Original Article

Diagnostic utility of conventional transbronchial needle aspiration without rapid on-site evaluation in patients with lung cancer

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ABSTRACT

Background: Endobronchial involvement is frequently absent in many patients with bronchogenic carcinoma. Malignant involvement may be confined to lymph nodes/peribronchial locations only or may be present along with endobronchial lesions. Transbronchial needle aspiration (TBNA) is a flexible bronchoscopic technique which can be employed to obtain tissue samples from mediastinal lymph nodes or peribronchial locations. Although a safe and cost effective bronchoscopic modality, it is frequently underutilized owing to concerns regarding its diagnostic utility and safety. Herein, we describe our experience over 1 year on the diagnostic utility of TBNA without rapid on-site evaluation (ROSE) in patients with suspected diagnosis of lung cancer. **Materials and Methods:** We retrospectively reviewed the cases in which conventional TBNA-without ROSE was performed for suspected lung cancer, between January 2012 and December 2012. Each lymph node station from which aspiration was performed was sampled thrice and smears were prepared on slides which were later examined by a cytopathologist. **Results:** Twenty-six cases were retrieved in which conventional TBNA without ROSE for suspected lung cancer with mediastinal involvement was performed during the study period. Adequate lymph node sampling could be achieved in 57.7% cases. Conventional TBNA was diagnostic in 11 out of the 26 (42.3%) patients. The diagnostic yield improved to 73.3% in patients in whom an adequate lymph nodal sample could be obtained. TBNA was the sole diagnostic sample in six (54.5%) patients. Alternative diagnoses (sarcoidosis and tuberculosis) were obtained in two patients. **Conclusion:** Conventional TBNA without ROSE is a safe and efficacious flexible bronchoscopic procedure which should be performed routinely from bronchoscopically accessible locations in patients with a suspected diagnosis of lung cancer.

KEY WORDS: Bronchoscopy, cytology, transbronchial needle aspiration

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INTRODUCTION

TBNA refers to a method used to obtain diagnostic samples from peribronchial or submucosally located lesions by using a needle attached to a catheter which is usually introduced through a flexible bronchoscope.[1] There are two methods of performing transbronchial needle aspiration (TBNA); endobronchial ultrasound (EBUS) guided or conventional TBNA (also known as Blind TBNA). In conventional TBNA, the bronchoscopist punctures the tracheal/bronchial wall based on the knowledge of anatomical landmarks along with computed tomography (CT) correlation of location of abnormality to obtain diagnostic samples. Conventional TBNA has high specificity, but variable degrees of sensitivity depending upon the study population, the operator skill, and adequacy of sample processing techniques.[1] Although it has been proposed by various authors that conventional TBNA should be an integral part of diagnostic flexible bronchoscopic sampling, it is very often an underutilized diagnostic modality.[2,3] More than half of the studies in literature on the use of TBNA are from North America but even in that setting, TBNA is very frequently underutilized.[4] Few of the many reasons

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for underutilization include concerns about its efficacy, technical aspects, and safety. Owing to concerns like increase in procedure time, lack of technical expertise and cost, the use of this modality in developing countries has been limited.

Most of the patients with lung cancer in India present in advanced stages of the disease.[5] Endobronchial involvement in advanced stages of the disease is common and diagnosis can usually be obtained by bronchial biopsy. However, endobronchial involvement may frequently be absent or the locations of the abnormalities may be localized to mediastinal lymph nodal stations/peribronchial locations. If TBNA is not performed in such situations, many of the patients can remain undiagnosed. We performed a 1 year retrospective review of the patients with a clinico-radiological diagnosis of lung cancer in which conventional TBNA without rapid on-site evaluation (ROSE) was performed. We aimed to study the sampling adequacy, the diagnostic accuracy, and safety of procedure in the study patients.

MATERIALS AND METHODS

We performed a retrospective review of all flexible bronchoscopy examinations performed at our center during the period January 2012-December 2012 and retrieved the study cases in which conventional TBNA without ROSE was performed.

The procedures were done as part of the routine clinical care. Informed consent for the procedure was obtained from all the patients. Patients reported fasting (at least 8 h for solids and 6 h for liquids) on the day of the procedure. All the procedures were performed on an outpatient basis. Flexible bronchoscopy was performed through the nasal route, using the Olympus BF-TE2 bronchofiberscope (Olympus, Japan) with a 2.8 mm working channel. For patient preparation, local anesthesia included application of 2% lignocaine jelly nasally along with spray application of lignocaine over the pharynx and vocal cords prior to and during insertion of the flexible bronchoscope. Sedation/analgesia was not administered to the patients during the procedure. Respiratory rate, heart rate, and pulse oximetric oxygen saturation was monitored throughout during the procedure.

TBNA was performed using the 21-gauge; 13 mm long cytology needle (Olympus, Japan). TBNA procedure included positioning of the bronchoscope to the target site, visualization of the needle sheath followed by needle exit, and puncture of the tracheobronchial wall. Puncture was performed using either the jabbing technique, hub against the wall technique, or the piggyback method.[6] After successful puncture of the tracheobronchial wall, suction was applied manually to the TBNA needle using a 20 cc syringe at the time of needle agitation within the lymph node. Three passes were obtained from each sampled lymph node station. Direct smears were made from the aspirate subsequently obtained and were fixed immediately in 95% alcohol for Papanicolaou stain. Few air-dried smears were also kept for May-Grunwald-Giemsa stain and acid fast staining. The samples were then assessed later by an experienced cytopathologist. Adequacy of sampling was defined by the presence of lymphocytes in the smear.

RESULTS

During the study period, 832 flexible bronchoscopy examinations were performed at our center. Ninety patients underwent conventional TBNA without ROSE with/without other flexible bronchoscopic sampling techniques, during diagnostic bronchoscopy performed for a variety of pulmonary disorders. Twenty-six patients were identified in which TBNA was performed for a suspected diagnosis of lung cancer.

There were 16 male (61.5%) and 10 female (38.5%) patients. The mean age was 53.1 ± 12.6 years (range 23-75 years). Adequate lymph node sampling was obtained in 15 out of the 26 patients (57.7%). The cytopathological examination findings from TBNA smears were diagnostic in 11 out of the 26 patients (overall diagnostic accuracy - 42.3%). The diagnostic accuracy in patients where an adequate sample could be obtained was 73.3% (11 out of the 15 patients with adequate samples) [Figure 1]. The commonly sampled lymph node stations during TBNA were subcarinal, right paratracheal, left paratracheal, right hilar, and left hilar lymph node stations [Figure 2]. In 84.6% subjects, only a single lymph node station was sampled. In four subjects, TBNA was performed from more than one site. Needle aspiration from an extrinsic compression site in the right intermediate bronchus was performed in one patient. In none of the patients, was TBNA performed from visible endobronchial growths.

Non-small cell lung cancer was the most frequent diagnosis. In 54.5% of the total diagnostic samples (six out of the 11 diagnostic samples), TBNA was the sole flexible bronchoscopic sample which was diagnostic. In the remaining five cases, TBNA was diagnostic concurrently along with any of the other bronchoscopic samples (bronchoalveolar lavage (BAL) fluid, bronchial washings, bronchial biopsy, and/or bronchoscopic lung biopsy), obtained at the time of flexible bronchoscopy examination. In 12 out of the 15 TBNA negative patients, a final diagnosis of lung cancer was confirmed by other ancillary investigations. Three patients were lost to follow-up pending histopathological confirmation of the diagnosis. No procedural complications were encountered during any of the TBNA procedures. The details of patients with diagnostic samples are summarized in Table 1.

DISCUSSION

Conventional TBNA is also termed as blind TBNA by many authors (though the procedure is not blind in the true sense as the bronchoscopist does know where he is

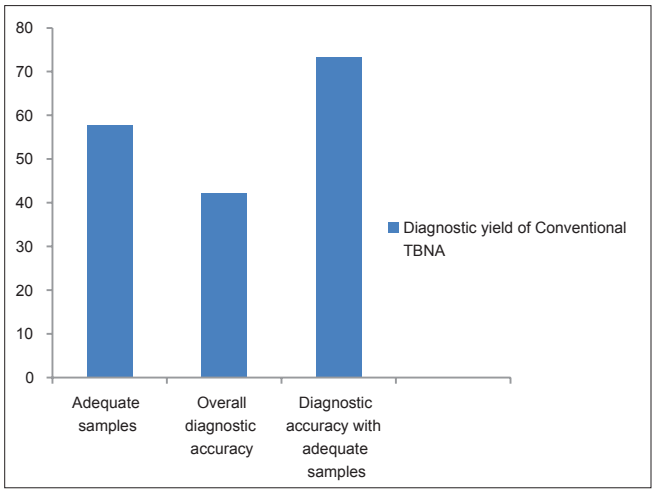

Figure 1: Overall results of sampling adequacy and diagnostic yield of conventional TBNA without ROSE in patients with suspected lung cancer

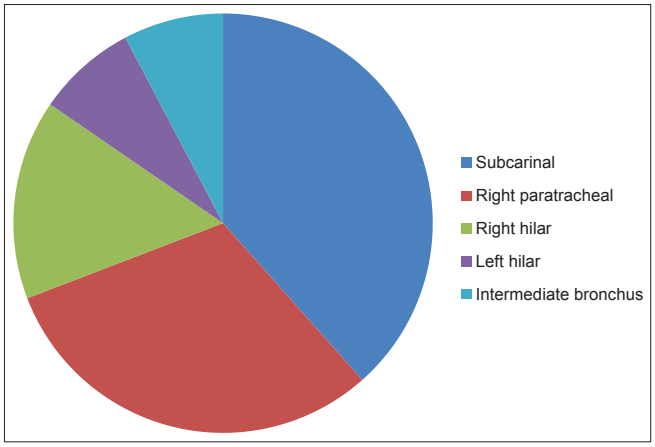

Figure 2: Lymph node stations sampled with conventional TBNA

Table 1: Details of patients with diagnostic samples with conventional TBNA

Number of patients with diagnostic samples	11
Non-small cell lung cancer	7 patients Squamous cell carcinoma 4 patients Adenocarcinoma 3 patients
Small cell lung cancer	2 patients
Alternative diagnosis	2 patients Tuberculosis 1 patient Sarcoidosis 1 patient
TBNA as only diagnostic sample	6 patients (54.4% patients)
TBNA concurrently diagnostic with other bronchoscopic sample	5 patients

TBNA: Transbronchial needle aspiration

puncturing the tracheobronchial wall) is a very useful technique but is underutilized in most of the centers.[7] The procedure has a learning curve and yields have been shown to improve over time. Low yields of the procedure during the learning curve can often make many operators discouraged by the results and give up the practice of routinely performing this simple and efficacious diagnostic technique. This may be an important factor contributing to the limited number of studies available from India on TBNA. It is important to have a strong collaboration and understanding with the cytopathology team especially during the initial phases in order to regularly appraise the yields of the procedures for refinement of technique and methods of sample preparation.

In most of the centers around the developed world, (EBUS-TBNA) has emerged as the first line standard of care investigation modality for mediastinal lymph node sampling.[8] In the perspective of developing countries, EBUS-TBNA is available at only a few centers. The cost of the procedure makes universal availability of the same for all the patients needing mediastinal evaluation, nearly impossible. The facility EBUS became available at our center only during the latter half of the study period. One of the conventional TBNA negative patients underwent EBUS-TBNA for diagnosis. In most of the other patients, a diagnosis could be obtained using other ancillary investigations (like CT, ultrasound-guided biopsy, fine needle aspiration cytology (FNAC), etc.).

We used strict criteria for identifying specimen adequacy. Presence of lymphocytes has been proposed as an essential criterion of specimen adequacy.[9] Possible reasons for sampling inadequacy in our study and in general include interoperator differences in technique of sampling, effect of the learning curve, or sample preparation. When the yield was calculated for the samples wherein adequate lymph node puncture had been obtained (indicated by a preponderance of lymphocytes), the yield improved to 73.3%. An on-site cytopathologist was not available during the study period. ROSE has been demonstrated to increase the yield of TBNA.[10,11] In fact, this may be especially important during the initial period that can enable the bronchoscopist to improve the technique of puncture and sampling and also streamline the process of sample preparation.

The diagnostic yield of conventional TBNA has been reported to range from 20 to 89%.[12-15] Our reported yield is similar to one large previous study from India in similar patient scenarios.[7] Other factors which may contribute to a higher yield in other reported studies from other patient populations include higher prevalence of lymph node metastasis,[16,17] large nodes,[18] and larger-bore needle use to obtain a core biopsy specimen.[19] On the other hand, the possibility of obtaining false positive results with TBNA due to contamination by respiratory secretions containing tumor cells has also been highlighted.[14]

A particularly important finding from the results of our study is that in more than half of the positive cases, TBNA was the only diagnostic bronchoscopically obtained sample. These results show that flexible bronchoscopy performed with diagnostic intent for patients with lung cancer can be nondiagnostic in many cases if TBNA is not performed where it could have been potentially useful. TBNA was not performed for staging of the mediastinum

in any diagnosed patient with lung cancer as most of the lung cancer in our setting presents later in advanced stages.[5] Another particularly important observation is the likelihood of obtaining an alternative diagnosis on TBNA in patient where the clinicoradiological possibility of lung cancer is considered. We had two such patients where a diagnosis of tuberculosis (one patient) and sarcoidosis (one patient) was confirmed.

CONCLUSION

The results of our study indicate that TBNA is a safe and efficacious procedure in patients with suspected lung cancer. It should routinely be employed by pulmonologists as a diagnostic bronchoscopic sampling modality in addition to the routinely obtained samples like BAL, bronchial washings, bronchial biopsy, and bronchoscopic lung biopsy.

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