

## Reminder of important clinical lesson

## Severe pneumonitis after fire eating

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**Summary**

A 38-year-old, previously healthy fire eater presented with severe pneumonitis after incidental aspiration of an unquantifiable amount of petroleum. The chest CT revealed extensive pulmonary consolidations, and the laboratory results showed massively elevated inflammatory markers. An intravenous antibiotic treatment was started and, after improvement of symptoms and inflammatory markers, continued orally for a total of 3 weeks, despite negative results of blood cultures and urinary pneumococcal and legionella antigen tests. The patient's symptoms subsided completely, and a CT scan 10 weeks after the accident showed complete resolution of the lung consolidations. Aspiration of petroleum is associated with a severe inflammatory response of the lung, but if bacterial superinfection can be prevented with early antibiotic treatment, even a severe presentation of a fire eater's lung usually follows a benign course with complete recovery.

**BACKGROUND**

This is not a first description of a fire eater's lung. However, we think, this case is unique in its severity of the radiological lung manifestations. Despite the severe pneumonitis, the patient recovered completely. We conclude that even a severe form of a fire eater's lung has a good prognosis, if superinfection can be prevented. This is a message that should be spread to a broad readership.

**CASE PRESENTATION**

A 38-year-old male fire eater presented with severe thoracic pain, fever, chills and cough after accidental aspiration of an unquantifiable amount of petroleum 15 h before. The patient had no significant medical history, and he denied any respiratory or flu-like symptoms before the accident. He was a smoker (20-pack-year smoking history), and currently smokes 30 cigarettes per day.

**INVESTIGATIONS****Physical examination**

The patient (height 184 cm, weight 72 kg, body mass index 21.3 kg/m<sup>2</sup>) was normotensive (112/66 mm Hg) and tachycardic (120/min). His body temperature was 39.1°C. Notably, the physical examination of the chest was unrevealing with normal breath sounds, but he was in mild respiratory distress (respiratory rate 18/min). The oxygen saturation was 94% while breathing room air. Cardiac auscultation was uneventful without any pathological murmurs. Signs of congestive heart failure (pedal oedema and jugular venous distension) were absent. The abdominal examination was uneventful.

**Laboratory findings**

Haematogram and blood chemistry revealed a leucocytosis (23.2 G/l) and a massively elevated C reactive protein (495 mg/l; normal value <5 mg/l). Haemoglobin was slightly reduced (11.8 g/dl) and thrombocytes were initially normal (261 G/l). Liver enzymes (alanine aminotransferase

(ALT) 25 U/l), creatinine (90 µmol/l) and electrolytes (potassium 3.8 mmol/l) were normal. CT scans are shown below (figure 1). Results of blood cultures and urinary pneumococcal and legionella antigen were negative. The electrocardiogram revealed a tachycardic sinus rhythm without ST-segment alterations. Blood gas analysis was not performed.

**Lung function measurement**

The measurements of lung volumes were just above the lower limit of normality: Forced vital capacity (FVC) 4.28 litre (83%), forced expiratory volume in 1 s (FEV1)



**Figure 1** Chest CT (lung window) scan 48 h after aspiration of petroleum showing extensive pulmonary consolidations of decreased attenuation and pneumatoceles in the lower lobes and the right middle lobe.



**Figure 2** Chest CT scan (lung window) 10 weeks after petroleum aspiration showing complete resolution of lung consolidations.

3.37 l (80%) and total lung capacity (TLC) measured with whole-body plethysmography 6.73 litre (91%). In contrast, the diffusing capacity for carbon monoxide (DLCO) was moderately reduced (51%).

**DIFFERENTIAL DIAGNOSIS**

On the basis of the chest imaging and the suggestive medical history with sudden onset of intense chest pain and fever a few hours following aspiration of petroleum, the diagnosis of a fire eater’s lung was made. However, the findings of the chest CT showing extensive pulmonary consolidations of decreased attenuation and pneumatoceles in both lower lobes and the right middle lobe are not specific for this entity leaving a broad range of differential diagnoses including acute pneumonia, trauma or aspiration of petroleum.<sup>1 2</sup>

**TREATMENT**

An intravenous antibiotic treatment (ceftriaxone/clarithromycin) was started on the first presentation and, after improvement of symptoms and inflammatory markers, continued orally (moxifloxacin) for a total of 3 weeks

despite negative results of blood cultures and urinary pneumococcal and legionella antigen test.

**OUTCOME AND FOLLOW-UP**

The patient’s symptoms subsided completely, and a CT scan 10 weeks later showed complete resolution of the lung consolidations (figure 2). The course of the laboratory findings is shown in table 1.

Notably, leucocytosis and the C reactive protein improved with antibiotic treatment. Later in the course, the peak value of the thrombocytes was achieved. Two months after the aspiration, the laboratory parameters have completely normalised. Furthermore, the lung function measurement revealed an improvement of the lung volumes (FVC 5.20 litre, 102%; FEV1 4.03 litre, 96% and TLC 6.73 litre, 91%), and a normalisation of the diffusing capacity (DLCO 92%).

**DISCUSSION**

Although we are not able to definitively prove the diagnosis of a fire eater’s lung without histology, the medical history, clinical presentation and course are highly suggestive, and all cases described in the literature had a similar presentation including severe chest pain and high fever with elevated inflammatory markers which appeared a few hours after petroleum aspiration.<sup>3-6</sup> In concordance with Lampert *et al* we feel that a bronchoscopy with broncho-alveolar lavage in a case with suggestive history of a fire eater’s lung is not indicated routinely if the initial treatment response is successful.<sup>5</sup> As the risk of bacterial superinfection is enhanced after aspiration of petroleum, antibiotic agents have been recommended for prophylactic use in fire eater’s lung.<sup>5 7</sup> However, evidence concerning the indication, the timing and the choice of a systematic antibiotic prophylaxis are lacking. To our experience and according to others, an early antibiotic prophylaxis is justified, because the clinical, laboratory and radiological findings of the fire eater’s lung is overlapping with bacterial superinfection which may lead to an adverse outcome.<sup>5 8</sup> A corticosteroid therapy should be avoided as it appears to be ineffective or even harmful.<sup>9</sup>

Aspiration of petroleum is associated with a severe inflammatory response of the lung, but if bacterial superinfection can be prevented with early antibiotic treatment, even a severe presentation of a fire eater’s lung usually follows a benign course with complete radiologic and functional recovery that was also reported by others.<sup>3 4 6</sup>

**Table 1** Clinical course of body temperature, laboratory findings and lung function measurements after accidental aspiration of petroleum

Day(s) after aspiration of petroleum	+1	+7	+10	+17	+27	+68
Antibiotic treatment	cef/cla	cef/cla	mox	mox	mox	–
Temperature (°C)	39.1	38.0	37.7	36.6	36.4	36.6
Haemoglobin (g/dl)	11.8	11.2	10.6	11.4	11.8	15.2
Thrombocytes (G/l)	261	869	1237	939	536	354
Leucocytes (G/l)	23.2	14.58	11.36	8.35	7.94	5.37
C reactive protein (mg/l)	495	223	146	63	27	2.1
Lactate dehydrogenase (U/l)	585	490				284
Forced vital capacity (litre) (%)	4.28 (83)				5.06 (99)	5.20 (102)
Forced expiratory volume in 1 s (litre) (%)	3.37 (80)				4.17 (99)	4.03 (96)
Total lung capacity (litre) (%)	6.73 (91)				6.67 (90)	6.77 (92)
Lung diffusing capacity for carbon monoxide, (%)	51				69	92

cef/cla, ceftriaxone/clarithromycin; mox, moxifloxacin.

## Learning points

- ▶ Aspiration of petroleum leads to a severe inflammatory response of the lung.
- ▶ If bacterial superinfection can be prevented with early antibiotic prophylaxis, the prognosis of a fire eater's lung is good and 'restitutio ad integrum' can be expected.
- ▶ A corticosteroid therapy in fire eater's lung is discouraged, as it does not improve the outcome.

**Competing interests** None.

**Patient consent** Obtained.

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