)

## An Overview of Percutaneous CT-Guided Lung Biopsies

Sharon Lehmann, MS, APRN, CNS, CRN<sup>a,\*</sup>, Nicholas Frank, MD<sup>b</sup><sup>a</sup> Department of Interventional Radiology, M Health, University of Minnesota Physicians, Minneapolis, MN<sup>b</sup> Department of Interventional Radiology, University of Minnesota, Minneapolis, MN

## A B S T R A C T

## Keywords:

CT-guided lung biopsy  
Transthoracic needle biopsy  
Core needle biopsy  
Pulmonary lesion  
Nursing care

Percutaneous computerized tomography-guided lung biopsy is a valuable tool in the evaluation of pulmonary lesions because it is minimally invasive and has a high degree of accuracy. However, this procedure is not without its risks, the most common of which is pneumothorax. This article includes an overview of preprocedure planning, contraindications, patient preparation, informed consent, patient positioning, sedation, breathing instructions, recovery after procedure, potential complication, and recovery at home.

Copyright © 2017 by the Association for Radiologic &amp; Imaging Nursing.

## Introduction

Computerized tomography (CT)-guided percutaneous lung biopsy is a minimally invasive method to obtain tissue for histopathology and sometimes microbiologic analysis from pulmonary lesions and/or masses suspected to represent malignancy or refractory infection. Many lesions are brought to light incidentally during radiographic and CT imaging obtained for other purposes in the ambulatory, emergency, and hospital settings.

Based on the lung cancer screening initiative research study, the American Cancer Society issued guidelines recommending low-dose chest CT screening of high-risk individuals (Wender et al., 2013), which has increased the number of suspicious pulmonary lesions identified. Numerous additional lesions are discovered on imaging obtained for routine follow-up in chronic diseases including pre-existing cancer diagnosis.

The purpose of this article is to provide nurses with a better understanding of the process for preprocedure planning and clinical preparation of the patient. An overview of the biopsy technique is included so that nurses can gain a better understanding of the procedure from beginning to end and anticipate potential complications that can occur.

## Background

The technique of using a needle passed through an intercostal space to obtain a fragment of diseased tissue from peripheral pulmonary lesions was described and highly recommended by Craver (1940) as well as Craver and Binkley (1939). Tripoli and Holland (1940) described the use of the Vim-Silverman biopsy needle for this procedure. The first lung core-needle biopsies were reported by Dutra and Geraci (1954). The procedure enjoyed an early period of success in the diagnosis of focal malignant, focal benign, and diffuse pulmonary disease (Youmans, de Groot, Marshall, Moretti, & Derrick, 1970; Zavala & Bedell, 1972). Unfortunately, series of reported fatalities during the 1960s and 1970s mainly because of pneumothorax and hemorrhage cast core biopsies into disfavor as compared with fine needle aspirate (Meyer, Ferrucci, & Janower, 1970; Norenberg, Claxton, & Takaro, 1974).

CT-guided lung biopsies were first reported in the literature by Haaga and Alfidi (1976). Since that time, there has been a significant improvement in the technique and the equipment used for the procedure. There is a high degree of accuracy, sensitivity, and specificity in detecting malignancy, specifically a primary lung (small cell or non-small cell) or metastatic disease. Genetic testing (molecular profiling) can be performed on samples for certain types of cancers to help identify gene mutations that can be targeted during treatment. A biopsy can also diagnose bacterial, mycobacterial, viral, or fungal infections that have been refractory to standard treatment. A biopsy specimen can also be used to clarify the diagnosis and response to treatment in the setting of chronic lung diseases, such as sarcoidosis, pulmonary fibrosis, or rheumatoid lung disease (Cham, Lane, Henschke, &

Conflict of interest: The authors declare no conflicts of interest. No financial assistance was provided for this article. The article was not presented at any meetings.

\* Corresponding author: Sharon Lehmann, Department of Interventional Radiology, M Health, University of Minnesota Physicians, 420 Delaware Street SE, MMC 292, Minneapolis, MN 55455.

E-mail address: [Lehma006@umn.edu](mailto:Lehma006@umn.edu) (S. Lehmann).

<https://doi.org/10.1016/j.jradnu.2017.12.002>

1546-0843/\$36.00/Copyright © 2017 by the Association for Radiologic & Imaging Nursing.

Yankelevitz, 2008; Winokur, Pua, Sullivan, & Madoff, 2013). The referring clinician should be the individual who orders the additional studies as warranted by the patient's condition for the biopsy.

### Preprocedure Planning

A recent CT scan of the chest, and/or positron emission tomography (PET)/CT, and any available relevant comparison imaging are reviewed by the performing interventional radiologist to determine the appropriateness of the proposed procedure and identify the target lesion. Imaging characteristics, such as rate of growth, shape, edge characteristics, the presence of benign or malignant pattern of calcification, lesion density, contrast enhancement, and PET/CT characteristics, can help determine the likelihood that a target lesion is benign or malignant. The radiologist will also pay attention to the size and location of the target lesion, which dictates whether percutaneous sampling is feasible, or if other techniques such as endoscopic bronchoscopy-assisted biopsy or surgical biopsy is most appropriate (Moore, Sawas, Lee, & Ferretti, 2001; Winokur et al., 2013; Wu, Maher, & Shepard, 2011).

Contraindications to percutaneous biopsy that will need to be considered include uncooperative patients or patients with altered mental status; patients with an intractable cough; patients on a ventilator (positive pressure ventilation); severe respiratory compromise (such as those with severe emphysema, contralateral pneumonectomy, and severe interstitial lung disease); pulmonary artery hypertension; small lesions (<1 cm) close to the diaphragm, and central lesions adjacent to central vessels or mediastinal structures (Winokur et al., 2013; Wu et al., 2011). Other contraindications include patients with congenital or acquired bleeding diathesis who cannot stop medications or have their international normalized ratio (INR), partial thromboplastin time, and/or platelet levels corrected may be ineligible for a lung biopsy (Winokur et al., 2013; Wu et al., 2011).

Ideally, all the preceding considerations are discussed at a multidisciplinary conference, which involves clinical input from all parties already or soon to be involved in the care of these patients. A multidisciplinary pulmonary nodule conference is usually attended by specialists in pulmonology/critical care medicine, oncology, radiation oncology, thoracic surgery, and interventional radiology. Physicians, advanced practice nurses, and nurse coordinators can benefit from attendance at these conferences (Horvath et al., 2010).

### Clinical Preparation of the Patient

Once a percutaneous biopsy is deemed necessary and achievable, the patient is referred to interventional radiology. Many interventional radiology practices see their patients in the clinic setting before biopsy. This clinic can be staffed by an interventional radiologist, physician assistant, and/or advanced practice nurse (Swisduk, 2005; Wempe, 2015).

At the clinic visit, the patient is reminded of the clinical scenario leading to the visit and given information about what to expect before, during, and after the procedure. History and physical examination is performed.

1. Patient allergies are noted, and medication lists are reviewed. The patient will need to be instructed on which medications to take, such as antihypertensive, the morning of the procedure. Diabetic agents may need to be adjusted.
2. Relevant laboratory tests are ordered if not current including INR, hemoglobin/hematocrit, and platelet count. INR to be at or below 1.5, and platelet count to be greater than or equal to

50,000/ $\mu$ L. A pregnancy test is performed on women of child-bearing age on the day of the procedure.

3. Twelve-lead electrocardiogram (EKG) is performed: if not done in the past year and age older than 55 years; if not done in the past year, and there is a history of diabetes, hypertension, heart failure or congestive heart failure, ischemic vascular disease, chest pain, smoking or morbid obesity; and if not done in the last year and a first degree relative with premature coronary artery disease (younger than 55 years in a man and younger than 65 years in a women).

### Clinician orders for patient instructions before percutaneous lung biopsy:

1. Nil per OS instructions are given. (No intake of solid foods or milk products for 6 hr before the procedures. May have clear liquids until 2 hr before the procedure).
2. Instruct the patient to stop warfarin (Coumadin), 3 to 5 days before the procedure. The length of time will depend on the patient's INR level. It will be up to the patient's physician who prescribed this medication, if the patient would need to be crosscovered with another medication, such as enoxaparin (Lovenox).
3. Instruct the patient to hold the enoxaparin for 24 hr before the biopsy.
4. Instruct the patient to discontinue acetylsalicylic acid (aspirin) 5 days before the biopsy.
5. Instruct the patient to discontinue antiplatelet inhibitors 5 days before the biopsy with their physicians' approval. This could include clopidogrel (Plavix), ticlopidine (Ticlid), dipyridamole (Persantine), aspirin/extended-release dipyridamole (Aggrenox), cilostazol (Pletal), and ticagerelol (Brilinta). Prasugrel (Effient) will need to be held for 7 days.
6. Instruct the patient about other anticoagulants that will need to be held. These include:
  - a. Subcutaneous heparin, hold 8 to 12 hr;
  - b. Apixaban (Eliquis), hold 48 hr;
  - c. Dabigatrin (Pradaxa), hold 3 days for creatinine clearance (CrCl)  $\geq 50$  mL/min or hold for 5 days for CrCl  $\leq 50$  mL/min;
  - d. Endoxaban (Savaysa), hold for 48 hr;
  - e. Fondaparinux (Arixtra), hold 3 days for CrCl  $\geq 50$  mL/min or hold for 5 days for CrCl  $\leq 50$  mL/min; and
  - f. Rivaroxaban (Xarelto), hold 24 hr for CrCl  $\geq 30$  mL/min or hold for 48 hr for CrCl  $\leq 30$  mL/min.
7. Some institutions may elect to have the patient hold nonsteroidal anti-inflammatory drugs before a biopsy.

### Preprocedure Area

CT-guided lung biopsy is an invasive procedure with potential complications, and although extremely rare, can include death. Obtaining informed consent with the patient and family understanding the procedure and potential risks is important (Tsai et al., 2009). The British Thoracic Society guidelines further suggests, "Operators should audit their own practice and monitor their complication rates to inform patients before consent is given" (Manhire et al., 2003).

Sedation assessment (American Society of Anesthesiologists, Physical Status Classification System, Mallampati score, Modified Aldrete Sedation Scoring System, Ramsay Sedation Scale, and sedation plan) is also performed by the radiologist (McFadden & Glickman, 2014). The laboratory values are reviewed, including hemoglobin/hematocrit, platelet count, and INR level. If the patient is diabetic, a blood glucose level is obtained and treated as appropriate. Other appropriate diagnostic tests, for example, 12-lead EKG,

Download English Version:

<https://daneshyari.com/en/article/8575788>

Download Persian Version:

<https://daneshyari.com/article/8575788>

[Daneshyari.com](https://daneshyari.com)