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Case report

Esophageal ultrasound with ultrasound bronchoscope (EUS-B) guided transvascular needle aspiration (TVNA)

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ABSTRACT

We have described a 67-year-old man, diagnosed to have adenocarcinoma of lung by transvascular approach with esophageal ultrasound using ultrasound bronchoscope (EUS-B). To the best of our knowledge this is the first case where EUS-B has been used for transvascular fine needle aspiration cytology to diagnose lung carcinoma.

1. Introduction

The lesions behind large vascular structures have been traditionally avoided because of concerns of bleeding [1]. In 2007, Wallace and colleagues successfully described a transvascular approach using endoscopic ultrasound (EUS) [2]. Since then endoscopic transvascular needle aspiration (TVNA) has revolutionized the diagnostic approach to mediastinal diseases. Recently, endobronchial ultrasound (EBUS) TVNA has also been described for the diagnosis of lung and/or mediastinal lesions [1]. We performed an endobronchial ultrasound using ultrasound bronchoscope (EUS-B) guided TVNA. Amongst the radial and convex curvilinear EBUS, the convex curvilinear EBUS is now being increasingly used as EUS-B [1]. Its use can be extended to TVNA too.

2. Case report

A 67-year-old man ex-smoker with smoking index of 80 pack years presented with left sided chest pain, which was worse on breathing for 2 days. There was no occupational exposure. There was no significant past history. The vital parameters were normal. The general examination and systemic examination were normal. The routine biochemical investigation and haematological investigations were within normal range. The chest radiograph revealed a left upper zone lesion demonstrating a negative silhouette sign with the arch of aorta suggestive of a lung mass versus a posterior mediastinal mass (Fig. 1). So, a contrast enhanced computed tomography (CECT) of chest with angiography (to rule out a rare descending thoracic aorta aneurysm) was advised. The CT was reported to have a solid lung lesion of 50 × 40*45 mm diameter with homogenous contrast enhancement. It was attached to mediastinal pleura and aortic arch (Fig. 2a and b). The lesion involved vessels of left upper lobe and left pulmonary artery. There was a fracture of anterior ends of left 3rd, 4th and 5th ribs. There were hypodense cysts in liver and right kidney. The bronchoscopy was normal. The coagulation profile was normal. The radial EBUS was not feasible because the tumour bronchus sign was negative. EUS-B was planned, as there was a safety window via the esophageal route (Fig. 2c). The procedure was performed under deep sedation with propofol infusion. Since, the EUS-B has poor vision intraluminally, the mass was identified with the help of aorta. The lesion was just above the aorta. While doing the EUS-B a major vessel could not be avoided, hence TVNA was performed with a 21-gauge needle. This being a challenging and difficult case we wanted to get a good tissue yield with least number of biopsies, hence we chose the 21 G needle. We traversed through subclavian artery and reached the mass (Fig. 3). We made only one pass. There were no complications related to the procedure. The EUS-B guided TVNA showed adenocarcinoma negative for EGFR, TTF1, PDL1, RoS1 and ALK. The positron emission tomography (PET) scan showed uptake in the left upper lobe mass with slight hyperactivity in the region adjacent to the left upper paratracheal region and uptake in the pathological fractures of 3rd, 4th and 5th rib.

3. Discussion

The lesions behind large vascular structures have been traditionally

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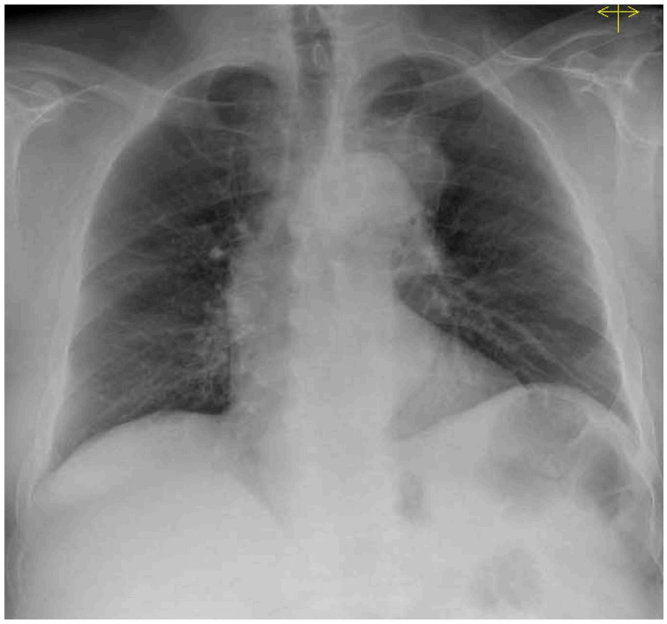


Fig. 1. Chest radiograph (PA) view showing a lesion around aorta.

avoided due to the concerns of bleeding. Since the last decade these are successfully biopsied with EUS and EBUS [1]. The use of EUS guided TVNA has been described since 2007 but the EBUS guided TVNA has only been described recently. The literature on EBUS guided TVNA is scant [3–7]. Mehta et al. describe ten patients of 7 transvascular and 3 intravascular lesions who had EBUS guided trans pulmonary or intrapulmonary aspiration with very good diagnostic yield. Of the transvascular lesions; 4 were lymph nodes, 2 masses and 1 bronchogenic cyst [7]. An EUS-B guided TVNA has not been described so far. The use of EUS-B with convex curvilinear EBUS requires anatomical

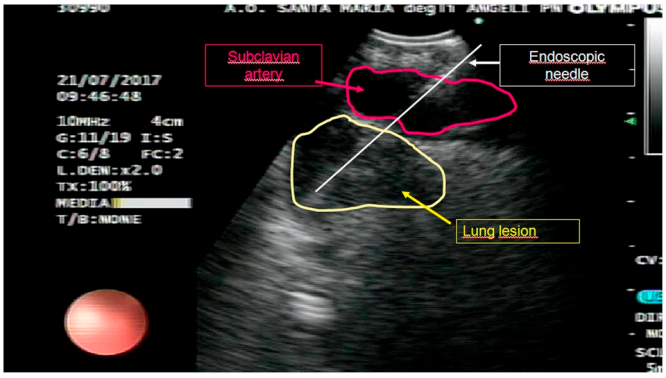
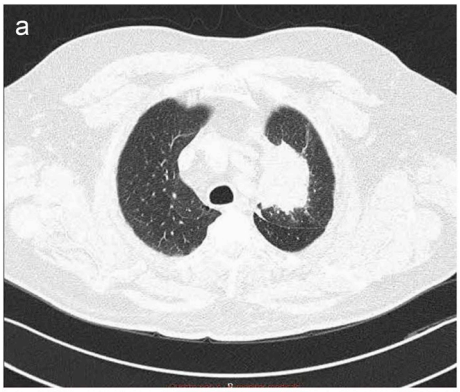
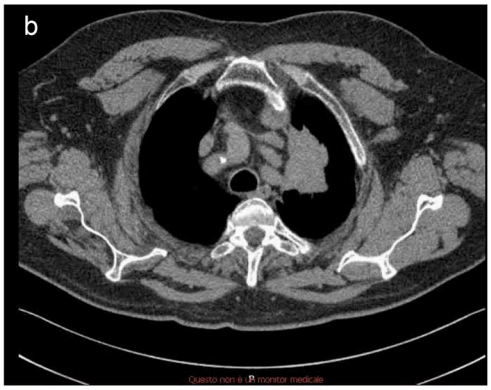


Fig. 3. Endosonographic view of the EUS-B scope showing needle in the mass traversing through the subclavian artery.

orientation of the mediastinal structures. The vision inside the scope is not useful unlike bronchoscopy but the structures outside the lumen can be easily identified with the ultrasound [8]. The level of sampling should be identified on CT scan. In our case the lesion was identified above the aorta at the origin of the major vessels. Since, EUS-B was a safer option and we have regularly doing EUS-B for the staging of lung cancers, EUS -B was performed. The puncture of subclavian artery was however unavoidable so the lesion was accessed via subclavian artery. Various reports and case series have described the access of lesions through aorta or pulmonary artery. No case report or series so far has described the access of lesion through subclavian artery.

The convex curvilinear EBUS which had been developed for sampling the mediastinal lymph node and mediastinal masses is now being increasingly used as EUS-B. The combined endosonography i.e. EBUS with EUS-B techniques are considered to be superior to conventional mediastinoscopy and have now become a norm in the initial staging of lung cancer [9]. A systematic review and meta-analysis compared combined EUS-B & EBUS fine needle aspiration (FNA) studies over a





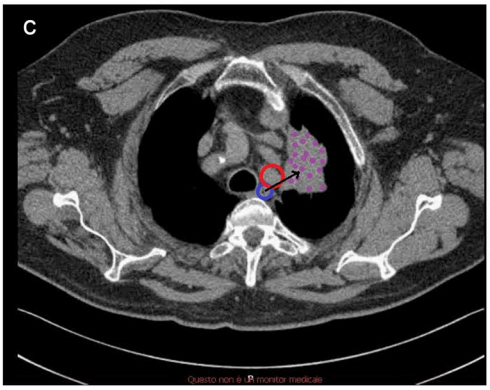


Fig. 2. a: Computed tomography (CT) of chest lung window in axial cut at the level of trachea showing mass around the major vessels in the mediastinum. b: CT of chest axial cut mediastinal window at the level of trachea showing mass around the major vessels in the mediastinum. c: CT of chest mediastinal window with the blue circle demarcating the esophagus, red circle demarcating the pulmonary artery, purple fill demonstrating the mass lesion and the black arrow showing the path taken by the needle. (For interpretation of the references to colour in this figure legend, the reader is referred to the Web version of this article.)

decade and concluded it to be a safe and effective method to increase the diagnostic yield in the evaluation of mediastinal lymphadenopathy [10]. It is important to apply TVNA too to EUS-B because: 1) The same endoscopy expert with a single scope can perform sampling of all the mediastinal lymphnodes along with FNA of the lesion under same sedation. 2) Since, the best possible approach is applied it reduces the risk of complications.

The possible complications with TVNA are: fatal haemorrhage [11], intramural hematoma, pneumomediastinum [12] and tracheal stenosis [13] due to hematoma. These are possible complications because they have been described after EBUS TBNA with an accidental puncture of a major vessel. There have been no complications described after planned TVNA. In one of the cases of fatal bleeding following EBUS TBNA, the platelet counts were low with deranged kidney function and the patient was on non-steroid anti-inflammatory drug. Another case of fatal bleeding was due to accidental puncture of pulmonary artery a patient with pulmonary hypertension. Thus, bleeding can be avoided if TVNA is planned and coagulation profile is normal. Studies have also recommended that TVNA must be performed by experienced hands at an experienced center where facilities like selective intubation, interventional radiology and thoracic surgery to tackle the bleeding complications are available [6]. Certain authors have performed the procedure under general anaesthesia and stopped the breathing while doing the procedure to avoid the complications. We took all the precautions prescribed to do the procedure. General anaesthesia was not necessary as an experienced anaesthetist ensured a deep sedation with propofol.

The alternative diagnostic modality of CT guided percutaneous FNA or core biopsy is always an option in evaluation of these lesions, however their role, safety, feasibility needs to be weighed strongly given the good accuracy and yield of EBUS, EUS and EUS-B. The role of a CT guided procedure is superior when core biopsy are required as in cases of lymphomas. The risk of haemorrhage and pneumothorax need to be kept in mind. The risk of symptomatic pneumothorax requiring drainage was associated with higher age, presence of emphysema, length of more than 1.5 cm from pleura [14,15].

To conclude, the role of EBUS is expanding from EUS-B for mediastinal structures, to EUS-B for transdiaphragmatic structures and is now considered a routine procedure in the staging of lung cancers. The important precautions to be remembered during an EUS-B-TVNA are as follows 1) Availability of an expert center, 2) Selection of appropriate patients (eg. patients where other lymph node locations not present or non-diagnostic despite rapid-on-site-evaluation (ROSE), patients were either not surgical candidates, or not willing for surgery), 3) Careful expert technique. These include-use of small bore needle, less number of passes, needle to be kept stable with no axis change during biopsy, static aspiration in intravascular lesions, 4) Use of deep sedation or general anaesthesia to avoid cough, 5) Follow up [7]. This case highlights that TVNA by EUS-B is also feasible and safe.

Conflicts of interest

There are no conflict of interest for all the authors.

References

[1] J. Kazakov, P. Hegde, M. Tahiri, V. Thiffault, P. Ferraro, M. Liberman, Endobronchial and endoscopic ultrasound-guided transvascular biopsy of mediastinal, hilar, and lung lesions, Ann. Thorac. Surg. 103 (2017) 951–955.
[2] M.B. Wallace, T.A. Woodward, M. Raimondo, M. Al-Haddad, J.A. Odell, Transaortic fine-needle aspiration of centrally located lung cancer under endoscopic ultrasound guidance: the final frontier, Ann. Thorac. Surg. 84 (2007) 1019–1021.
[3] B. Vincent, J.T. Huggins, P. Doelken, et al., Successful real-time endobronchial ultrasound-guided transbronchial needle aspiration of a hilar lung mass obtained by traversing the pulmonary artery, J. Thorac. Oncol. 1 (2006) 362–364.
[4] R. Folch, A. Santacruz, M. Machuzak, et al., Safety and efficacy of EBUS-guided TBNA through the pulmonary artery: a preliminary report, Chest 140 (2011) 600A.
[5] E. Folch, J.F. Santacruz, S. Fernandez-Bussy, et al., The feasibility of EBUS-guided TBNA through the pulmonary artery in highly selected patients, J. Bronchol. Interv. Pulmonol. 23 (1) (2016) 7–13.
[6] T.S. Panchabhai, M.S. Machuzak, S. Sethi, et al., Endobronchial ultrasound– guided transvascular needle aspiration, J. Bronchol. Interv. Pulmonol. 22 (4) (2015) 306–311.
[7] R.M. Mehta, P.R. Biraris, V. Pattabhiraman, A. Srinivasan, A. Singla, S. Kumar, et al., Defining expanded areas in EBUS sampling: EBUS guided trans- and intra-pulmonary artery needle aspiration, with review of transvascular EBUS, Clin. Res. J. 12 (2018) 1958–1963.
[8] A. Bugalho, M. de Santis, A. Szlubowski, A. Rozman, R. Eberhardt, Trans-esophageal endobronchial ultrasound-guided needle aspiration (EUS-B-NA): a road map for the chest physician, Pulmonology 24 (2018) 32–41.
[9] I. Berania, J. Kazakov, M. Khereba, E. Goudie, P. Ferraro, V. Thiffault, et al., Endoscopic mediastinal staging in lung cancer is superior to ‘gold standard” surgical staging, Ann. Thorac. Surg. 101 (2016) 547–550.
[10] S. Dhooria, A.N. Aggarwal, D. Gupta, D. Behera, R. Agarwal, Utility and safety of endoscopic ultrasound with bronchoscope- guided fine-needle aspiration in mediastinal lymph node sampling: systematic review and meta-analysis, Respir. Care 60 (7) (2015) 1040–1050.
[11] D.R. Miller, H.H. Mydin, A.D. Marshall, G.S. Devereux, G.P. Currie, Fatal haemorrhage following endobronchial ultrasound-transbronchial needle aspiration: an unfortunate first, QJM 106 (2013) 295–296.
[12] M. Botana-Rial, M. N_u～nez-Delgado, A. Pallar_es-Sanmartín, et al., Intramural hematoma of the pulmonary artery and hemopneumomediastinum after endobronchial ultrasound guided transbronchial needle aspiration, Respiration 83 (2012) 353–356.
[13] M.O. Al-Qadi, F. Maldonado, Focal tracheal stenosis due to intramural hematoma following endobronchial ultrasound-guided transbronchial needle aspiration, J. Bronchol. Interv. Pulmonol. 21 (2014) 274–276.
[14] J. Takeshita, K. Masago, R. Kato, A. Hata, R. Kaji, S. Fujita, et al., CT-guided fine-needle aspiration and core needle biopsies of pulmonary lesions: a single-center experience with 750 biopsies in Japan, Am. J. Roentgenol. 204 (2015) 29–34.
[15] H. Lal, Z. Neyaz, A. Nath, S. Borah, CT-guided percutaneous biopsy of intrathoracic lesions, Korean J. Radiol. 13 (2) (2012) 210–226.