Original Article

Endobronchial Ultrasound-guided Transbronchial Needle Aspiration Under Local Anesthesia: Real-time Experience Over Two Years in a Tertiary Care Hospital in North India

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Abstract

Background. Endobronchial ultrasound-guided transbronchial needle aspiration (EBUS-TBNA) is usually performed under deep sedation or conscious sedation. We describe the diagnostic yield and complications of EBUS-TBNA performed under local anesthesia.

Methods. Patients undergoing EBUS-TBNA at our center from February 2016 to April 2018 were evaluated retrospectively. All procedures performed under local anesthesia using lignocaine were assessed for sampling adequacy, diagnostic yield, cough during endoscopic procedure and complications.

Results. Thirty-four patients underwent EBUS-TBNA under local anesthesia. Mean age was 41.1 years with male to female ratio of 1:1. Mean (standard deviation) dose of lignocaine used was 311.6 (16.4) milligram and mean (standard deviation) duration of the procedure was 23.7 (3.78) minutes. Sample adequacy rate was 88.2%. The diagnostic yield of the procedure was 60%. In 91.1% of patients, cough was absent or did not interfere with EBUS-TBNA. Complications related to EBUS were observed in three (8.8%) patients and were minor and self-limiting. None of the patients required escalation of care.

Conclusion. EBUS-TBNA performed under local anesthesia was found to be safe and was associated with an acceptable diagnostic yield. **[Indian J Chest Dis Allied Sci 2020;62:19-22]**

Key words: Lymph node, EBUS-TBNA, Anesthesia, Tuberculosis, Sarcoidosis

Introduction

Patients with mediastinal lymphadenopathy are becoming a diagnostic dilemma with the increased use of advanced imaging modalities, like computed tomography (CT) and positron emission tomography (PET) scans. It is a challenge for the clinicians to establish the diagnosis in these patients due to the location and paucity of the sampling modalities. Mediastinal lymphadenopathy can be due to various causes including infection, inflammation, malignancy or simply non-specific reactive hyperplasia. While metastatic cancer, lymphoma and sarcoidosis are more common causes of lymphadenopathy in the developed world, infective and benign aetiologies are more likely in the developing world like India.[1,2] Mediastinal lymphadenopathy requires accurate diagnosis to determine the optimal treatment. For this nodal sampling is necessary that has traditionally been done by CT-guided fine needle aspiration cytology (FNAC) and/or biopsy, mediastinoscopy, and/or thoracoscopy.[3] The safety profile, cost and tissue yield are the main limitations of these investigations.[4,5] Blind transbronchial needle aspiration (TBNA) has been popular for the sampling of intra-thoracic lymph nodes. However, it is associated with variable sensitivity and specificity.[6] Moreover, with this procedure only subcarinal and right para-tracheal lymph nodes can be sampled. In recent years, these challenges have led to the development of minimally invasive techniques for mediastinal lymph node evaluation.

Endobronchial ultrasound (EBUS) is a new diagnostic tool, that has expanded the view of the bronchoscopist beyond the confinement of the airways. It is a recent minimally invasive and safe investigation for the mediastinum.[7] EBUS is a combination of bronchoscopy and ultrasound with Doppler mode which allows the physician to directly visualise and locate the lymph nodes situated near to the bronchial wall. A real-time, ultrasound-guided fine needle aspiration of lymph nodes is also possible with EBUS. EBUS-TBNA is indicated for the diagnosis and staging of the lung cancer, evaluation of mediastinal tumours and mediastinal adenopathies of unknown aetiology (sarcoidosis, tuberculosis, lymph node metastasis of a known tumour).[8-12]

As EBUS scope has larger diameter than flexible bronchoscope, it is done transorally and patients feel more discomfort and has low tolerability.[13] Thus, it is usually performed under either general anesthesia or conscious

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sedation.[14,15] It is known that sedation could entail certain risks, provoke adverse reactions, increases the costs and observation requirements. Most of the studies regarding the impact of type of sedation on diagnostic yield of EBUS-TBNA were done either under general anesthesia or conscious sedation.[16-19]

To the best of our knowledge, no study has evaluated diagnostic yield and patient tolerability in EBUS-guided transbronchial needle aspiration (EBUS-TBNA) under local anesthesia. In this study, we report our experience with EBUS-TBNA performed under local anesthesia in patients presenting with mediastinal lymphadenopathy of unknown aetiology in a tertiary care hospital in Delhi.

Material and Methods

We retrospectively analysed the data of all the cases of EBUS-TBNA procedure under local anaesthesia. Detailed history, clinical examination, radiological findings, location of lymph nodes sampled, and final diagnosis achieved after histopathological and microbiological examination of aspirated material was noted. Patients who were diagnosed as having tuberculosis without microbiological confirmation were followed up for clinical and radiological improvement after the treatment with anti-tubercular drugs. Similarly, patients diagnosed as sarcoidosis were also followed up to assess the improvement on medication.

Patients were admitted in the ward one day prior to the procedure to keep the patients nil orally for 6 hours. All patients were nebulised with 2.5mL of 4% lignocaine (42.5mg lignocaine/mL) for 15 minutes immediately before the procedure. Any other pre-medication (atropine/promethazine) or sedation was not used. Two sprays (each spray of 10mg) of local 10% lignocaine were applied in the oropharynx along with cricothyroid injection 2mL of 2% lignocaine (21.3mg lignocaine/mL). One aliquot each of 2mL of 2% lignocaine was instilled in the trachea, carina and in the right and the left main bronchus. Additional lignocaine aliquots were instilled as required to suppress cough and total dose of lignocaine was noted. Bronchoscopy was done using the EBUS scope (BF-UC 180F; Olympus Medical Systems) in supine position trans-orally through a protective mouth guard. Oxygen saturation, heart rate, blood pressure, vital signs and the thoracic cage excursion were monitored throughout the procedure. Targeted lymph nodes were identified using ultrasound and colour-doppler was used to visualise the blood vessels near or within the lymph nodes. Lymph node dimensions were documented by measuring the short axis diameter once the best view of the node was identified. 21G EBUS-TBNA needle (NA 201SX-4021 OLYMPUS) was used for all TBNA specimen collection using jabbing method while visualising under real time ultrasound. Continuous suction was applied with 20cc syringe and catheter was moved to and fro for 20 times. The targeted lesions were punctured three times. The aspirates were then smeared on slides and air dried smears were sent for cytopathological and microbiological examinations. At the end of the procedure a questionnaire on cough was administered to the patient by the bronchoscopist. After procedure patients were kept under observation for six hours and a chest radiograph was done to rule out any complication.

Results

A total of 34 patients (17 males) with age ranged from 20-75 years with a mean age of 41.1 years underwent EBUS-TBNA procedure under local anesthesia. Most common symptom on presentation was cough, followed by fever, breathlessness and only one patient had haemoptysis (Table 1). Most common group of lymph node enlarged on CT scan was right para-tracheal followed by sub-carinal, hilar and vascular (Table 2).

Table 1. Baseline characteristics of the patients

Characteristics	
Total no. of patients	34
Age range (in years)	20 - 75
Mean age (in years)	41.1
Male:Female	1:1
Presenting Symptoms	**No. of Patients**
Cough	29
Breathlessness	15
Fever	12
Weight loss	10
Haemoptysis	01

Table 2. Observations made on computed tomography for lymph node station

Lymph Node Station	No. of Lymph Node
Lower paratracheal (Right and Left)	32
Sub-carinal	30
Hilar	17
Pre- and para-vascular	09

Most common pre-procedural clinical diagnosis was sarcoidosis followed by tuberculosis. Malignancy was the third clinical differential diagnosis. Total number of lymph nodes sampled were 62 in 34 patients. Right lower para-tracheal being the most common group of lymph node (34 out of 62 lymph-nodes sampled), followed by sub-carinal (20/62) and hilar (08/62) (Table 3). Average duration of the procedure was 23.7 minutes. Thirty-two patients tolerated the procedure under local anesthesia with an average dose of lignocaine of 311.6mg, in two patients midazolam was also administered.

Out of a total of 34 patients, sample material was satisfactory (presence of lymphocytes) in 30 patients (88.2%) for cytological examination. Cytological examination of 16 (47.0%) patients showed granulomatous inflammation and in 2 (5.9%) patients malignancy was confirmed, so the overall diagnostic yield was 52.9% (18/34). The diagnostic yield increased to 60% after excluding unsatisfactory samples (Table 4).

In the granulomatous pathology, most common aetiology was sarcoidosis (12/16, 75.0%), followed by tuberculosis (4/14, 25.0%). Three patients with granulomatous inflammation

had granuloma with necrosis and one patient was smear positive for acid-fast bacilli with necrotic granuloma. Out of four patients of tuberculosis, one was microbiologically confirmed, and three were diagnosed on the basis of necrotic granulomatous lymphadenitis, on the basis of clinical and radiological evidences. All the patients were put on anti-tubercular therapy and were on regular follow up.

Table 3. Procedural data

Procedures	No. of Lymph Node
Total no. of lymph node sampled	62
Station of lymph node sampled	
Right paratracheal	34
Sub-carinal	20
Hilar	08
Characteristics	**Mean (±SD)**
Number of lymph node stations sampled/ patient	1.8
Dose of lignocaine used/patient (mg)	311.6 (16.4)
Duration of EBUS procedure/patient (min)	23.7 (3.78)

Table 4. Diagnostic yield of EBUS-TBNA

Characteristics	No. of Lymph Node (%)
Cytology of the sample (N=34)	
Adequate	30 (88.2)
Inadequate	04 (11.7)
Diagnostic sample (N=34)	
Yes	18 (52.9)
No	16 (47.0)
Finding of diagnosed sample (N=18)	
Granulomatous	16 (88.8)
Malignancy	02 (11.1)

Well-defined granuloma without necrosis was present in 12 patients, who were diagnosed as sarcoidosis. EBUS-TBNA of two patients was suggestive of non-small cell carcinoma. These patients were referred to the oncology center for further management.

In 12 patients, TBNA material was representative but no granuloma was seen, while specimen was not satisfactory in four patients who were diagnosed as sarcoidosis on the basis of clinico-radiological features and other investigations including high serum angiotensin-converting enzyme (ACE) levels and negative mantoux test. A total 28 out of 34 patients (82.3%) were diagnosed as sarcoidosis. All these patients were followed up regularly and showed improvement with the treatment.

Minor complications were encountered in three patients (8.8%), including post-procedure minor bleed in two patients, and hypoxaemia (fall in pulse oximetric saturation below 88% for >1 min) in one patient due to bronchospasm requiring high flow oxygen supplementation and nebulisation with bronchodilators. After one hour, bronchspasm and hypoxaemia was relieved. None of the patients needed escalation of the care for the complications.

In 31 of 34 patients (91.1%), coughing was absent or did not interfere with EBUS-TBNA procedure. In two patients (5.9%) cough interfered with the sampling of lymph nodes and in one patient (2.9%), excessive secretions caused a significant delay in the procedure.

Discussion

We analysed the data of 34 adult patients who underwent EBUS-TBNA under local anesthesia. In the present study, we were able to achieve representative samples in 88.2% of patients, while confirmed diagnosis was established in 52.9% and excluding four patients in whom material was not satisfactory, it increased to 60%. The diagnostic yield of our study is comparable to other studies done under conscious sedation.[19,20] However, many other randomised controlled trials have higher diagnostic yield ranging from 66.7% to 96.3%.[13,21,22] Low yield is the present study is possibly due to small sample size, learning curve associated with the procedure and non availability of rapid onsite evaluation of the samples. Moreover, majority of our patients had a clinical suspicion of sarcoidosis and the yield of EBUS in sarcoidosis is comparatively low.[21]

Some minor adverse events occurred only in 8.8% of the patients in the present study and none of them required increased duration of hospital stay.[21]

Table 5. Comparison of diagnostic yield and complication rate with other studies

Studies	No. of Patients	Sample Adequacy (%)	Diagnostic Yield (%)	Average Duration of Procedure (Min)	Complication Rate (%)	Final Diagnosis No. (%)
Present study	34	88.2	60	23.7	8.82	Sarcoidosis 28 (82.3) Tuberculosis 04 (11.7) Malignancy 02 (5.9)
Agostini *et al*[19]	131	92,4	55	29	5.22	Malignancy (38.9) Sarcoidosis (4.6) Tuberculosis (0.8)
Dhooria *et al*[20]	1004	94.9	61.2	22.5	5.9	Sarcoidosis (46.9) Tuberculosis (32.4) Malignancy (19.7)
Casal *et al*[21]	74	98	68.9	20.6	29.6	Malignancy (54)

Lignocaine is the most widely used local anesthetic agent during bronchoscopy because of its rapid onset, short duration of action, and lesser toxicity.[23] The use of lignocaine topically during bronchoscopy has also been shown to improve patient's tolerance and satisfaction of the procedure.[24,25] In the present study, we found that the patient tolerated EBUS-TBNA very well under local anesthesia with an average dose 311.6mg of lignocaine and that was well within the recommended maximum dose (15.4mg/kg) as per British Thoracic Society (BTS) guidelines.[26] Intravenous midazolam was given in two patients only.

Cough is considered as a major limitation during EBUS-TBNA. The present study demonstrated that cough control was very good with the use of local lignocaine as in 91.1% of the patients coughing was absent or did not interfere with the procedure which is comparable to the study done by Agostini *et al*.[19]

Among the limitations, present study is retrospective, observational study of procedure under local anesthesia without control group. Therefore, assessments such as patient satisfaction and readiness to undergo a repeat procedure were not done. Moreover, there was non-availability of rapid on-site evaluation and non diagnostic samples were not subjected to further invasive procedure, like mediastinoscopy. Most of the guidelines advised for EBUS-TBNA to be done under conscious sedation or general anesthesia. As per Yasufuku and Colleagues,[13] EBUS-TBNA has a sensitivity of 94.6%, specificity of 100% and diagnostic accuracy rate of 96.3%.

Conclusions

This study is the first study to evaluate diagnostic yield and complications of EBUS-TBNA procedure when sedation is not used. The results showed that without sedation; EBUS-TBNA procedure remains quite acceptable to the patient. The diagnostic yield and complications are also comparable to the studies done under conscious sedation.

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