CASE REPORT

Nocardia cyriacigeorgica intracavitary lung colonization: first report of an actinomycetic rather than fungal ball in bronchiectasis

Cecília Bittencourt Severo,¹ Flávio de Mattos Oliveira,¹ Bruno Hochhegger,² Luiz Carlos Severo³

¹Mycology Laboratory of Santa Casa Hospital Complex, Porto Alegre, Rio Grande do Sul, Brazil

²Pneumology of Santa Casa Hospital Complex, Porto Alegre, Rio Grande do Sul, Brazil

³Federal University of Rio Grande do Sul, Porto Alegre, Brazil

Correspondence to

Dr Luiz Carlos Severo,
severo@santacasa.tche.br

SUMMARY

We report the first case of an isolated endobronchial mass caused by *Nocardia cyriacigeorgica* in an immunocompetent patient with a history of lung surgery; this is a rare presentation of an emerging opportunistic pathogen. The infection was successfully eradicated by surgery. Microbiologists and clinicians should pay more attention to this group of filamentous bacteria, which in the past have often been neglected by medical personnel.

BACKGROUND

Nocardia is a strictly aerobic, soil-borne, typically filamentous, Gram-positive, weakly acid-fast actinomycete. It is ubiquitous and the classic route of infection is via the respiratory tract (ie, by inhalation). *Nocardia* present in the sputum is not considered a contaminant; rather, it may be representative of colonisation, a subclinical condition if accompanied by a normal chest roentgenogram or active pulmonary infection.¹ Nevertheless, a positive sputum culture in the presence of symptoms and signs of pulmonary infection is sufficient evidence of nocardiosis to initiate treatment, especially in patients who may have an altered immune status and underlying conditions. Bronchiectasis is the most frequent underlying pathology associated with colonisation by *Nocardia*^{2–6} and in a recent study *Nocardia cyriacigeorgica* was identified as the most frequently detected species in patients thus afflicted.^{3–4} To the best of our knowledge, this is the first description of a patient with bronchiectasis associated with actinomycetic colonisation and mass formation involving *N cyriacigeorgica*.

We decided to study this case:

- To report the first case of an actinomycetic ball in bronchiectasis.
- To highlight the fact that not every solid mass within a lung cavity is a fungus ball (aspergilloma).
- To underline the fact that Methenamine Silver staining reveals more filaments than any other staining method.

CASE PRESENTATION

The patient, a 77-year-old housewife, presented at our emergency room with haemoptysis and was admitted. Physical examination revealed a healed thoracic surgical scar on her right side and digital clubbing. Her blood pressure was 130/80 mmHg; pulse rate, 80/min; respiration rate, 20/min and temperature, 36°C. She had a long history of chronic obstructive pulmonary disease with respiratory and systemic symptoms including a productive cough, low-grade intermittent fever and malaise.

Her medical history revealed that she had undergone lung surgery 43 years ago. A right lower lobe lobectomy was performed and the subsequent pathological examination indicated bronchiectasis.

Postoperatively, she presented with a productive cough on several occasions, and after 2 weeks her respiratory symptoms became pronounced. She began experiencing repeated haemoptysis. A high-resolution axial CT scan revealed a cavitary lung lesion in the lingula that resembled a fungus ball and was filled with opacity (figure 1). Resection of the lingula was performed, and a section of the lingular segment showed bronchiectasis, a thin-walled cavity partially filled with inflammatory debris and a ball of

Figure 1 (A) Chest x-ray shows heterogeneous pulmonary opacity in lower left lung. (B) High resolution axial CT scan shows cavitary lung lesion in lingula filled by opacity resembling a fungus ball. (C) CT shows a pulmonary bronchiectasis in the lingula (arrow).

To cite: Severo CB, Oliveira Flávio de Mattos, Hochhegger B, et al. *BMJ Case Rep* Published online: [please include Day Month Year] doi:10.1136/bcr-2012-007900

Figure 2 *Nocardia cyriacigeorgica*. Actinomycetic ball from the cavity of the pulmonary lingular lobe. (A) Cut section of the ball showing zonation of actinomycete filaments growth. (B) Section of the ball showing thin branched filaments (GMS-stained, ×40 and ×1000, respectively).

granular dark-brown material. The intracavitary specimen comprised numerous Gram-positive branching filaments, but only *N cyriacigeorgica* was cultured. Microscopically, the bronchiectatic lesion and the cavity were covered by mucosa; metaplasia and ulceration were apparent. Grocott Methenamine Silver staining of a section of the ball revealed zonation growth of thin-branched actinomycetic filaments (figure 2). The postoperative course was uneventful.

INVESTIGATIONS

Microbiology

Gram staining of the ball revealed numerous Gram-positive branching filaments, and modified Ziehl-Neelsen staining (Kinyoun) revealed Gram-positive, weakly acid-fast, branching filamentous rods consistent with *Nocardia*. The specimen was also inoculated onto Sabouraud dextrose agar (25°C) and Brain Heart Infusion agar (35°C). White colonies consistent with *Nocardia*-like organisms appeared on all media after 3–15 days of incubation.

Sequence analysis

DNA sequencing was performed with an automatic sequence analyser (Applied Biosystems USA) using a dye terminator cycle sequencing kit (PE Applied Biosystems) and the sequencing primer 515FLR, which revealed 100% homology with several sequences of *N cyriacigeorgica*.

DIFFERENTIAL DIAGNOSIS

- ▶ Pulmonary fungus ball (aspergilloma)
- ▶ Pulmonary encapsulated abscess cavity
- ▶ Sequestrum of non-viable pulmonary tissue
- ▶ Cavitary lung carcinoma
- ▶ Pulmonary actinomycosis

DISCUSSION

Fungus balls are commonly formed after infection with *Aspergillus* spp. However, other species of true fungi may also produce a fungus ball. Rarely, true bacteria such as those in the *Actinomyces*^{7–8} and *Nocardia*^{9–10} genera may form a movable mass of actinomycetes. Upon gross examination these may greatly resemble a fungus ball, but histopathological examination will reveal thin, branching filaments and the lack of true

hyphae. For this reason, the term ‘fungus ball’ should not always be applied to intracavitary bacterial filaments.^{9–11}

Nocardia spp. are becoming more frequently recognised as serious but potentially treatable pathogens. The most frequently detected pathogens involved in human infections are members of the *Nocardia asteroides* complex.¹² In 2001, Yassin *et al* first described *N cyriacigeorgica* (formerly *N cyriacigeorgici*) in bronchial secretions of a patient with chronic bronchitis.^{12–13} At present, *N cyriacigeorgica* is considered an emerging pathogen that requires closer attention and microbiology laboratories need to adapt laboratory protocols for its specific identification.^{14–15}

Learning points

This case reveals the following important points:

- ▶ A cavitary lung lesion with opacity in a patient with a history of bronchiectasis and haemoptysis is not synonymous with an aspergilloma (fungal ball).
- ▶ Clinicians and radiologists should be aware of this unusual manifestation of nocardiosis.
- ▶ The findings on thoracic CT contributed to early consideration of intracavitary lung colonisation in the differential diagnosis.
- ▶ The term ‘fungus ball’ should not be applied to an intracavitary mass comprising actinomycete filaments.

Competing interests None.

Patient consent Obtained.

Provenance and peer review Not commissioned; externally peer reviewed.

REFERENCES

- 1 Frazier AR, Rosenow ED III, Roberts GD. Nocardiosis—a review of 25 cases occurring during 24 months. *Mayo Clin Proc* 1975;50:657–63.
- 2 Sanyal K, Sabanathan K. Nocardia—opportunistic chest infection in elderly: a case report. *Cases J* 2008;1:122.
- 3 Ferrer A, Llorenç V, Codina G, *et al*. Nocardiosis y bronquiectasias ¿Una asociación infrecuente?. *Enferm Infecc Microbiol Clin* 2005;23:62–6.
- 4 García-Bellmunt L, Sibila O, Solanes I, *et al*. Nocardiosis pulmonary en pacientes con EPOC: características y factores pronósticos. *Arch Bronconeumol* 2012;48:280–5.
- 5 Padjama P, Verghese SL, Elizabeth SJ, *et al*. colonizing bronchiectatic cavity. *J Assoc Physicians India* 2002;50:590–1.
- 6 Picazo M, Linden CV, Montañana D, *et al*. Nocardiosis pulmonary en paciente inmunocompetente con bronquiectasias. *Radiologia* 2006;48:103–5.
- 7 Severo LC, Kaemmerer A, Camargo JJ, *et al*. Actinomycotic intracavitary lung colonization. *Mycopathologia* 1989;108:1–4.
- 8 Filho JC Coelho. Pulmonary cavities colonized by actinomycetes: report of six cases. *Rev Inst Med Trop São Paulo* 1990;32:63–6.
- 9 Tilak R, Agarwal D, Lahiri TK, *et al*. Pulmonary nocardiosis presenting as fungus ball—a rare entity. *J Infect Dev Countries* 2008;2:143–5.
- 10 Wilhite JL, Cole FH. Invasion of pulmonary cavities by *Nocardia asteroides*. Report of five cases. *Ann Surg* 1966;32:107–11.
- 11 Korop PV. Pulmonary fungus ball due to *Nocardia* species. *Scan J Resp* 1968;49:9–14.
- 12 Brown-Elliott BA, Brown JM, Conville PS, *et al*. Clinical and laboratory features of the *Nocardia* spp. based on current molecular taxonomy. *Clin Microbiol Rev* 2006;19:259–82.
- 13 Yassin AF, Rainey FA, Steiner U. *Nocardia cyriacigeorgici* sp. nov. *Int J Syst Evol Microbiol* 2001;51:1419–23.
- 14 Schlager R, Huard RC, Della-Latta P. *Nocardia cyriacigeorgica*, an emerging pathogen in the United States. *J Clin Microbiol* 2008;46:265–73.
- 15 Minero MV, Marín M, Cercenado E, *et al*. Nocardiosis at the turn of the century. *Medicine* 2009;88:250–61.

Copyright 2013 BMJ Publishing Group. All rights reserved. For permission to reuse any of this content visit <http://group.bmj.com/group/rights-licensing/permissions>.
BMJ Case Report Fellows may re-use this article for personal use and teaching without any further permission.

Become a Fellow of BMJ Case Reports today and you can:

- ▶ Submit as many cases as you like
- ▶ Enjoy fast sympathetic peer review and rapid publication of accepted articles
- ▶ Access all the published articles
- ▶ Re-use any of the published material for personal use and teaching without further permission

For information on Institutional Fellowships contact consortiasales@bmjgroup.com

Visit casereports.bmj.com for more articles like this and to become a Fellow