CASE REPORT

An unusual case of iatrogenic haemoptysis

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SUMMARY

Transbronchial needle aspiration (TBNA) of the hilar and mediastinal lymph nodes and lung masses is a powerful tool in the diagnostic evaluation of mediastinal adenopathies including malignancies. As its use becomes more widespread, few cases have been reported with complications. We present a case of a 57-year-old man who was transferred to our institution for uncontrolled haemoptysis following endobronchial ultrasound-guided TBNA. At our institution, emergent bronchoscopy revealed a large clot distal to the right upper lobe bronchus without a visible fistula tract. A CT pulmonary angiogram and a subsequent pulmonary angiogram showed an aneurysm originating from the right superior pulmonary vein. Management was conservative with strict blood pressure control and lowering the left atrial pressure allowed spontaneous resolution of the bleed.

BACKGROUND

The use of CT and positron emission tomography (PET) is an effective way to stage mediastinal lymph nodes. For a complete staging of lymph nodes, tissue sampling is required. Mediastinoscopy is useful for tissue sampling but is considered an invasive technique,^{1 2} and the use of endobronchial ultrasound-transbronchial needle aspiration (EBUS-TBNA) has been encouraged. EBUS-TBNA has been proved to be superior to the use of PET or CT alone and has also demonstrated to be a highly sensitive, specific and safe procedure in staging mediastinal lymph nodes.¹

As new diagnostic techniques become available, operators should be able to recognise and manage potential complications as they happen. Real-time visualisation with colour flow Doppler enhancement to differentiate vascular structures may have been beneficial prior to the initial needle aspiration.³ By identifying possible complications, future users may learn from these experiences and improve the technique as well as improve the safety profile of the procedure.

CASE PRESENTATION

A 57-year-old man with a history of hypertension, chronic obstructive pulmonary disease, chronic kidney disease, and exposure to tuberculosis and asbestos, was transferred to our institution for uncontrolled haemoptysis following an EBUS-guided TBNA of a station 10R lymph node.

His primary pulmonologist referred him to an experienced EBUS operator (who had performed more than 50 EBUS-guided procedures previously) for evaluation of evolving adenopathy in the mediastinal and hilar regions (figure 1). The patient had a prior positive purified protein derivative and known prior exposure to tuberculosis for which he

received 9 months of isoniazid treatment for latent tuberculosis infection. The chest CT 1 month prior to his admission demonstrated calcified hilar lymphadenopathy with no vascular abnormality. The bronchoscopic procedure performed was under general anaesthesia using a laryngeal mask airway (LMA). The procedure note stated that the station 10R lymph node was easily identified to be hypoechoic with an intact capsule and one pass was made without difficulty into the identified lymph node site identified. The patient was noted to become immediately hypoxic and the EBUS scope was removed and a therapeutic bronchoscope was inserted via the LMA. Bleeding was noticed originating from the endobronchial puncture site and the procedure was aborted. He underwent a pulmonary angiogram and an unsuccessful embolisation of a bronchial artery branch. Over the following 4 days at the other facility he continued to be hypertensive and had recurrent bleeding from the puncture site. He required multiple therapeutic bronchoscopies for lavage of the massive haemoptysis but no other endobronchial directed treatment at the bleeding site was attempted. Additionally, he had multiple supportive packed red blood cell transfusions prior to his transfer but had no coagulation disorders noted and did not need plasma or platelet transfusions.

The patient was transferred to our institution because of massive haemoptysis and progressive hypoxic respiratory failure. On arrival to our institution, emergent bronchoscopy revealed blood in all segments of the right lung with active oozing from distal segments of the anterior right upper lobe subsegment without a visible fistula tract. There were copious blood clots bilaterally with a large clot just distal to the right upper lobe takeoff at the site of the endobronchial ultrasound TBNA that was not amenable to any coagulation or clipping via endobronchial approach. The adherent clot was left untouched to prevent further bleeding. A CT pulmonary angiogram (figures 2 and 3) and a subsequent pulmonary angiogram with delayed imaging (figure 4) showed an aneurysm that originated from the right superior pulmonary vein.

The patient was noted to be hypertensive and with high peak airway pressures on the ventilator. His blood pressure was controlled and he was deeply sedated and paralysed for improved ventilator synchrony as well as to facilitate lung protective ventilation strategies. Our management included repeated bronchoscopies for respiratory toilet because of the recurrent haemoptysis in addition to aggressive control of the patient's blood pressure in order to reduce left atrial pressures allowing spontaneous resolution of the bleed.

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Figure 1 CT of the chest without contrast performed 1 month prior to the biopsy demonstrating calcified hilar lymphadenopathy and pleural plaque on the left side.

OUTCOME AND FOLLOW-UP

The patient required a tracheostomy due to a prolonged wean from the ventilator. He was eventually discharged to a long-term acute care facility for physical and pulmonary rehabilitation.

DISCUSSION

TBNA of the hilar and mediastinal lymph nodes and lung masses is a powerful tool in the diagnostic evaluation of mediastinal adenopathies including malignancies.¹ The EBUS-guided TBNA is reported to be a safe and highly accurate procedure for examining and staging of mediastinal and hilar lymph nodes.⁴ To date it has been a relatively safe procedure. A review of 50 patients undergoing EBUS for the diagnosis of sarcoidosis reported no complications.⁵

Tissue sampling under visual control and in real-time allows for direct visualisation of the airway, adjacent vessels and organs, thus creating fewer complications during the procedure. Doppler ultrasound (US) findings provide valuable information about the anatomy and physiology of the vessels. Spectral Doppler ultrasonography and colour-flow vascular imaging supplement grey-scale US in identifying blood vessels, confirming the direction of blood flow within the vessel. A study in 2004 by Dr Yasufuku⁶ concluded that real-time convex probe endobronchial ultrasound-guided TBNA of mediastinal and hilar

Figure 2 CT angiogram of the chest with coronal views showing aneurysmal dilation originating from the right superior pulmonary vein with subsequent drainage into the left atrium.

Figure 3 CT angiogram of the chest with corresponding axial view showing aneurysmal dilation originating from the right superior pulmonary vein with subsequent drainage into the left atrium with consolidation of the left upper lobe and right lower and middle lobes.

lymph nodes is a safe and novel approach with good diagnostic yield.

Recently, a systematic review of complication rates with endobronchial ultrasonography (EBUS) and endoscopic ultrasonography (EUS) in 16 181 patients showed a rate of 23 (0.14%) of serious adverse events (SAE) and 35 (0.22%) of minor adverse events with no observed mortality. Serious adverse events with the use of only EBUS were as low as 0.05% with no mortality observed. In fact, the study showed superiority in EBUS-guided procedures over EUS-guided procedures.⁷ The most frequently reported SAEs were infections such as mediastinitis and mediastinal abscess formation. Other severe complications reported have included intramural haematoma of the pulmonary artery,⁸ airway laceration⁹ and, in rare instances, pneumothorax.¹⁰

Figure 4 Delayed imaging during right pulmonary angiogram showing the venous return phase, revealing aneurysmal dilation of the right superior pulmonary vein.

As far as we know, there have not been any cases reported to date of a pulmonary venous aneurysm formation following an EBUS-guided procedure. Biopsies obtained by traversing the pulmonary artery have shown to be safe with lower risk of bleeding,³ likely because of the low-pressure system of the pulmonary artery. In our case, the patient had a normal echocardiogram with normal systolic and diastolic left ventricular function and normal estimated right ventricular systolic pressure suggesting normal pulmonary vascular pressures. It is possible that the puncture site created the initial insult for an aneurysm to form, creating a weak vascular wall, resulting in repeated episodes of massive haemoptysis. Our management included repeated bronchoscopies for pulmonary toilet due to recurrent haemoptysis with subsequent development of airway clots which lead to hypoxia. Aggressive control of the patient's blood pressure enforced a reduction in the left atrial pressures allowing spontaneous resolution of the bleed. With our conservative management eventually the bleeding stopped and the aneurysm healed.

EBUS-guided procedures remain a safe and effective tool for tissue sampling. As the widespread use of it increases, more complications are expected to be reported. A nationwide survey from 455 facilities in Japan, of which 210 facilities had 7345 cases that used EBUS-TBNA, reported a higher incidence of complications with EBUS (1.23%) and reiterates that there is an increased rate of recently trained bronchoscopists with variable institutional-dependent training methods.¹¹ The implementation

of a good educational system in the use and safety of the EBUS procedure should be considered.¹¹ This case demonstrates one of the complications encountered from the procedures which bronchoscopists must be aware of. Improved safety training and the use of colour Doppler enhancement of structures in the hilar and mediastinal regions during EBUS, prior to needle aspiration, can help differentiate vascular structures,³ and complications such as reported in this case can be avoided.

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Competing interests None.

Patient consent Obtained.

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Learning points

- This case illustrates rare major bleeding from a pulmonary venous aneurysm formation following endobronchial ultrasonography (EBUS)-guided transbronchial needle aspiration that was managed conservatively with spontaneous resolution of bleeding.
- Use of colour Doppler enhancement of structures in the hilar and mediastinal regions during EBUS prior to needle aspiration can help differentiate vascular structures, and complications such as these could be avoided.
- Implementation of a good educational system in the use and safety of the EBUS procedure should be considered during training.

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