

Airway foreign body caused by pepper inhalation 7 years previously retrieved under conscious sedation with spontaneous respiration: a case report

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Abstract

A 26-year-old man who had inhaled a dried pepper 7 years previously was admitted to our hospital for repeated coughing with yellow sputum and occasional hemoptysis. A thoracic high-resolution computed tomography scan revealed a foreign body at the proximal end of the right lower bronchus. We attempted to remove the foreign body by flexible bronchoscopy, but this was unsuccessful because the foreign body fell deeper into the bronchus. After a multi-disciplinary team meeting, the foreign body was successfully extracted by bronchoscope suction and forceps under conscious sedation with spontaneous respiration. We avoided rigid bronchoscopy and traumatic surgery, thus decreasing the patient's risk and cost. We herein share our successful experience with this case.

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Keywords

Dried pepper, tracheal foreign body, flexible bronchoscopy, multidisciplinary team, high-resolution computed tomography, conscious sedation with spontaneous respiration

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Introduction

Tracheobronchial foreign body (FB) aspiration in adults is relatively rare, with a reported prevalence of 0.25%.¹ It may occur in patients without identifiable high-risk factors, such as those with neurological disorders, alcohol or drug intoxication, or dental problems.² Organic objects are more frequently found than inorganic objects in patients with FB aspiration. Organic FBs tend to be more symptomatic than inorganic FBs, and they are associated with a longer time lag from aspiration to bronchoscopy; greater radiopacity; and higher incidence of pneumonia, atelectasis, bronchiectasis, and granuloma formation after 30 days.³ These adverse effects may be attributed to the fact that organic oils are more irritating than inorganics and more strongly induce inflammation. Fish and chicken bones are the most prevalent FBs in the literature.⁴ However, a dried pepper is a very rare FB. Duan et al.⁵ reported three cases of pepper aspiration during the past 30 years, and surgical procedures were performed in all cases because of the late diagnosis. Importantly, appropriate anesthetic techniques are key procedures to remove FBs from the airways. Alternative methods include conscious sedation with spontaneous breathing as well as general anesthesia with a laryngeal mask or tracheal intubation. We herein describe an adult patient who had inhaled a dried pepper 7 years previously. The pepper FB was successfully retrieved with a flexible bronchoscope using conscious sedation with spontaneous respiration. The purpose of

this report is to share our experience of removing a dried pepper FB from an airway without surgical intervention.

Case presentation

A 26-year-old man was admitted to our hospital because of a 7-year history of repeated coughing with yellow sputum and occasional hemoptysis. No fever, dyspnea, or other symptoms were observed. The lung window of thoracic computed tomography (CT) showed a large area of mottled, patchy opacification in the right lower lung. An arcuate dense shadow at the entrance of the right inferior lobar bronchus was also observed (Figure 1(a), (b)). The abnormality resembled a tracheal calcification or tracheal FB; it measured 5 × 2 mm and had a CT value of about 110 to 386 HU. Upon questioning the patient regarding his medical history, we found that he had inhaled a dried pepper 7 years previously.

Before treatment, we localized the organic dried pepper based on the patient's aspiration history and the presence of an obvious dense shadow at the entrance of the basal segment of the right inferior lung on the thoracic CT scan. Flexible bronchoscopy revealed hyperemia and edema of the bronchial mucous membrane and many irregular granulomas at the opening of the basal segment of the right inferior lobe accompanied by a large amount of phlegm (Figure 2). Because of the dried pepper's dehydrated nature, small mass, and light weight, it easily floated up and down with the patient's respiration and coughing.

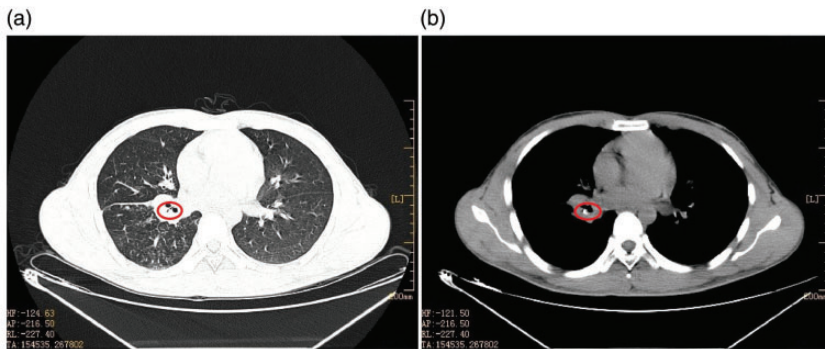


Figure 1. (a) Lung window of thoracic CT showed a large area of mottled, patchy opacification in the right lower lung. (b) Mediastinal window of thoracic CT demonstrated an arcuate dense shadow at the entrance of the right inferior lobar bronchus. The abnormality resembled tracheal calcification or a foreign body in the trachea; it measured 5×2 mm, and its CT value ranged from 110 to 386 HU.

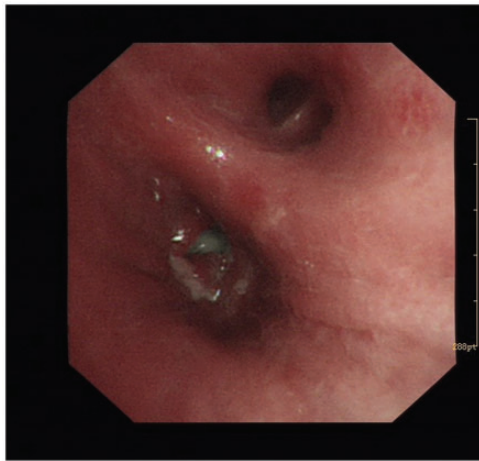


Figure 2. Flexible bronchoscopy showed a large amount of phlegm and many irregular granulomas at the opening of the basal segment of the right inferior lobe.

A large area of granulomatous tissue was present, so we decided to use a biopsy forceps and basket in case the pepper became stuck. Repeated flushing was performed to obtain a clear view and more easily locate the FB. However, the flushing procedures pushed the pepper to the lower bronchus, resulting in failed FB removal during the first procedure. The displacement of the

FB was further confirmed by a thoracic CT scan (Figure 3(a), (b)).

We arranged a preoperative planning session with a multidisciplinary team (MDT) involving bronchoscopists, assistant bronchoscopists, nurses, radiologists, and anesthesiologists. The bronchoscopists suggested performing virtual bronchoscopic navigation via CT, which has been shown to have 100% sensitivity and 75% specificity.⁶ However, the patient refused because of the high cost of this procedure. The radiologists suggested that C-arm fluoroscopy could not be used to locate the FB because the CT value was not high enough. Thus, an operation under C-arm guidance was not recommended. The anesthesiologists suggested inducing a state of conscious sedation and spontaneous respiration anesthesia during the operation, while the bronchoscopy team prepared forceps, snares, baskets, and a balloon catheter. Considering the location of the FB, the bronchoscopists chose a bronchoscope with an outer diameter of 4.2 mm via oral entry. It was very important to avoid pushing the pepper further into the lower bronchus by rinsing. The bronchoscopists then carefully cleaned the secretions with a biopsy forceps and absorbing materials,

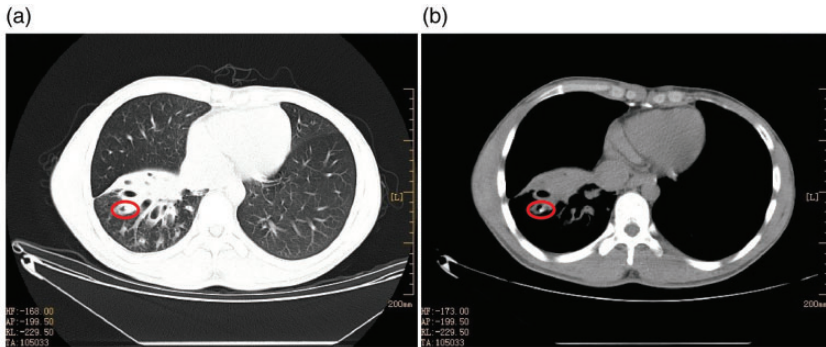


Figure 3. (a) Lung window of repeat thoracic CT showed a large area of mottled, patchy opacification in the right lower lung. (b) Mediastinal window of repeat thoracic CT demonstrated a dense shadow in the outer basal segment of the right inferior lobe.

but no rinsing was performed. After a very successful operation, the dried pepper finally floated to the outer basal segment of the right inferior lobe and was removed from the trachea. In summary, with the cooperation of the MDT, we performed a repeat flexible bronchoscopic operation and finally successfully removed the FB from the grade 5 bronchus in the outer basal segment of the right inferior lobe (B9).

The FB was a well-shaped dried pepper of approximately 1.3×0.8 mm (Figure 4(a), (b)). A biopsy from the basal segment of the right inferior lobe revealed inflammation (Appendix A Figure 1). The intact dried pepper was fully investigated after its removal. To ensure that the dried pepper had been entirely removed, we immediately conducted a CT scan of the dried pepper and compared its CT value with that of the FB inside the patient's body. The dried pepper immediately after removal displayed a very high CT value *in vitro* (115–380 HU), consistent with the *in vivo* scan (Appendix A Figure 2). The relatively high CT value of the dried pepper *in vitro* and *in vivo* suggested calcification of the FB over time. Moreover, a full airway survey was performed to check for additional FBs and other important parameters including bronchial stenosis, granulation tissue,

and bleeding.⁶ We suggested that the patient undergo follow-up treatment of argon plasma coagulation to remove the granulomatous tissue and remove the airway stenosis, exudation, and hyperplasia. However, he refused because of the high cost. Two days after the operation, the patient's symptoms were significantly improved and he was discharged with anti-infective drugs.

Discussion

We have herein described an adult patient with no specific high-risk factors who inhaled a dried pepper that remained in the bronchus for 7 years. We successfully removed the FB with flexible bronchoscopy. A literature review of tracheobronchial pepper inhalation produced no results. To the best of our knowledge, this is the first report of an adult patient with a chronic dried pepper FB within an airway in the English-language literature, according to a search of Medline.

An FB should be considered in an apparently healthy young patient with a chronic cough, and thoracic images as well as the patient's medical history should be carefully investigated. Oil within some FBs, such as food, has been reported to cause much

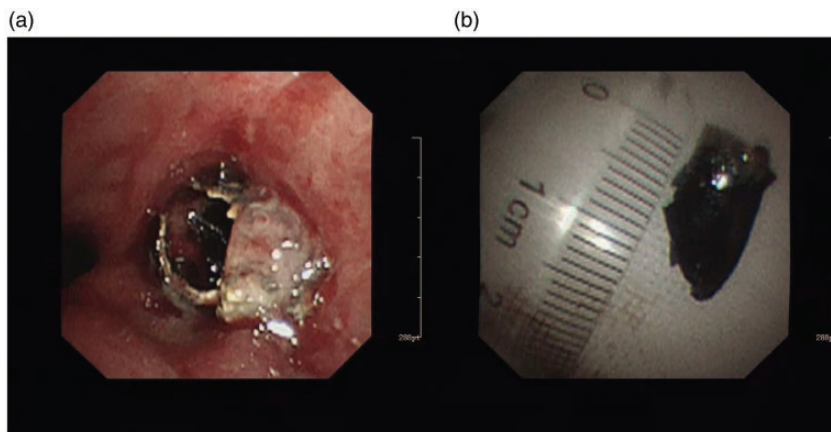


Figure 4. Repeat bronchoscopy. (a) After repeated sputum aspiration, a foreign body could be seen in the outer basal segment of the right inferior lobe (B9). (b) The foreign body was extracted and measured 1.3×0.8 cm.

more severe inflammatory reactions than metal FBs⁷; this may explain the excessive secretions and bleeding during the first flexible endoscopic operation. After successful removal of the FB, we considered two ways to confirm its retrieval. The first was to perform thoracic HRCT to identify any residual FB in the lung. However, there was no bedside thoracic HRCT unit available, and C-arm fluoroscopy could not clearly reveal the FB because the CT value was not high enough. The patient would have needed to be delivered to the HRCT room, undergo anesthetic induction and maintenance, and resuscitation from anesthesia once the procedure was completed (see Appendix B). If any FB residue was found after the thoracic HRCT examination, the patient would have needed to be sent back for a repeat of the entire imaging procedure. The other method by which to confirm the FB retrieval was to take a CT scan of the removed FB and compared its HU value and size with those of the FB while still inside the patient's bronchus. Considering the history of the patient's inhalation, we were sure that if both the HU value and size were consistent, our procedure had been

successful. If not, we could have continued to check for residual FB by bronchoscopy. The latter method was less time-consuming, risky, and financially burdensome.

Finally, the anesthesia method of FB removal by flexible bronchoscopy requires a brief discussion. The traditional approach is general anesthesia through a laryngeal mask. With the development of narcotics and sedatives and the popularity of high-flow humidified oxygen delivery, the application of conscious sedation with spontaneous breathing can better meet the effect of intravenous general anesthesia without endotracheal intubation during flexible bronchoscopy. In addition, conscious sedation with spontaneous breathing can reduce the incidence of complications and the economic cost. We used propofol combined with remifentanyl to maintain spontaneous respiration (see Appendix B for further details). This technique contributed to the success of this procedure.

Conclusion

We have described the successful removal of a FB that had been present in the

airway for 7 years. We avoided rigid bronchoscopy and traumatic surgery by performing repeated flexible bronchoscopy. In our case, consultation with an MDT and cooperation by experienced bronchoscopists were the key factors leading to our success, helping to reduce the surgical risk, economic cost, and length of the procedure.

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Declaration of conflicting interest

The authors declare that there is no conflict of interest.


Ethics and consent

The study protocol was approved by the Ethics Committee of The People's Hospital of Nanhai District, Foshan (STAMP). The patient provided verbal informed consent.

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Supplemental material

Supplemental material for this article is available online.

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