Case report

Iatrogenic pneumothorax following vigorous suctioning of mucus plug during flexible bronchoscopy

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SUMMARY

Flexible bronchoscopy is a commonly performed procedure in pulmonary medicine. The common complications following bronchoscopy include minor bleeding, transient hypoxaemia, pneumothorax and others. Pneumothorax during diagnostic flexible bronchoscopy is mainly encountered after performing transbronchial lung biopsy. Iatrogenic pneumothorax is uncommon when lung biopsy is not performed. Herein, we report the unusual occurrence of pneumothorax following bronchoscopic suctioning while removing a mucus plug.

BACKGROUND

Diagnostic flexible bronchoscopy is a safe and widely performed procedure. While complications such as minor airway bleeding (bleeding that does not require any intervention), and transient hypoxaemia are common, life-threatening complications are unusual.¹ Pneumothorax during diagnostic flexible bronchoscopy is usually encountered after transbronchial lung biopsy (TBLB), with an incidence ranging from 0% to 4%.² When a lung biopsy is not performed, pneumothorax is an uncommon event following diagnostic bronchoscopy.³ We recently reported the rare occurrence of pneumothorax complicating bronchoalveolar lavage (BAL).⁴ Herein, we report an even more unusual occurrence of pneumothorax following bronchoscopic suctioning to remove a mucus plug.

CASE PRESENTATION

A 38-year-old woman was evaluated for dry cough of 3 months duration. There was no history of breathlessness, wheeze, haemoptysis, chest pain or fever. She did not have a history of smoking or drug abuse. For the past 5 years, she had a seasonal episodic cough that did not require any medical attention or treatment. She had no known comorbid illnesses or any drug intake. At the time of presentation, her vitals were stable, and clinical examination of the chest (including percussion and auscultation) was normal.

INVESTIGATIONS

Chest radiograph was suggestive of right upper lobe collapse. CT of the chest confirmed the presence

of right upper lobe collapse. We performed flexible bronchoscopy under topical anaesthesia (10 puffs of 10% lignocaine (Lox 100 mg/mL; Neon Laboratories Ltd, Mumbai, India) sprayed over the oropharynx, and lignocaine jelly was instilled in the nose before advancing the bronchoscope). During bronchoscopy, topical lignocaine (2 mL aliquots of 1% lignocaine) was administered using the spray-as-you-go technique.⁵ The initial part of the procedure was unremarkable, well-tolerated and revealed the presence of a mucus plug occluding the right upper lobe bronchus. However, we encountered difficulty while removing the thick and adherent mucus plug. The suction pressure was increased to remove the mucus plug during which she started developing cough. The mucus plug was completely removed following suction; no underlying growth was seen, and a bronchial washing was obtained. The entire procedure lasted for about 10 min. There was no bleeding or trauma following the mucus plug removal. However, the cough worsened further, accompanied by severe chest pain on the right side. On auscultation, breath sounds in the right mammary area were decreased. A point-of-care ultrasound revealed an absence of lung-sliding sign on the right side, suggesting a pneumothorax. Chest radiograph also showed the presence of a pneumothorax (figure 1).

TREATMENT

A manual aspiration was performed, which failed. Subsequently, an intercostal tube was inserted. Chest radiograph after a week revealed only segmental atelectasis and the intercostal drain was removed as the underlying lung had expanded.

OUTCOME AND FOLLOW-UP

Bronchial washings did not reveal malignant cells or acid-fast bacilli. Fungal smear revealed septate hyphae, and culture grew *Aspergillus fumigatus*. Specific IgE against *Aspergillus fumigatus* (24.1 kUA/L) and total IgE (2700 IU/L) were elevated. She was diagnosed to have allergic bronchopulmonary aspergillosis (ABPA) based on the clinical and immunological features. Treatment with systemic glucocorticoids was initiated. At 3 months follow-up, there was complete clinical and radiological resolution.

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Figure 1 Chest radiograph showing pneumothorax on the right side (arrowhead) and the underlying lung shows the segmental collapse of the right upper lobe (arrow).

DISCUSSION

Herein, we report the occurrence of pneumothorax while performing bronchoscopy to remove a mucus plug in a patient with ABPA. The index case reminds us that pneumothorax, though rare, is possible even when a TBLB is not performed. A minor increase in respiratory symptoms following bronchoscopy is common, however, when they are severe and persistent, evaluation for complications is warranted. Hence, when the clinical features are suggestive of pneumothorax; clinical examination and imaging (ultrasonography and chest radiograph) should be performed, even when a lung biopsy has not been performed.

In general, vigorous suctioning should be avoided, and the suction pressure applied from the wall-mounted apparatus should be monitored. A suction pressure of <60 mm Hg is preferred while performing BAL, and the pressures should not exceed beyond 100 mm Hg.⁶ The safe range of suction pressure to be used for bronchoscopic removal of mucus plug is not defined. At our bronchoscopy suite, we restrict the suction pressure below 100 mm Hg; however, in the index case, the pressure had to be exceeded to remove the mucus plug. The index patient developed cough during the procedure, whether this was the cause, or an effect of the pneumothorax remains unclear. Coughing is preceded by a deep breath causing the lungs to expand (along with an increase in intrathoracic pressure), while suctioning produces a counter-active force. Considering the temporal sequence of events, we believe that the application of a strong suction force in our index patient resulted in pneumothorax. Cough appeared to be an effect, rather than being the cause of pneumothorax. It is possible that if the bronchoscopy had been performed under conscious sedation, the chances of cough and thereby the risk of pneumothorax could have been smaller.⁷ Unfortunately, owing to logistic reasons, we perform routine bronchoscopic procedures under local anaesthesia, despite guideline recommendation for conscious sedation in all patients.¹ On the contrary, a deeply sedated patient would not have communicated the symptoms, thereby delaying the

detection of pneumothorax, in a procedure where this complication is seldom expected. Soni *et al* reported a similar case of pneumothorax following bronchoscopic suction. However, their patient had suffered blunt trauma to the thorax (with rib fractures) and developed pneumothorax while on positive pressure ventilation.⁸

The occurrence of pneumothorax in patients with ABPA, either spontaneously or following bronchoscopy, have been reported previously. In one of these cases, vigorous coughing to clear retained mucus had been proposed as the cause of pneumothorax. However, this patient also had a history of transbronchial lung biopsy from a mucus impacted right upper lobe posterior segment bronchus, 48 hours before the development of pneumothorax.⁹ Ricketti *et al* reported a 38-year-old woman with advanced ABPA, who had apical blebs and fibrotic lung, which had predisposed to spontaneous pneumothorax.¹⁰ Our patient was distinct from both these reports, neither was the lung disease advanced, nor a biopsy was performed. In the index case, vigorous suctioning rather than ABPA, appears to be the cause of pneumothorax. Finally, in patients with ABPA, the hyperattenuating mucus impaction causes atelectasis, which in turn may facilitate the spread of inflammation to the pleura. Once the atelectasis resolves, pneumothorax may develop.

In conclusion, bronchoscopic suction of thick mucus plugs should be performed carefully and the suction pressure should be maintained below 100 mm Hg, to avoid the development of pneumothorax.

Learning points

- ▶ Iatrogenic pneumothorax can rarely occur after vigorous suctioning following diagnostic bronchoscopy. A suction pressure of <60 mm Hg should be preferred during bronchoscopy to avoid complications.
- ▶ In the presence of persisting cough, hypoxaemia and chest pain following bronchoscopy, one should evaluate for pneumothorax, even when a lung biopsy has not been performed.
- ▶ Allergic bronchopulmonary aspergillosis can present with segmental, lobar or lung collapse due to mucus plugging. Rarely, pneumothorax may develop spontaneously or following bronchoscopy.

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