A patient with persistent consolidation and a pulmonary mass

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Abstract

Community-acquired pneumonia is a common condition and 6–24% of patients will fail to improve as expected. We present a patient who was initially treated for community-acquired pneumonia but did not make the anticipated recovery. We explore potential differentials, and the investigation and management of the rare condition we subsequently diagnosed.

Keywords: actinomycosis, consolidation, cough, haemoptysis, infection, pneumonia

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Case presentation

A 60-year-old female presented with a 2-week history of breathlessness and cough productive of green sputum. She reported weight loss of 10 kg over recent weeks. She had a history of asthma, coeliac disease, hypothyroidism and glaucoma. She was a never smoker. She was born in Pakistan but had lived in the UK since 1980, and her most recent travel was to Pakistan 18 months previously. Chest X-ray showed left upper lobe consolidation (Figure 1a). Sputum cultured normal flora and three samples were smear- and culture-negative for tuberculosis. She was admitted and treated for community-acquired pneumonia, with minimal clinical improvement prior to discharge.

The patient re-presented twice in the following 2 months with productive cough and ongoing weight loss. She also developed haemoptysis and left sided pleuritic chest pain. CT thorax (Figure 1b) showed a left peri-hilar mass compressing and possibly infiltrating the left upper lobe bronchus, with left upper lobe consolidation, but no significant lymphadenopathy. After discussion at the respiratory multidisciplinary team meeting, a bronchoscopy with washings was performed. The samples contained a few macrophages and numerous neutrophils, were smear negative for tuberculosis, sterile on culture, and contained no malignant cells.

The following week a CT-guided core biopsy of the mass was taken. This showed interstitial fibrous thickening and alveoli containing foamy macrophages and granulation tissue. There was no evidence of vasculitis or malignancy. Although difficult to interpret, it was felt that the features were in keeping with one of the clinical differentials being considered, cryptogenic organising pneumonia. A positron emission tomography (PET) scan was also performed (Figure 1c), which found the mass and the left upper lobe consolidation to be highly avid, with one avid hilar node. After further discussions, a trial of steroids was started for possible cryptogenic organising pneumonia.

The patient deteriorated further, and was admitted twice more in quick succession. A further CT-guided biopsy was performed which showed inflammation and oedema with foamy histiocytes. This sample was sent to the regional haematological malignancies diagnostic service, which found no evidence of lymphoma or plasmacytoma. A repeat bronchoscopy was performed, this time including transbronchial biopsies from the left upper lobe. Washings and brushings found neutrophils and macrophages, but no malignant cells or fungi. The trans-bronchial biopsy found clusters of filamentous organisms within acute inflammatory material, favouring actinomyces like organisms.

A diagnosis of pulmonary actinomycosis was made. The patient was treated with 6 weeks of intravenous penicillin followed by 12 months of oral antibiotics (amoxicillin 1 g three times a day and co-trimoxazole 960 mg three times a day). She had a good clinical response, and a repeat chest X-ray at one year (Figure 2) showed complete resolution of the previous abnormalities.

Discussion

The patient was initially treated for community-acquired pneumonia, but failed to respond to treatment as expected. The investigation and potential differentials for suspected pneumonia which does not resolve with treatment are outlined in the British Thoracic Society guidance on community-acquired pneumonia.[1] These guidelines suggest that history, examination, and investigations should be

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Figure 1a Chest X-ray at presentation

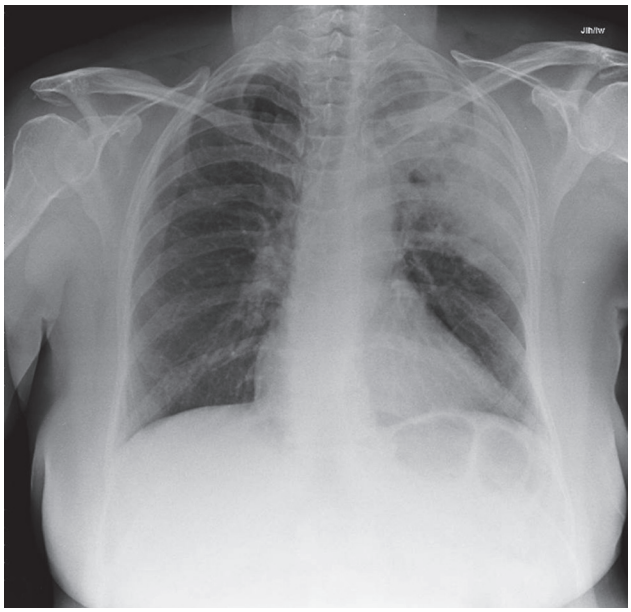


Figure 1b CT scan of the thorax performed during investigation

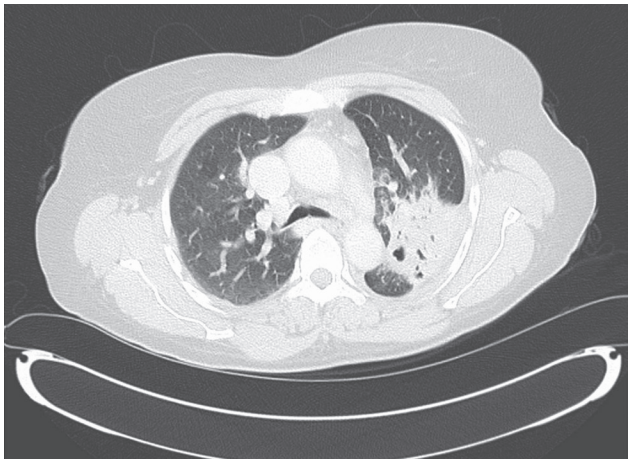


Figure 1c PET scan performed during investigation

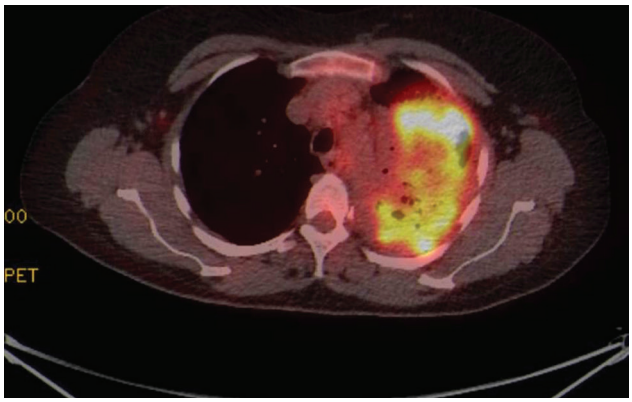
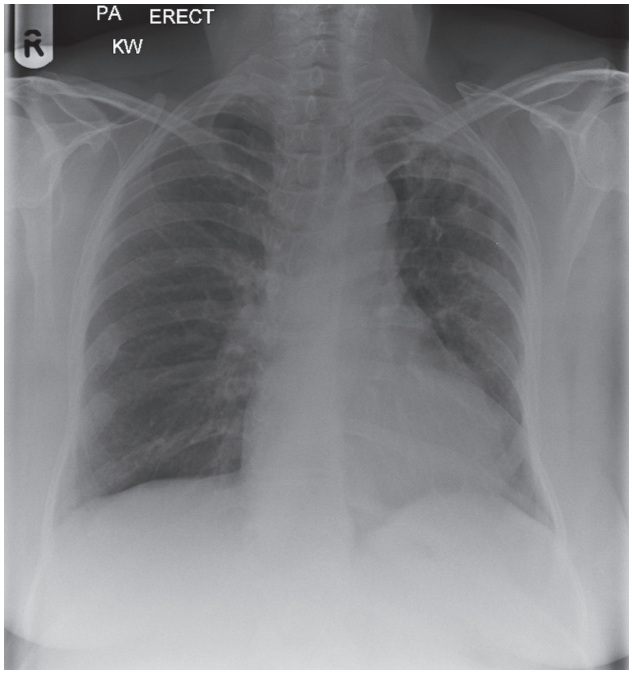


Figure 2 Chest X-ray after completion of treatment



revisited, and referral to a respiratory physician considered. Potential causes include complications of pneumonia (e.g. empyema), ineffective treatment (e.g. due to inadequate dosing or absorption), an incorrect diagnosis (e.g. malignancy or cryptogenic organising pneumonia) or unexpected pathogens (which may include atypical bacteria, fungal pathogens, or mycobacterium).[1]

Actinomycosis is a rare granulomatous infectious disease caused by the Gram-positive bacteria actinomyces.[2,3] Actinomyces is found as a commensal in the mouth, and may also colonise the gastrointestinal and female genito-urinary tracts.[2,3] *Actinomyces israelii* is the most common species implicated in human disease, but many more species are known, with six thought to be potentially pathogenic in humans.[2]

Actinomycosis most commonly presents with cervico-facial infection (50–60% of cases) while 15% of cases are pulmonary.[2] Pulmonary actinomycosis is more common in men. The median age of presentation in a European case series was 56.[2,4] Risk factors include poor oral hygiene, chronic respiratory disease, and alcohol excess.[2,4] These factors may be related to infection of oropharyngeal secretions and risk of aspiration, which is thought to be the likely source of actinomyces in pulmonary disease.[3] In this case the patient's only respiratory disease was asthma, and she did not drink alcohol. However, she did complain of dental pain during her admissions, and an orthopantomogram revealed retained roots of two teeth, for which beclomethasone wash was recommended.

Pulmonary actinomycosis may mimic other respiratory conditions including pneumonia, fungal infection, tuberculosis, and malignancy. The most common presenting symptoms are cough, sputum production and chest pain, followed by systemic symptoms such as fever and weight loss.[2,4] Both symptoms and examination findings are usually non-specific, leading to potential for delayed or incorrect diagnosis. In a series of patients subsequently diagnosed with pulmonary

actinomycosis, the most common initial diagnoses were malignancy, tuberculosis, and pneumonia, all of which were considered in this case.[4]

Chest x-rays and CT can show consolidation or cavitation, which may cross the fissures and involve the pleura or chest wall.[2] PET scans typically show very high uptake of fluorodeoxyglucose, similar to that seen in malignancy.[5] As imaging does not usually help differentiate pulmonary actinomycosis from other respiratory conditions, histological or microbiological samples are required to make the diagnosis.

Actinomyces cultured in sputum or broncho-alveolar lavage is not diagnostic as it may represent oropharyngeal colonisation.[2] Therefore tissue sampling (via bronchoscopy, surgery, or radiologically-guided methods) is required, and is also necessary to exclude malignancy, which actinomyces may mimic or co-exist with. If organisms are present on microscopy, they appear as Gram-positive branching filaments surrounded by inflammatory cells.[3] Culturing the organism is challenging, with bacterial confirmation of a clincopathologic diagnosis in less than 50% of cases. This is due to the technique and time required to culture the organism and its sensitivity to many commonly-used antibiotics (even a single dose of antibiotic may inhibit growth on culture).[2] Histologically, the presence of sulphur granules (hard round or oval masses in pus) is considered highly suggestive of actinomycosis, but not diagnostic.[2,3]

Treatment for pulmonary actinomycosis is based on accumulated clinical experience rather than trial evidence, and there are no national or international guidelines on the topic. Accepted practice is 2–6 weeks of an intravenous antibiotic (usually penicillin-based) followed by 6–12 months of oral antibiotics.[2] Surgery may be necessary for abscesses, fistulae or empyema, or if large volume haemoptysis occurs.[2] However in most patients the response to appropriate antibiotic therapy is good, with improvement on imaging expected within 4 weeks, and a high clinical cure rate reported.[2,4]

Conclusion

Community-acquired pneumonia is common, but when response to treatment is not as expected, other conditions (and complications) must be considered. Pulmonary actinomycosis is a rare condition but can mimic other respiratory diseases. Diagnosis can be challenging but, once identified, patients typically respond well to treatment.

References

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