



## Case report

## A direct adverse effect of smoking

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## ABSTRACT

Smoking has been accounted for numerous adverse effects. We report a direct effect of smoking in a 73-year-old patient, a heavy smoker who presented to the emergency department with a 48-h history of productive cough and fever. Chest x-ray and chest CT revealed right lung infiltrates; however, they were not suggestive of the diagnosis, which was established through flexible bronchoscopy. The specific procedure concurrently contributed to the treatment of the patient.

## 1. Case presentation

A 73-year-old male presented at the emergency department with a 48-h history of productive cough and fever up to 38,5 °C. He was a heavy smoker of 80 pack-years with an unremarkable medical history. On examination, the patient was in mild distress, febrile (temperature 38,2 °C), tachypneic (respiratory rate 24/min), tachycardic (heart rate 95/min) and with room air oxyhemoglobin saturation (SaO<sub>2</sub>) of 97%. Physical examination revealed reduced breath sounds and end-expiratory crackles in the right middle and lower lung field. Physical examination was otherwise normal. The leucocyte count revealed a mild leukocytosis of 12.61 × 10<sup>9</sup> cells/L with a mildly elevated neutrophilic differential (80.9%). C-reactive protein and erythrocyte sedimentation rate were markedly elevated at 141 mg L<sup>-1</sup> (upper normal limit 6 mg L<sup>-1</sup>) and 69 mm h<sup>-1</sup> respectively. Other laboratory examinations were unremarkable.

A chest radiograph showed localised infiltrates in the right lung and right middle lobe atelectasis (Fig. 1 a-b). The chest CT scan revealed endobronchial obstruction, atelectasis and tree-in-bud infiltrates in the right middle lobe and enlarged right hilar lymph nodes (Fig. 2 a-c).

Based on these findings, the differential diagnosis at the time included pneumonia, right middle lobe syndrome or lung cancer.

Flexible bronchoscopy was performed where we identified a cigarette filter obstructing the entrance of the right middle lobe bronchus, with purulent secretions around the foreign body (Fig. 3a). The filter (Fig. 3b) was retrieved with a single-use, flexible, alligator-jaw foreign body removal forceps (Fig. 3c). Subsequently, the patient's condition improved significantly and he was discharged 48 hours after the

procedure.

## 2. Discussion

Numerous adverse effects are attributed to smoking [1], the vast majority being long-term and with potentially life-threatening complications. Smoking is responsible for a substantial increase in the risk of developing lung cancer, chronic obstructive pulmonary disease, cardiovascular disease, peripheral artery disease, blood hypertension, type 2 diabetes, fertility and pregnancy problems, congenital abnormalities, impaired immune system response, and poor oral hygiene [2]. In this case, we report an immediate effect of smoking which has not previously been described to the best of our knowledge: a cigarette filter aspiration in an adult.

In adults, as in this case report, foreign bodies tend to lodge in the right bronchial tree as the right main stem bronchus has a smaller angle to the trachea and a larger diameter than the left main stem bronchus. However, foreign bodies have been reported in all airway locations [3]. A recent retrospective study revealed that foreign bodies can settle in the trachea (2.7%), right main bronchus (4.5%), right upper lobe bronchus (2.7%), bronchus intermedius (23.4%), right middle lobe bronchus (3.6%), right lower lobe bronchus (27%), left main bronchus (18%), left upper lobe bronchus (3.6%) and left lower lobe bronchus (14.4%) [4].

In 1897 Gustav Killian reported the first foreign body removal from the lower respiratory tract using an esophagoscope, and, during the 1st quarter of the 20th century, he developed rigid bronchoscopy. Flexible bronchoscopy through the oropharyngeal approach is currently the procedure of choice in patients without symptoms or signs of acute

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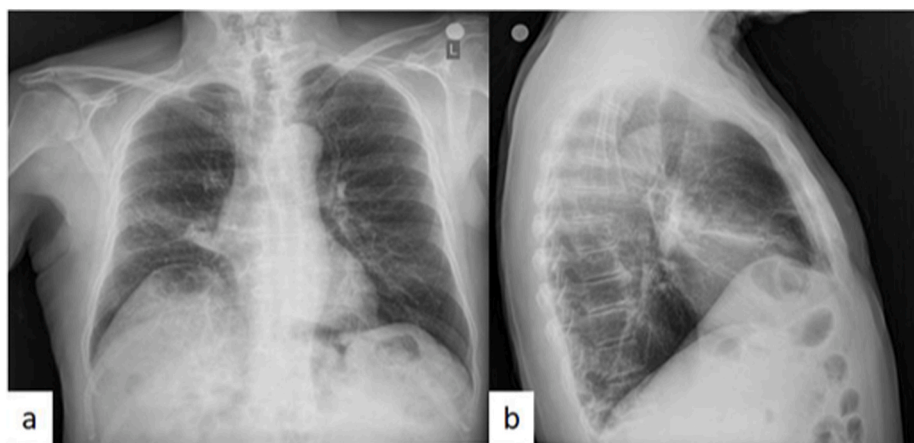
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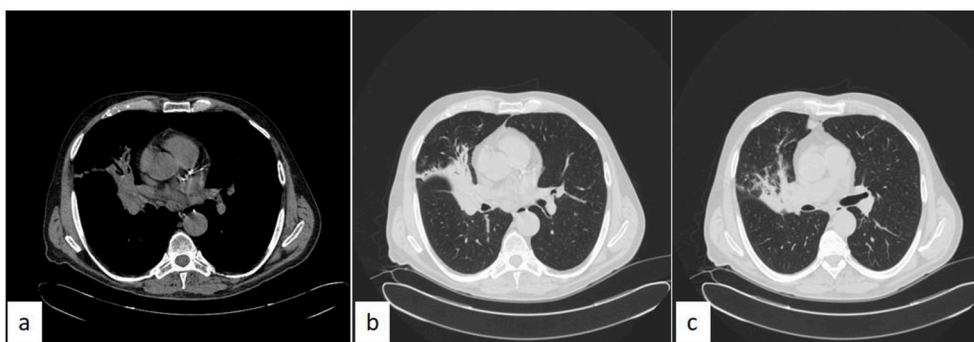
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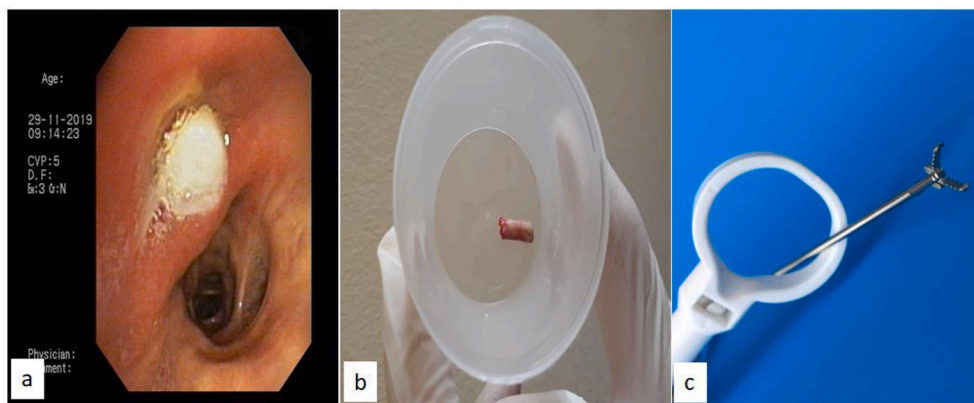
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**Fig. 1.** (a–b) Chest radiograph: localised infiltrates in the right lung and right middle lobe atelectasis.



**Fig. 2.** (a–c) Chest CT: endobronchial obstruction, right middle lobe atelectasis, tree-in-bud infiltrates and enlarged right hilar lymph nodes.



**Fig. 3.** (a) Bronchoscopy: a cigarette filter obstructing right middle lobe, (b) Cigarette filter removed from the right middle lobe bronchus during bronchoscopy, (c) Flexible alligator-jaw foreign body removal forceps used for the filter retrieval.

asphyxiation and especially in those with foreign bodies which have wedged in distal bronchi [5]. Rigid bronchoscopy is preferable in cases of large foreign bodies in the central airways and for complex foreign bodies that cannot be removed by flexible bronchoscopy [6]. Often, a combination of flexible and rigid bronchoscopy is needed. Techniques such as electrocautery, cryotherapy, argon plasma coagulation or laser are helpful, especially in cases of organic foreign bodies or granulation tissue formation [5]. Rarely, surgical retrieval of the foreign body cannot be avoided.

Foreign body aspiration (FBA) can result in several symptoms of varying severity, or it can be completely asymptomatic. The cardinal symptom in non-asphyxiating FBA in adults is cough (81% of cases);

however, wheezing, chest pain, hemoptysis and dyspnea may also occur. Up to 80% of the cases, foreign bodies are not visible on chest x-ray and are incidentally revealed on radiographic imaging ordered for symptoms mistakenly attributed to other medical conditions [7]. Chest CT more frequently shows a radiopaque foreign body. According to various studies, the sensitivity of multidetector CT for the detection of a bronchial foreign body is close to 100%, with a specificity ranging between 66.7% and 100%. False positives are generally related to the presence of a mucus plug or artifact [8].

The retained foreign body may result in bronchial stenosis, middle lobe syndrome, unresolving pneumonia, obstructive emphysema, recurrent haemoptysis, lung abscess, lung fibrosis and bronchiectasis if

the diagnosis of FBA is delayed [9–11].

Our patient did not recall an aspiration event, which is not unusual, making the diagnosis more difficult and a high index of suspicion necessary. Flexible bronchoscopy was the key procedure for establishing the diagnosis of foreign body aspiration that additionally provided the treatment [3]. Importantly, this case highlights an unusual, direct adverse effect of smoking.

### Statements

a. Contributors: Chris Kyriakopoulos: writing the manuscript and takes responsibility for the integrity of the data and the accuracy of the content. Athena Gogali and Konstantinos Kostikas: reviewing and thoughtful comments on the manuscript. Chris Chronis: performed the bronchoscopy and foreign body removal. All authors critically edited the manuscript for important intellectual content. All authors approved the final version before submission.

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f. Patient consent: Obtained from the patient and available upon request.

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