

The Usefulness of Fine Needle Aspiration Biopsy in the Diagnosis of Mediastinal Lesions

Marry Fasul*

Department of Molecular Biology, Washington University, St. Louis, MO 63110, USA

Abstract

Fine Needle Aspiration Biopsy (FNAB) is a minimally invasive procedure that is commonly used in the diagnosis of mediastinal lesions. The mediastinum is the central compartment of the thoracic cavity that contains various structures such as the heart, major blood vessels, lymph nodes, and other organs. Mediastinal lesions can include tumors, cysts, lymphadenopathy (enlarged lymph nodes), and other abnormal growths. FNAB involves inserting a thin needle into the mediastinal lesion to collect a small sample of cells or tissue for examination under a microscope. This procedure can be performed with the guidance of imaging techniques such as ultrasound, Computed Tomography (CT), or Endoscopic Ultrasound (EUS) to precisely target the lesion. FNAB provides an accurate diagnosis in a significant number of cases. It allows for the evaluation of the cellular composition of the lesion, which helps differentiate between benign and malignant conditions. The examination of the obtained cells or tissue by a pathologist can determine the presence of cancer, infection, inflammation, or other pathological processes.

Keywords: Diagnosis • Fine needle • Cancer • Blood vessels

Introduction

FNAB is a relatively simple and minimally invasive procedure compared to more invasive diagnostic techniques such as surgical biopsies. It can be performed on an outpatient basis, usually under local anesthesia, with minimal discomfort to the patient. The risk of complications is low, and the recovery time is short. FNAB can precisely target mediastinal lesions with the guidance of imaging techniques. This improves the accuracy of the procedure, reduces the likelihood of sampling errors, and increases the chances of obtaining a representative sample for analysis. The results of FNAB can guide treatment decisions and planning. If the mediastinal lesion is diagnosed as malignant, the type and extent of the cancer can be determined, which helps in selecting the most appropriate treatment approach, such as surgery, radiation therapy, chemotherapy, or targeted therapies. Surveillance and Follow-up: In cases where the lesion is diagnosed as benign or inconclusive, FNAB can still provide valuable information. If the diagnosis is inconclusive, further investigations or repeat biopsies may be warranted. If the diagnosis is benign, close monitoring and follow-up can be established to detect any changes or growth of the lesion over time [1].

Literature Review

Despite its advantages, FNAB also has limitations. Sometimes, the obtained sample may be insufficient for a definitive diagnosis, leading to a no diagnostic or indeterminate result. In such cases, additional diagnostic procedures may be necessary, such as repeat FNAB, core needle biopsy, or surgical excision. In summary, FNAB is a valuable tool in the diagnosis of mediastinal lesions. It provides a minimally invasive approach with high diagnostic accuracy, aiding in treatment planning and follow-up care. However, individual cases may vary, and the appropriateness of FNAB should be determined by healthcare professionals based on the specific clinical scenario and the characteristics of the mediastinal

*Address for Correspondence: Marry Fasul, Department of Molecular Biology, Washington University, St. Louis, MO 63110, USA, E-mail: marryfasul@gmail.com

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lesion.

FNAB helps in distinguishing between different types of mediastinal lesions. The cellular and histological examination of the obtained sample can differentiate between primary tumors originating from mediastinal structures, metastatic tumors originating from distant sites, infections, granulomas, and other benign conditions. This information is crucial for accurate diagnosis and appropriate management. FNAB offers a relatively quick turnaround time for obtaining a diagnosis. Once the sample is collected, it can be processed, prepared for microscopic examination, and analyzed by a pathologist promptly. This rapid diagnosis allows for timely decision-making and initiation of appropriate treatment, particularly in cases where urgent intervention is required. FNAB can be repeated during the course of treatment to assess treatment response. Comparing the cellular changes in the repeat FNAB sample to the initial diagnosis can help evaluate the effectiveness of therapy, especially in cases of malignancy. It allows clinicians to make adjustments to the treatment plan if needed in cases of suspected malignancy. FNAB can provide essential information for risk stratification and prognostication. The cellular characteristics, such as the presence of certain markers or genetic abnormalities, can help determine the aggressiveness of the tumor and predict the patient's prognosis. This information assists in tailoring treatment plans and determining the need for additional therapies.

Discussion

When surgical intervention is planned for a mediastinal lesion, FNAB can be performed preoperatively to guide surgical decision-making. It helps determine the nature of the lesion, its relationship to surrounding structures, and the extent of surgical resection required. This information assists the surgeon in planning the appropriate surgical approach, reducing the risk of complications and improving patient outcomes. FNAB is generally a cost-effective diagnostic procedure compared to more invasive techniques like surgical biopsies. It reduces hospitalization time, minimizes the need for general anesthesia, and has lower overall healthcare costs. This aspect is particularly important in resource-limited settings where cost considerations play a significant role in healthcare decision-making. It's important to note that while FNAB is generally safe and effective, there are potential risks and limitations to consider. Complications, although rare, can include bleeding, infection, pneumothorax (collapsed lung), or accidental injury to adjacent structures. Additionally, there may be instances where FNAB is contraindicated due to the specific characteristics of the mediastinal lesion or patient factors [2].

FNAB can help avoid unnecessary surgical procedures by providing a definitive diagnosis before considering invasive interventions. In cases where the lesion is determined to be benign or non-malignant, surgical excision may not be

required, sparing the patient from potential risks and complications associated with surgery. Mediastinal lymphadenopathy can be a result of various underlying causes, including infections, autoimmune diseases, or malignancies. FNAB allows for the sampling of enlarged lymph nodes in the mediastinum, aiding in the identification of the underlying cause. This information is vital for appropriate treatment planning and management [3,4].

In cases where the mediastinal lesion is diagnosed as a malignancy, FNAB can provide important information regarding specific biomarkers or genetic mutations. This data can guide the selection of targeted therapies or immunotherapies that specifically address the molecular characteristics of the tumor, leading to more effective treatment and improved patient outcomes. FNAB can be particularly valuable for lesions located in difficult-to-access areas or those adjacent to vital structures. By obtaining a diagnosis through FNAB, clinicians can determine if a non-operative approach, such as radiation therapy or systemic treatment, is appropriate. This approach may be preferable when surgery poses significant risks or is technically challenging. In cases where the mediastinal lesion is diagnosed as advanced or metastatic cancer, FNAB can provide valuable information for palliative care planning. It helps in assessing the extent of the disease, identifying potential treatment options to alleviate symptoms, and enhancing the patient's quality of life. It is essential to emphasize that FNAB is a diagnostic tool and may not always provide a definitive diagnosis. In such cases, additional diagnostic procedures or techniques, such as core needle biopsy, surgical excision, or imaging studies, may be necessary for further evaluation and confirmation [5,6].

Conclusion

In conclusion, FNAB is a valuable tool in the diagnosis of mediastinal lesions, providing accurate and rapid results, aiding in treatment planning, and enabling appropriate patient management. Its benefits, along with its minimally invasive nature, make FNAB a preferred choice for obtaining diagnostic samples in many cases. However, the decision to perform FNAB should always be made by healthcare professionals based on individual patient factors and clinical judgment. It provides a minimally invasive approach with high diagnostic accuracy, aiding in treatment planning and follow-up care. However, individual cases may vary, and the appropriateness of FNAB should be determined by healthcare professionals

based on the specific clinical scenario and the characteristics of the mediastinal lesion.

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Conflict of Interest

There are no conflicts of interest by author.

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