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Case report

Lung cancer with superior vena cava syndrome diagnosed by intravascular biopsy using EBUS-TBNA

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ABSTRACT

Since superior vena cava syndrome (SVCS) is a critical condition, immediate diagnostic approach and therapy are imperative to avoid potentially life-threatening complications. Here, we report a case of lung cancer with SVCS, which was diagnosed through intravascular tumor biopsy using endobronchial ultrasound-guided transbronchial needle aspiration (EBUS-TBNA). EBUS-TBNA enabled us to obtain tissue sufficient for diagnosis, without significant complications. Prompt diagnosis was followed by appropriate anticancer treatment and improvement in the symptoms. For patients suspected of SVCS and requiring prompt pathologic diagnosis, we can consider EBUS-TBNA to diagnose intravascular or mediastinal tumors and provide an accurate diagnosis.

The superior vena cava syndrome (SVCS) is a critical condition, which encompasses symptoms and signs caused by obstruction of the superior vena cava (SVC) [1]. The blockage of blood flow in the SVC results in edema of head and upper body, which leads to functional compromise of the larynx or pharynx and cerebral edema, manifested as headache, confusion, and coma [2]. Furthermore, decreased venous return may cause hemodynamic compromise [1]. Immediate diagnostic approach and emergency therapy are imperative to avoid potentially life-threatening complications [3].

Most common cause of SVCS is intrathoracic malignancy such as lung cancer, lymphoma and metastatic cancer [4]. Since treatment varies according to the histology of the underlying disease, accurate histologic diagnosis is crucial in patients with SVCS [2]. To obtain tissue diagnosis, invasive procedures such as mediastinoscopy and mediastinotomy may be required. Previous studies indicated patients with SVCS compared to those without SVCS show significantly higher rate of complications from mediastinal procedures [5]. Recently, endobronchial ultrasound-guided transbronchial needle aspiration (EBUS-TBNA) has been performed in patients presented with SVCS. Recent reports suggest EBUS-TBNA has high diagnostic accuracy and is relatively safe for the diagnosis of SVCS [6].

EBUS-TBNA is a minimally invasive procedure that was developed for evaluating mediastinal lymph nodes with real-time visualization of intrathoracic structures [7]. EBUS-TBNA has a key role in diagnosis of lung cancer and mediastinal staging by sampling metastatic lymph nodes currently [8]. In addition, Park et al. reported case describing intravascular mass diagnosed as pulmonary angiosarcoma using EBUS-TBNA biopsy [9]. However, there is limited information on its role in diagnosing intravascular lesions. Herein, we report a case of lung cancer invading SVC, which was diagnosed by biopsy of intravascular mass using EBUS-TBNA.

1. Case report

A 46-year-old man was transferred to our emergency room for facial and upper trunk swelling and dyspnea with chest discomfort that had begun 1 month earlier. He was a 30-pack-year current smoker. On physical examination, neck vein engorgement was observed, with distended veins and edema on the upper trunk and both arms. Chest radiograph showed consolidation in the right paratracheal area that suggestive of central malignancy (Fig. 1). We performed chest computed tomography (CT) with contrast

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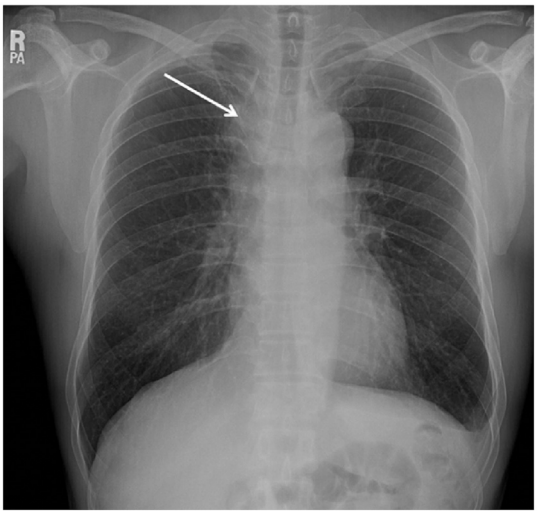

Fig. 1. Chest radiograph shows consolidative mass in the right mediastinal area (arrow) and left pleural effusion.

enhancement to rule out SVC syndrome. The CT revealed a soft-tissue mass in the right paratracheal area that has invaded into the SVC and extended to the right atrium with bilateral pleural effusions (Fig. 2A–C). Positron emission tomography (PET)-CT with ^{18}F-fluorodeoxyglucose (FDG) showed increased FDG uptake, with a maximum standardized uptake value (SUV_{max}) of 10.6 in the SVC (Fig. 2D). It was not available to obtain tissue from the primary lesion in the right upper lung using CT-guided percutaneous core needle aspiration (PCNA). In the bronchoscopy, there was no endobronchial lesion. Therefore, we decided to perform EBUS-TBNA to obtain tissue from the intravascular mass in SVC. EBUS-TBNA was performed using an ultrasound bronchoscope with a linear scanning transducer. Under ultrasound visualization, the SVC was tightly packed by the mass and blood stream was not detected around the tumor. The tumor was punctured using a 22-gauge needle under real-time visualization (Fig. 3A). During the procedure, there was no serious bleeding or other complication. Cytopathology confirmed poorly differentiated adenocarcinoma, with TTF-1-positive immunohistochemistry (Fig. 3B). There were no epidermal growth factor receptor (EGFR) gene mutations or KRAS gene mutations. He received 4 cycles of gemcitabine-carboplatin chemotherapy for the treatment of lung cancer. Two months after the chemotherapy, chest CT showed that the tumor size was decreased and his symptoms were relieved as well (Fig. 4).

2. Discussion

In patients with newly diagnosed malignancy presenting with SVCS, urgent diagnostic evaluation and treatment to alleviate symptoms are required to avoid serious complications. We are reporting a case of lung cancer with SVCS diagnosed through intravascular tumor biopsy using EBUS-TBNA. Fortunately, since diagnosis was confirmed pathologically, the patient underwent anticancer treatment and his symptoms were improved.

In SVCS, timely establishment of the underlying diagnosis of SVCS is imperative for starting appropriate treatment. Surgical procedures including mediastinoscopy and mediastinotomy may be required. General anesthesia itself in patients with SVCS is related to high morbidity and mortality [10]. Also, patients with SVCS underwent mediastinoscopy and mediastinotomy for

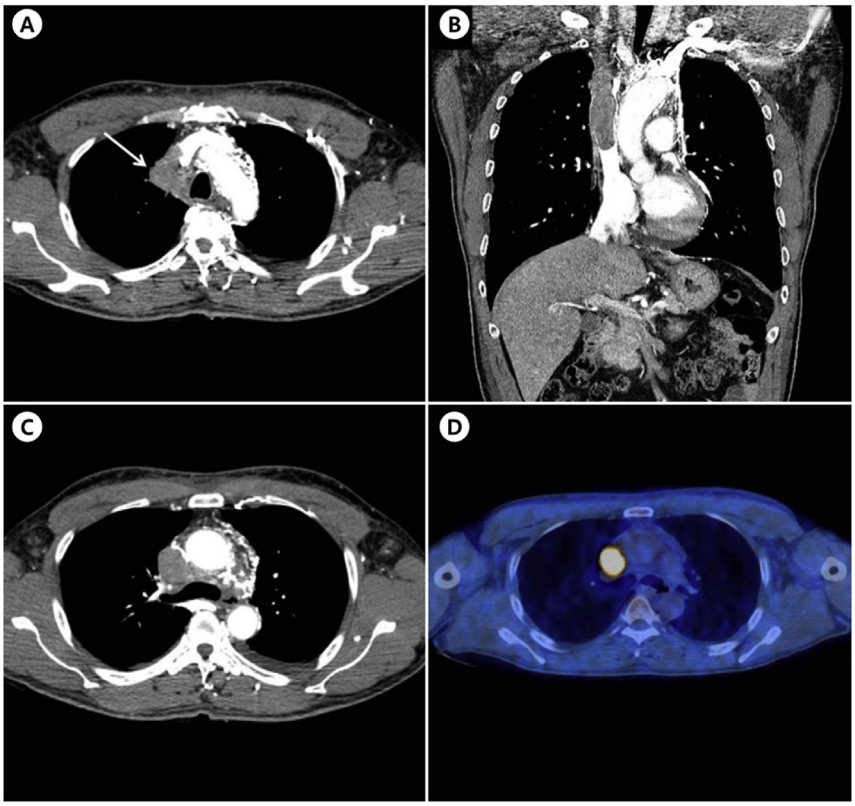

Fig. 2. Chest computed tomography (CT) scan shows 38 mm primary lung mass invading the right mediastinum (arrow) (A). On coronal image, SVC mass is extended to the right atrium (B). Transverse lung window CT image shows the mass fully occupying the SVC (C). PET-CT images shows FDG uptake with SUVmax of 10.6 on the SVC mass (D).

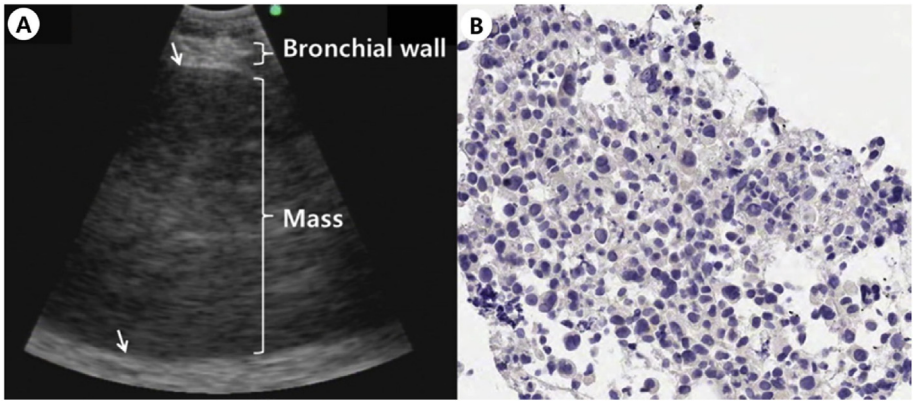

Fig. 3. Endobronchial ultrasound imaging and pathology specimens from EBUS-TBNA. Ultrasound imaging shows the mass within SVC wall (arrows) (A). The biopsy shows poorly differentiated adenocarcinoma (H&E, ×400) (B).

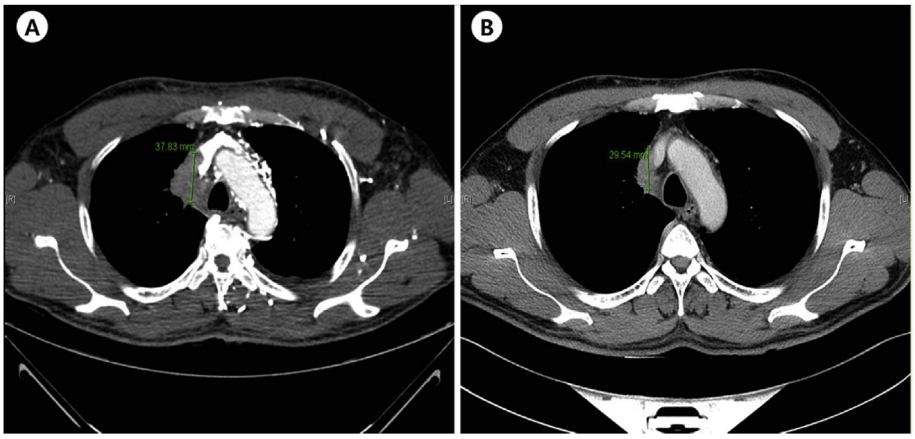

Fig. 4. Initial lung mass in chest CT scan (A), and follow up chest CT shows interval decrease in size of the primary lung cancer (B).

histologic diagnosis showed higher complication rate, which was associated with major hemorrhage, airway obstruction, wound infection, etc. [5] In our case, EBUS-TBNA enabled us to obtain tissue via the SVC immediately without significant complications, avoiding an undesirable thoracotomy under general anesthesia.

As in this case, Jeong et al. previously described a critically ill patient who was diagnosed by using EBUS-TBNA [11]. The patient with extensive pretreated lung cancer causing respiratory failure confirmed pathologic diagnosis using EBUS-TBNA. Both cases suggest that physicians necessitate new perspective on the use of EBUS-TBNA in critically ill patients. EBUS-TBNA, which is a novel diagnostic modality and relatively safe technique with high diagnostic accuracy, may be alternative diagnostic method for critically ill patients who cannot undergo surgery under general anesthesia.

Several cases about EBUS-TBNA of intravascular lesions have been reported. Harris et al. reviewed 10 reported cases of EBUS-TBNA guided biopsy for diagnosis of intravascular masses, and there are no significant complications [12]. Similarly, Von Bartheld et al. reported a case series that demonstrated the safety of transaortic fine needle aspiration under real-time endoscopic ultrasound guidance in the diagnosis of lung tumors and lymph nodes [13]. In the report, only two of 12 patients had a possible paraaortic hematoma on the EUS image after the biopsy, and they recovered uneventfully. Also, Panchabhai et al. revealed safety of transvascular approach of EBUS-TBNA. No complications were noted in any of the 10 cases [14]. Likewise, our patient was successfully diagnosed using EBUS-TBNA to puncture the SVC without any complications. Considering the reports and our case, in experienced hands, the intravascular and transvascular approach using EBUS-TBNA may be safe procedure.

In conclusion, our case showed the safety and feasibility of using EBUS-TBNA to diagnose fully packing SVC masses. It suggests that when the patient who suspected SVCS and needs prompt pathologic diagnosis, we can consider EBUS-TBNA for diagnosing intravascular or mediastinal tumors and providing exact diagnosis to clinicians. It can also provide sufficient tissue as much as surgical biopsy for immunohistochemistry and EGFR/KRAS mutation analyses for targeted therapy.

Conflict of interest

No potential conflict of interest relevant to this article was reported.

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