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Endobronchial Ultrasound Guided Transbronchial Needle Aspiration

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ABSTRACT

Evaluation of mediastinal lymphadenopathy is often challenging. Endobronchial Ultrasound (EBUS) is a novel technique which provides real time sonographic guidance during Transbronchial Needle Aspiration (TBNA) from mediastinal and hilar lesions. A 60-year-old smoker presented with two months history of cough and chest pain on the right side. CT thorax revealed a right upper lobe spiculated mass with paratracheal (Station 4R) and subcarinal (Station 7) lymph nodes. Bronchoscopy did not reveal any endobronchial mass. Since EBUS-TBNA is superior to conventional TBNA for malignant mediastinal node, an EBUS- TBNA was performed from both lymph node stations. . Cytopathology and histopathology revealed non-small cell lung cancer. We hereby report the first use of EBUS-TBNA in Nepal, in a patient with lung cancer and mediastinal lymphadenopathy.

Keywords: Endobronchial ultrasound; lung cancer; mediastinal lymph node; transbronchial needle aspiration.

INTRODUCTION

Mediastinal lymphadenopathy is common with various malignant and benign conditions. The diagnosis is often challenging and requires tissue sampling. Endobronchial Ultrasound (EBUS) is a novel technique which provides real time sonographic guidance during Transbronchial Needle Aspiration (TBNA) from mediastinal and hilar lesions.[1] The probe used for EBUS are of two types. Convex probe EBUS (CP-EBUS) samples mediastinal masses and parabronchial lesions whereas radial probe EBUS (RP-EBUS) is used to biopsy peripheral pulmonary lesions.[2] Although CP-EBUS was initially developed for diagnosis and staging of lung cancer, recent years have seen the extension of its use in benign conditions like tuberculosis and sarcoidosis.[2] As a minimally invasive tool, EBUS is superior to conventional TBNA for diagnosis and staging of lung cancer.[3,4] In contrast to mediastinoscopy, it is safer, less invasive, more accurate and does not require general anaesthesia.[5]

CASE REPORT

A 60-year-old male with 15 pack years of smoking, presented with two months history of dry cough and chest pain on the right side. His pulse rate was 78/min and Blood Pressure was 132/76 mmHg. There were no palpable peripheral lymph nodes. On chest examination there was decreased breath sound in the right infra-scapular area. Chest X-ray revealed mild right pleural effusion and widening of right para-tracheal area. Computed Tomography (CT) of the thorax showed small spiculated nodule in the right upper lobe measuring 16X14mm, with mild right pleural effusion and heterogenous right paratracheal node and subcarinal node (Figure 1). Pleural fluid analysis revealed an exudative effusion with low ADA (18U/L). Pleural fluid cytology was negative for malignant cells. Ultrasound thorax revealed no pleural thickening or deposits, hence biopsy was not done. USG could not localize abnormal pleura or nodules. As bronchoscopy did not reveal any endobronchial mass, sampling of the mediastinal node was contemplated as it would serve the purpose of both diagnosis and mediastinal lymph node staging of the tumor.

Endobronchial Ultrasound (EBUS) was performed through the oral route with EB-1970UK Pentax ultrasound video bronchoscope, EPK-100 video processor and Hitachi Hi Vision 5,500 processor. Midazolam, Fentanyl and Propofolwere used for sedation during the procedure. EBUS revealed a heterogeneous right paratracheal node measuring 18x14 mm and subcarinal node measuring 16x12mm (Figure 2). EBUS guided transbronchial needle aspiration (EBUS-TBNA) was performed from the subcarinal and right paratracheal node (Figure 3). Three passes were obtained from each nodal station using the Cook EchoTip22G EBUS-TBNA needle (Cook Medical) and the aspirates were fixed in alcohol for further staining. Core biopsy samples were also obtained during the aspiration and fixed in formalin for histopathology. Systematic screening did not show any significant node in the left para-tracheal (4L), left hilar (10L) and left interlobar (11L) stations. Patient remained stable throughout the procedure and no complications were noted. He was discharged after 3 hours of observation in the recovery room.

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Cytology smears revealed large cells arranged in loose clusters and dispersed singly in the background of red blood cells. The cells showed moderate pleomorphism, high nuclear-cytoplasmic ratio; nuclei showed irregular nuclear membrane, coarse chromatin and conspicuous nucleoli. Few cells also showed emperipolesis. Histopathology revealed atypical cells in loose clusters with individual cells showing mild to moderate pleomorphy with enlarged, hyperchromatic nuclei and abundant amount of eosinophilic cytoplasm. The overall cytology and histopathology features were suggestive of Non Small Cell Lung Carcinoma (Figure 3). Patient is scheduled for complete staging workup and planned to start platinum based doublet chemotherapy.

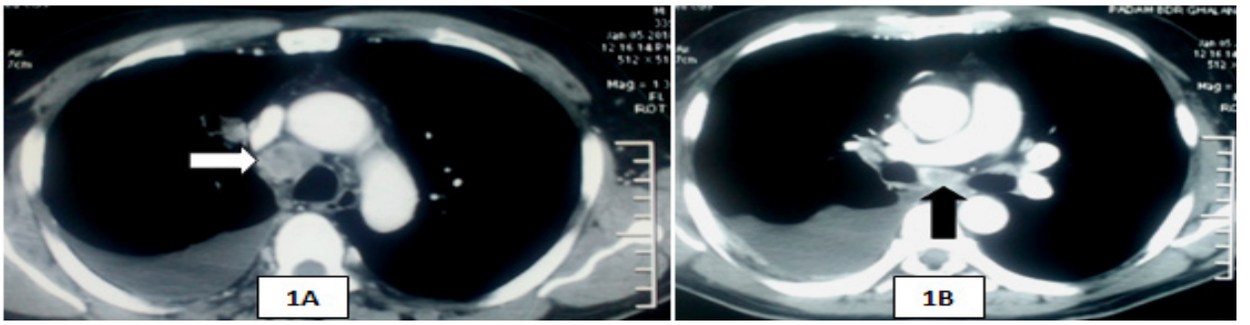

Figure 1. CECT thorax of the patient showing large heterogenous right paratracheal lymph node (Station 4R, White arrow) measuring 21 X 16mm (Figure 1A) and subcarinal node (Station 7, Black arrow) measuring 16x14mm (Figure 1B). There is also presence of right pleural effusion.

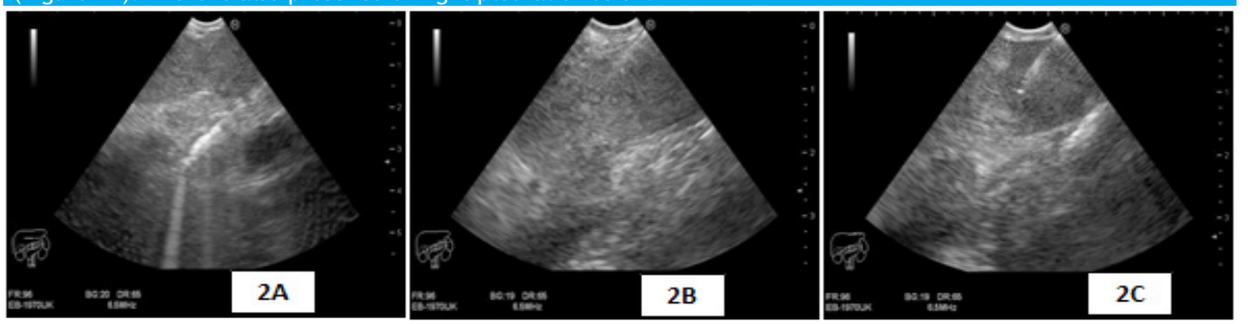

Figure 2. EBUS images form right paratracheal measuring 18 x 14 mm (Figure 2A) and subcarinal measuring 16 x 12 mm (Figure 2B) stations. EBUS guided TBNA pass being taken from the right paratracheal station (Figure 2C). Needle is visualized as hyperechoeic structure entering the node from cranial end.

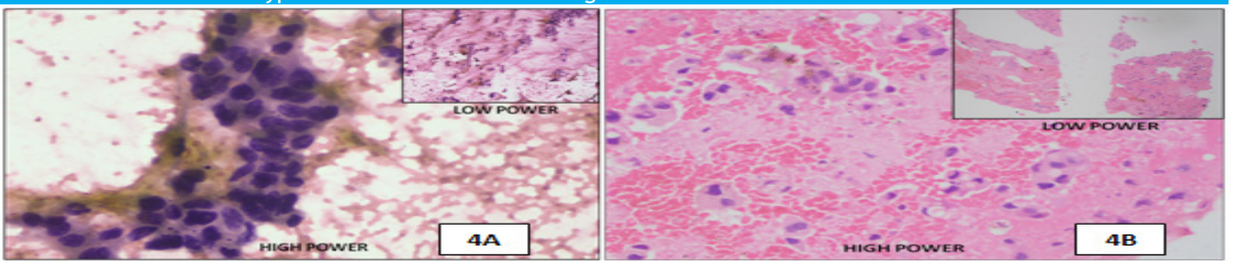

Figure 3. Cytopathology (Figure 4A) and histopathology (Figure 4B) of the EBUS-TBNA sample showing atypical cells arranged in loose clusters with moderate pleomorphism, high nuclear-cytoplasmic ration; nuclei showed irregular nuclear membrane, coarse chromatin and conspicuous nucleoli. The overall features was suggestive of Non Small Cell Lung Cancer (NSCLC)

DISCUSSION

Since its inception in 2003, the convex probe EBUS has evolved as an important minimally invasive technique for diagnostic aspiration of mediastinal and hilar lymph nodes and middle mediastinal masses.[1,6] CP-EBUS is performed with a dedicated EBUS scope havinga linear ultrasound transducer at the tip and a dedicated ultrasound image processor. After acquisition of images, a real time puncture of the involved node or mass is done using the EBUS-TBNA aspiration needles to obtain the cytology specimen. At times core tissue samples can also be obtained which can be processed for histopathology, cell block or molecular studies in suspected malignancy. In addition to diagnosis and staging of lung cancer, EBUS is gaining popularity for sampling of mediastinal nodes in granulomatous conditions like TB and sarcoidosis.[2]

Patients with lung cancers may not have a visible mass during flexible bronchoscopy but may have mediastinal and hilar involvement of the lymph nodes. CT guided biopsy, mediastinoscopy or a conventional TBNA has been traditionally used for sampling such nodes. EBUS-TBNA is superior to conventional TBNA in the diagnosis of malignant mediastinal node. CT guided biopsy and mediastinoscopy are invasive and associated with many complications like bleeding, pneumothorax, wound infection, recurrent laryngeal nerve palsy and rare instances of tracheal and oesophageal injuries.[6] Yasufuku et al. reported the sensitivity and specificity of EBUS to be 95% and 100% respectively for staging of lung cancer. The positive and negative predictive values were 100% and 90% respectively. In almost half the patients included in their study, invasive procedures like mediastinoscopy, thoracotomy and CT guided biopsy were avoided.[7] Our patient had right upper lobe lesion which was not accessible to biopsy by conventional bronchoscopy, hence we opted to use EBUS-TBNA for diagnosis. The aspiration smears and core biopsy sample clinched the diagnosis of non small cell carcinoma.

Diagnostic and therapeutic bronchoscopies are performed at very few centers in Nepal. Studies pertaining to the use of bronchoscopy are sparse from our country. Moreover, a very few studies have reported utility of bronchoscopic conventional TBNA.[8-10] Although EBUS was introduced more than a decade back for evaluation of a patient with mediastinal masses, this useful tool had not yet been introduced in our country. We hereby report the first ever use of EBUS-TBNA in Nepal.

The challenges of introducing this novel technology in resource limited setting like ours are many. On one hand, the procurement cost of the equipments can be a restraining factor for an institution, on the other the cost of the procedure may be prohibiting for patients. Lack of skilled manpower is yet another paramount limitation. Since EBUS is an expensive procedure, proper patient selection is the most essential factor for treating physicians. EBUS-TBNA can become an important tool in the armamentarium of pulmonologists and thoracic surgeons for comprehensive evaluation of lung cancer and diagnosis of benign conditions like TB and sarcoidosis.

CONCLUSIONS

In a resource limited setting like ours, introducing a novel technology is often challenging. EBUS-TBNA is a valuable tool for evaluation of patients with mediastinal lesions of benign and malignant etiology. The addition of this new tool is an important milestone for comprehensive evaluation of such patients in Nepal.

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