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ORIGINAL ARTICLE

Endobronchial ultrasound-guided transbronchial needle aspiration for nodal staging in non-small cell lung carcinoma

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KEYWORDS
EBUS-TBNA;
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Abstract
Introduction: Lung cancer staging has recently evolved to include endobronchial ultrasound-guided transbronchial needle aspiration (EBUS-TBNA) for nodal assessment.
Aim: Evaluate the performance and safety of EBUS-TBNA as a key component of a staging algorithm for non-small cell lung carcinoma (NSCLC) and as a single investigation technique for diagnosis and staging of NSCLC.
Methods: Patients undergoing EBUS-TBNA for NSCLC staging at our institution between April 1, 2010 and December 31, 2014 were consecutively included with prospective data collection. EBUS-TBNA was performed under general anesthesia through a rigid scope.
Results: A total of 122 patients, 84.4% males, mean age 64.2 years. Histological type: 78 (63.9%) adenocarcinoma, 33 (27.0%) squamous cell carcinoma, 11 (8.9%) undifferentiated/other NSCLC. A total of 435 lymph node stations were punctured. Median number of nodes per patient was 4. EBUS-TBNA nodal staging: 63 (51.6%) N0; 8 (6.5%) N1; 34 (27.9%) N2, and 17 (13.9%) N3. EBUS-TBNA was the primary diagnostic procedure in 27 (22.1%) patients. EBUS-TBNA NSCLC staging had a sensitivity, specificity, positive predictive value, negative predictive value, and diagnostic accuracy rate of 83.3, 100, 100, 86.1, and 91.8%, respectively. No complications were attributable to the procedure.
Conclusion: A comprehensive lung cancer staging strategy that includes EBUS-TBNA seems to be safe and effective. Our EBUS-TBNA performance and safety in this particular setting was in line

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with previously published reports. Additionally, our study showed that, in selected patients, lung cancer diagnosis and staging are achievable with a single endoscopic technique.

Introduction

In spite of all advances in surgical treatment and multimodality treatment, lung cancer is still the most common cause of cancer death across the world.[1] In Portugal, lung cancer is the fourth most common malignancy, with a crude incidence of 30.6 per 100,000 inhabitants, and the second highest cause of malignancy disease death.[2] Accurate staging is important in patients with non-small cell lung cancer (NSCLC) who are fit for surgery and have no evidence of extrathoracic disease, because mediastinal lymph nodes disease status is an indicator for treatment with curative intent.[3]

Several invasive and non-invasive techniques are available to support lung cancer staging. Imaging methods, such as computed tomography (CT) and positron emission tomography (PET), indicate size and metabolic activity of mediastinal nodes, respectively, but the lack of specificity is an important pitfall.[4] Therefore, tissue confirmation of suspected malignant lymphadenopathy is required, especially before surgical resection. Surgical staging by mediastinoscopy presents a high sensitivity and specificity and was for many years the gold standard modality for this purpose.[5,6] However, it is a surgical procedure that requires general anesthesia and clinical admission.

Endobronchial ultrasound-guided transbronchial needle aspiration (EBUS-TBNA) is a newer technique that allows minimally invasive sampling of intrathoracic lymph nodes adjacent to the bronchial tree and it is gradually replacing mediastinoscopy as NSCLC staging gold standard.[5] In recent guidelines,[3] lung cancer staging has evolved to include EBUS-TBNA for nodal assessment.

The aim of our work was to evaluate our EBUS-TBNA performance and safety as a key component of a staging algorithm for NSCLC and as a single investigation technique for diagnosis and staging of NSCLC.

Methods

Patients

From April 1, 2010 and December 31, 2014, all consecutive patients referred for EBUS-TBNA with the purpose of NSCLC staging at our institution were prospectively included in our study. Chest CT was mandatory before the procedure (PET or PET-CT was dependent upon referring physician decision). Primary exclusion criteria were, significant concurrent malignant disease or any condition or concurrent medicine that contraindicated EBUS-TBNA. Secondary exclusion criteria were added to ensure maximum homogeneity on our EBUS staging performance evaluation: patients that received induction chemotherapy, that were lost to follow up, or that had a surgery related complication that precluded a correct mediastinal surgical staging were excluded from this latter analysis.

The 7th edition of the TNM staging system in lung cancer was used throughout.

Procedures

EBUS-TBNA was performed under general anesthesia with flexible ultrasound bronchoscope (BF-UC180F, Olympus, Tokyo, Japan) through a rigid scope in an outpatient setting. A systematic examination of all mediastinal and hilar lymph node stations was conducted. N3 nodes were first punctured, followed by N2 and lastly ipsilateral hilar N1 nodes, if appropriate. Transbronchial aspiration was performed through a dedicated 22-gauge or 21-gauge needle (NA-201SX-4021/2, Olympus, Tokyo, Japan) and with application of negative pressure. At least two needle passes per station were carried out. Additional punctures were performed when rapid on-site evaluation (ROSE) or the macroscopic appearance of the acquired material was not satisfactory. The aspirated material was smeared onto glass slides. Smears were fixed in alcohol and immediately stained with hematoxylin/eosin staining protocol for ROSE by a cytopathologist. Specimens were categorized as positive (tumor cells), negative (lymphoid but no tumor cells), or inconclusive (poor cellularity).

Statistical methods

A descriptive analysis was carried out in which categorical variables were expressed as absolute and relative frequencies and continuous variables as means and standard deviation.

For statistical purposes in our EBUS staging performance evaluation, it was assumed that a positive EBUS-TBNA for N2/N3 disease (with or without surgical-pathologic confirmation) was a true positive. A N0/N1 staging obtained by EBUS-TBNA and confirmed by subsequent methods (invasive or 6 month clinical and radiological follow-up) was considered a true negative. A negative EBUS-TBNA result that was later confirmed to be positive for malignancy by other invasive methods in the same anatomical location or by disease progression on clinical follow up was a false-negative. The sensitivity, specificity, positive predictive value, negative predictive value, and diagnostic accuracy rate were calculated using the standard definitions.

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