Non-diagnostic fine needle aspiration (FNA) of lung nodules under computed tomography (CT) guidance: Factors influencing the diagnostic failure and outcome analysis in a tertiary care hospital in Canada.

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INTRODUCTION

Lung cancer is the most commonly diagnosed cancer worldwide with the highest cancer mortality¹. Adequate tissue sampling for accurate diagnosis and prognostic studies is vital to patient management. Percutaneous transthoracic lung biopsy (PTLB) using computed tomography (CT) continues to be the most effective and relatively safe diagnostic modality with a high degree of accuracy². Several studies report rates of sensitivity, specificity, and adequacy of percutaneous needle biopsies upwards of 90%³,⁴. However, insufficient tissue sampling may result from various factors and can contribute to diagnostic failure⁵,⁶. The size of the lung lesions is an independent factor for diagnostic success. Lesions less than 1 cm in size have a higher false negative rate for malignancy⁷. Pneumothorax is a commonly encountered complication during CT-guided lung biopsies and is shown to be an independent risk factor for diagnostic failure⁸. Deep seated lung lesions and undergoing emphysematous lung disease are susceptible to pneumothorax, which may call for termination of the procedure before specimen acquisition. Rapid on-site evaluation (ROSE) of the sample by a trained pathologist, especially an experienced cytopathologist is associated with higher rate of diagnostic success⁹.

OBJECTIVE

The purpose of our study is to analyze various factors related to the lung lesion (radiologic criteria such as size, consistency, suspicion of malignancy, etc.), patient and underlying lung disease (emphysema, etc.), biopsy procedure (availability of ROSE, chronology of FNA and CNB, when both performed), and procedural complication (pneumothorax, etc.) to determine effect on non-diagnostic FNAs and to correlate with the outcome on follow up.

METHODS

- Retrospective study of all non-diagnostic lung FNA between January 2013 and December 2016, performed in two institutions within Eastern Health, St. John’s, NL, Canada.
- Approval from the institutional review board obtained.
- Data collected pertaining to patient demography, radiology, procedural detail and complication, cytopathology and histopathology reports and patient follow up until December 2018 to obtain final outcome.
- 22-gauge Chiba needle used for FNA, 19-gauge Turner needle used for CNB.
- Cytology collected for SurePath™, CNB collected in 10% buffered formalin.
- ROSE slides (FNA and touch preparation of the cores) stained with Diff Quik (DQ).

RESULTS

- Percentage of non-diagnostic CT-guided lung FNA in patients with underlying lung disease: A total of 55 cancer patients were documented from Eastern Health between January 2013 and December 2016, with 25 cases at St. Clare’s Mercy Hospital (SCM) and 30 cases at Health Sciences Centre (HSC), respectively. A total of 155 FNA cases were non-diagnostic. ROSE slides were included in 120 cases (77%), with 70 and 50 cases at SCM and HSC, respectively.
- Adequacy of percutaneous needle biopsies: Out of a total of 155 non-diagnostic FNA cases, 120 were excluded in this subset analysis (n= 91, SCM, n= 55, HSC). A total of 34 cases at SCM and 14 cases at HSC were performed without ROSE with 95 and 25 cases at SCM and HSC, respectively.
- Adequacy of percutaneous needle biopsy of lung with a high degree of accuracy: A total of 42% of total FNA cases were performed with FNAB, 30% with CNB, and 28% with both FNA and CNB. Adequacy of percutaneous needle biopsies upwards of 90%²,³.
- Adequacy of percutaneous needle biopsy of lung: The size of the lung lesions is an independent factor for diagnostic success. Lesions less than 1 cm in size have a higher false negative rate for malignancy⁴. Deep seated lung lesions and undergoing emphysematous lung disease are susceptible to pneumothorax, which may call for termination of the procedure before specimen acquisition.
- Rapid on-site evaluation (ROSE) of the sample by a trained pathologist, especially an experienced cytopathologist is associated with higher rate of diagnostic success⁹.
- Adequacy of percutaneous needle biopsy of lung: The size of the lung lesions is an independent factor for diagnostic success. Lesions less than 1 cm in size have a higher false negative rate for malignancy⁴. Deep seated lung lesions and undergoing emphysematous lung disease are susceptible to pneumothorax, which may call for termination of the procedure before specimen acquisition.
- Rapid on-site evaluation (ROSE) of the sample by a trained pathologist, especially an experienced cytopathologist is associated with higher rate of diagnostic success⁹.

CONCLUSION

- Overall rate of diagnostic FNA at our two institutions is comparable to data in the literature.
- Careful case selection for FNA should be done by a multidisciplinary board of physicians.
- Accurate clinical history, including the presence of underlying lung disease and history of prior malignancy, should be included on requisitions.
- FNA should ideally be done prior to CNB to avoid bloody contamination of cytology sample.
- On-site adequacy assessment of FNA can improve the diagnostic success and helps in triage.

REFERENCES