

## CASE REPORT

# Bronchiolitis obliterans and organising pneumonia caused by carbamazepine and mimicking community acquired pneumonia

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Bronchiolitis obliterans and organising pneumonia (BOOP) presents with fever, dyspnoea, and other features that may be mistaken for pneumonia. Treatment is, however, very different, requiring corticosteroids.

A man was admitted as an emergency with fever, dyspnoea, and non-productive cough. The chest radiograph showed consolidation which, despite antibiotics, progressed to become bilateral. BOOP was considered, and confirmed by transbronchial biopsy. The response to oral prednisolone was rapid with complete resolution of symptoms and radiographic consolidation within three weeks. The cause of BOOP is often never found; it is believed, however, that in this instance it occurred as a result of carbamazepine therapy started seven weeks earlier.

Presenting features of fever, breathlessness, cough, and a chest radiograph demonstrating alveolar consolidation in one or more lobes often lead to an emergency admission and a diagnosis of pneumonia.

We describe a man who was thought to have developed community acquired pneumonia, but later transpired to have bronchiolitis obliterans and organising pneumonitis (BOOP) as a result of taking carbamazepine.

### CASE REPORT

A 72 year old, previously fit man, had a fall at home resulting in a subdural haematoma. This was evacuated successfully, but a week later he suffered two focal seizures, after which he was started on carbamazepine 400 mg twice daily.

After seven weeks he was admitted to hospital as an emergency, saying that during the previous week he had fevers and increasing breathlessness associated with a non-productive cough. He had a temperature of 38.5°C with, on examination, bilateral inspiratory basal crackles.

The chest radiograph revealed some consolidation in the right upper lobe. Full blood count was normal without neutrophilia or eosinophilia. A diagnosis of community acquired pneumonia was made and treatment with intravenous cefuroxime began. Two days later he remained pyrexial and a repeat chest radiograph now showed extension of the alveolar shadowing to involve the left lower lobe. He was more breathless and hypoxaemic (oxygen pressure 7.12 kPa, carbon dioxide pressure 4.12 kPa).

Induced sputum and blood cultures were negative. Serology for atypical pneumonia and legionella were also negative, as were antinuclear factor and antineutrophil cytoplasmic antibodies.

Flexible fibre optic bronchoscopy and bronchoalveolar lavage were normal. Transbronchial biopsies demonstrated focal involvement of the lung by an organising tissue filling the alveolar spaces and small bronchioles. The features were consistent with BOOP.

Treatment with oral prednisolone 60 mg started, and the antibiotic and carbamazepine were discontinued. He made a dramatic improvement and after a week was discharged from hospital. At review two weeks later he was asymptomatic and the chest radiograph was normal. Over the next six weeks the prednisolone was gradually withdrawn and nine months later he remained well with no evidence of recurrence.

### DISCUSSION

In most instances the pathogenesis of BOOP is unclear. It is thought that injury to the bronchiolar epithelium and/or alveolar membrane initiates the process. Attempted repair results in excessive proliferation of granulation tissue in the airway lumen and organising alveolar exudate, leading to breathlessness and radiographic consolidation.

Most often BOOP is idiopathic, but it has been described after respiratory infections such as mycoplasma, toxic inhalation injury, and radiation therapy for breast cancer.<sup>1,2</sup>

This case presented with breathlessness, non-productive cough and fever, features that initially pointed to a diagnosis

**Table 1** Clinical features of pneumonia and BOOP

Clinical features	Pneumonia	BOOP
Dyspnoea	++	++
Cough	+ Purulent	+ Often non-productive or mucoid
Onset	Often rapid <6 days	Insidious often >6 days
Fever	+	+
Crackles	+	+
Chest radiograph	Lobar/unilateral	Often bilateral blotchy shadows
Extrapulmonary features	Especially with atypical, pneumonia—for example, headache, gastrointestinal disturbance	None

BOOP, bronchiolitis obliterans and organising pneumonia.

### Box 1: Medications that have been reported to cause BOOP

- Amiodarone.
- Bleomycin.
- Carbamazepine.
- Cyclophosphamide.
- Minocycline.
- Nitrofurantoin.
- Penicillamine.
- Phenytoin.

of pneumonia. However, despite antibiotic therapy the dyspnoea worsened, the consolidation on the chest radiograph progressed to become bilateral. This, in addition to the non-productive cough, led to consideration of other causes of consolidation and dyspnoea, including BOOP (table 1).<sup>2,3</sup> This diagnosis was confirmed by transbronchial biopsy. Common causes of BOOP were excluded, autoantibodies, antinuclear factor, and antineutrophil and cytoplasmic antibodies were negative. There was no evidence of infection. Certain medications have been documented to cause BOOP and a search using [www.pneumotox.com](http://www.pneumotox.com) identified several drugs, including carbamazepine (box 1).

Carbamazepine has been described to cause BOOP in association with skin rash and eosinophilia,<sup>4-6</sup> features absent in this case. Carbamazepine perhaps more commonly is associated with adverse involvement of the lung due to drug induce lupus.<sup>4-6</sup> Carbamazepine has been described more rarely to cause BOOP alone<sup>7</sup>; this we believe is more unusual.

Two thirds of patients usually have a rapid response to corticosteroid therapy with complete resolution of symptoms within a few weeks, as happened in this case. Sometimes BOOP relapses, the rapid response to oral prednisolone along with stopping the offending drug, and no evidence of recurrence makes it likely that BOOP was induced by

### Learning points

- Not all patients with fever, cough, and “pneumonic” shadowing on the chest radiograph have pneumonia.
- Features pointing towards BOOP are non-productive cough, longer history of dyspnoea, and bilateral areas of consolidation on the chest radiograph.
- BOOP may be mistaken for pneumonia. It may be idiopathic or can be associated with other causes, including drug therapy.

carbamazepine. Confirmation of the diagnosis with a further challenge to carbamazepine was not thought to be justified.

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