CASE REPORT

MRSA infected emphysematous bullae in an asymptomatic COPD patient

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SUMMARY

This is a case of a 57-year-old gentleman with a history of chronic obstructive pulmonary disease (COPD) who presented with diarrhoea of more than 4 weeks in length. On chest x-ray, he was incidentally found to have a large cavitating lesion in his right lung. He denied having any respiratory distress at any stage and clinically he had been completely asymptomatic. The CT-guided biopsy confirmed a methicillin-resistant *Staphylococcus aureus* positive lung cavitation, most likely secondary to his poor dentition. A full dental clearance was performed, and he was treated with a course of intravenous vancomycin and oral clindamycin with good effect.

BACKGROUND

The diagnosis of infected emphysematous bullae has been previously seen in chronic obstructive pulmonary disease (COPD) patients. However, methicillin-resistant *Staphylococcus aureus* (MRSA) as a causative pathogen is rare, and this case is only the second to be reported that could be found. This case outlines the importance of clinical acumen in the setting of a misleading presentation.

CASE PRESENTATION

A 57-year-old gentleman presented with diarrhoea of more than 4 weeks, with a concern that it was not improving and he was unable to cope at home. He was experiencing loose watery diarrhoea up to nine times per day with occasional faecal incontinence. He stated that he had had chronic diarrhoea in the past but usually had settled within 2–3 weeks. He denied any per rectum bleeding, constipation, abdominal pain or cramps. Of note, he denied having any chills, rigours, fevers, productive coughs, dysuria, chest pain or any new dyspnoea. There was no history of tuberculosis exposure.

His medical history included COPD from being a lifelong heavy smoker, having osteoporosis, a right hip dynamic hip screw inserted in March 2012 for a fracture sustained following a mechanical fall, hypercholesterolaemia and alcohol-related liver disease. He currently lives with his wife who is the primary carer, smokes up to 20 cigarettes/day and drinks up to four beers a day in addition to a bottle of wine. His previous exacerbation of COPD was more than 1 year ago when he was admitted to hospital for 3 days for a course of intravenous antibiotics, oral corticosteroids and inhalers. His wife is also a heavy smoker. Prior to being diagnosed with COPD, he was a manual tradesman by profession and denied having any exposure to any

occupational agents such as asbestos. There was no history of recent overseas travel in the last 5 years.

On examination, he appeared malnourished but was not tachycardic, tachypneic and exhibiting oxygen saturations of 97% on room air. His temperature was 36.2°C and he appeared slightly dehydrated. He had poor dentition with significant decay of many teeth. There was decreased air entry right upper lobe and fine crepitations throughout with a prolonged expiratory phase. He had a palpable liver edge but otherwise an unremarkable abdominal examination.

INVESTIGATIONS

The bedside urinalysis was clear and the ECG was showing a sinus rhythm. His blood tests were predominantly unremarkable with the exception of a C reactive protein of 117 (<10 mg/l) and mildly deranged liver function tests. The total white cell count (WCC) was 9 ($4\text{--}10 \times 10^9/\text{l}$). The chest x-ray (CXR) showed what appeared to be a large cavitating lesion in the right upper lobe with an air/fluid level (figures 1 and 2).

A CT chest with contrast was performed which showed a $13 \times 10 \times 12$ cm cavitating lesion with a large air/fluid level predominantly in the right upper lobe (figure 3). Associated with it, there was prominent reactive adenopathy in the superior, anterior mediastinum as well as in the subcarinal position. The rest of the chest findings were consistent with his COPD.

A CT-guided biopsy was performed which aspirated small amounts of purulent fluid (figure 4). The microscopy, culture and sensitivity (MC&S) grew an MRSA susceptible to clindamycin. No acid-fast bacilli or any fungal growth was seen. This was consistent with the sputum MC&S of several days earlier. Cytology showed no evidence of malignancy. Blood cultures and urine MC&S were negative for cultures. QuantiFERON testing for latent tuberculosis infection was negative.

DIFFERENTIAL DIAGNOSIS

In this case, three predominant differential diagnoses were allowed—infected emphysematous bulla, malignancy or a tuberculosis reactivation. Given that he had never been overseas to an endemic region of tuberculosis or been exposed otherwise, tuberculosis reactivation was unlikely. Certainly malignancy was a possibility with his medical history. Though with minimal symptoms or signs suggestive of a malignancy, this would have been unexpected. Therefore by clinical deduction, the most likely diagnosis was an infected emphysematous bulla out of the three

To cite: Zaman SR. *BMJ Case Reports* Published online: [please include Day Month Year] doi:10.1136/bcr-2012-007803

Figure 1 The patient's chest x-ray 2 months prior to the development of the infected bulla.

likely diagnoses, although he denied any symptoms suggestive of an infective process. Clinically, he was completely asymptomatic, surprisingly, given the large cavitation in his right chest.

TREATMENT

He was started on 2 weeks of intravenous vancomycin and a 6-week course of by mouth clindamycin after the cultures returned MRSA. The source of the MRSA was thought to be most likely secondary to his significantly poor dentition. The maxillofacial team subsequently reviewed the case for a full dental clearance and had it completed several days later. He was started on chlorhexidine mouth washes for the next 2 weeks.

OUTCOME AND FOLLOW-UP

Despite the large fluid cavitation in his right chest, he was clinically asymptomatic. Biochemically, he had an elevated C reactive protein. After the starting of antibiotics following the diagnosis

Figure 2 The chest x-ray of the patient on presentation showing the unexpected fluid-filled cavity in the right chest.

Figure 3 The first CT chest after the discovery of the cavitating lesion on the chest x-ray showing a 13×10×12 cm lesion predominantly in the right upper lobe with reactive adenopathy.

of MRSA positive emphysematous bulla, the C reactive protein fell to 130 over the course of 2 weeks and his WCC remained within normal limits. The CXR after a few days of antibiotic treatment showed a reduction in the size of the bulla. He will be followed up by the maxilla-facial surgeons for his dental clearance and the infectious disease physicians for the MRSA bulla.

DISCUSSION

Infected emphysematous bullae pathology appears to be a common but an under-reported complication of COPD. Several case series have been conducted dating back to the early 1950s, with a spectrum of patients from asymptomatic to acutely symptomatic.¹² Much like this case, previous reports found most patients with infected bullae to be asymptomatic. The pathogenesis currently remains controversial. Rothstein reported 10 cases of infected emphysematous bullae from the 1950s, of which eight were associated with *Mycobacterium tuberculosis* infection.²³ Because the benign presentation of this condition, Mahler *et al* proposed that the fluid accumulation was sterile and was as a result of reaction to the inflammation in the surrounding lung parenchyma.⁴⁵ In the symptomatic patient, however, current speculation suggests that the infection arises from either the surrounding lung parenchyma or via haematogenous spread.⁶ Of Mahler's 10 patients, four were asymptomatic. The rest presented with a variety of symptoms including pleuritic chest pain, productive coughs or fever. Of the patients in whom sputum was expectorated two grew *Escherichia coli*, one grew *Streptococcus pneumoniae* and four

Figure 4 The CT-guided biopsy of the cavitating lesion.

cultured normal flora.⁴ Subsequently, Peters case series of 14 patients found only two to be asymptomatic. The others presented again with symptoms such as fever, pleuritic chest pain, dyspnoea, cough and/or purulent sputum. All the patients cultured normal respiratory flora, with one also having grown α -haemolytic *Streptococcus* and the other with both α -haemolytic *Streptococcus* and *Haemophilus influenzae*.⁷

As patients with COPD can develop a variety of lung cavitating lesions, the diagnosis is challenging. Prior imaging with evidence of an existing bulla greatly simplifies the management and all efforts should be made to obtain prior radiology of the chest.⁶ In the event prior radiology is not available, the presence of a thin-walled cavity with a disproportionate clinical picture would be suspicious of the diagnosis.⁴⁷ This man fortunately had CXRs 2 months previously, which did not show any obvious fluid cavity lesions (figure 1). Importance must be placed on investigating asymptomatic COPD patients who present with possible infective aetiology with a thorough septic screen (CXRs, urine tests and blood tests). It was due to the septic screening in this case that the cavitating lesion was able to be discovered.

The gold standard treatment has not been clearly established. With asymptomatic patients, most authors have opted for conservative management with antibiotics alone. The choice of antibiotics had been empiric. In most cases, such management proved to be enough with eventual resolution of the fluid over a few weeks.¹ Although strongly discouraged previously, percutaneous drainage is now emerging as a safe, high yield procedure that results in a rapid improvement in symptoms and assists with titrating antibiotic therapy to the specific microorganism.^{47,8} Current literature suggests that the causative microorganisms can vary widely and minimal or slow response to empiric therapy is seen, then obtaining biopsies is recommended.⁶ In this case, CT guided biopsies were obtained that cultured MRSA bacteria. To the best of my knowledge, this is the second reported case of an MRSA causing an infection of an emphysematous bulla. The first case in 2006 was treated initially with vancomycin and changed to an oral clindamycin regimen for a total of 6 weeks. This case was treated with 8 weeks in total of antibiotics, due to the initial delay in commencing on vancomycin and due to MRSA being the pathogen.

The outcome with antibiotic management was favourable as with the first reported case.

Learning points

- ▶ In chronic obstructive pulmonary disease patients presenting with fluid-filled chest cavities, consider an infection of an emphysematous bulla.
- ▶ Infected emphysematous bullae are common but under-reported.
- ▶ Strive to obtain previous chest radiography to assist with the diagnosis.
- ▶ Percutaneous drainage/biopsies provide rapid symptomatic relief and enable titration of antibiotics to the causative microbe.
- ▶ Treat methicillin-resistant *Staphylococcus aureus*-positive infections as a matter of urgency with vancomycin and an appropriate oral stepdown.

Competing interests None.

Patient consent Obtained.

Provenance and Peer review Not commissioned; externally peer reviewed.

REFERENCES

- 1 Chandra D, Soubra SH, Musher DM. A 57-year-old man with a fluid-containing lung cavity: infection of an emphysematous bulla with methicillin-resistant *Staphylococcus aureus*. *Chest* 2006;130:1942–6.
- 2 Rothstein E. Infected emphysematous bullae; report of five cases. *Am Review Tuberc* 1954;69:287–96.
- 3 Rothstein EM, Moberly JW. Emphysematous bullae and pulmonary tuberculosis. *Dis Chest* 1952;22:587–97.
- 4 Mahler DA, Gertstenhaber BJ, D'Esopo ND. Air-fluid levels within lung bullae associated with pneumonitis. *Lung* 1981;159:163–71.
- 5 Mahler DA, D'Esopo ND. Peri-emphysematous lung infection. *Clin Chest Med* 1981;2:51–7.
- 6 Chandra D, Rose SR, Carter RB, *et al*. Fluid-containing emphysematous bullae: a spectrum of illness. *Eur Respir J* 2008;32:303–6.
- 7 Peters JJ, James KK, Gotlieb MS, *et al*. Lung bullae with air-fluid levels. *Am J Med* 1987;82:759–63.
- 8 Leatherman JW, McDonald FM, Niewohner DE. Fluid-containing bullae in the lung. *South Med J* 1985;78:708–10.

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