Pulmonary carcinoid presenting with cavitating lung infection and oligometastatic mediastinal disease

Introduction

A previously fit 25-year-old man presented with cavitating lung infection and evidence of cystic bronchiectasis. Computed tomography showed a 4.7 cm soft tissue mass containing patchy calcification occluding the basal bronchus of the right lower lobe, resulting in atelectasis and marked distal airway dilatation with endoluminal air-fluid levels and mediastinal lymphadenopathy. Bronchoscopy revealed a vascular polypoid lesion occluding the posterior basal segment of the right lower lobe suspicious for a carcinoid and histology from the biopsies confirmed a typical carcinoid. Surgical resection and lymph node dissection revealed evidence of metastasis in the subcarinal node and therefore the patient was referred for adjuvant chemotherapy.

This is a relatively rare first presentation of typical carcinoid in a young patient with oligometastatic mediastinal disease with cavitating lung infection and extensive bronchiectasis. This case illustrates the need for more effective systemic therapies for metastatic disease in bronchial carcinoid.

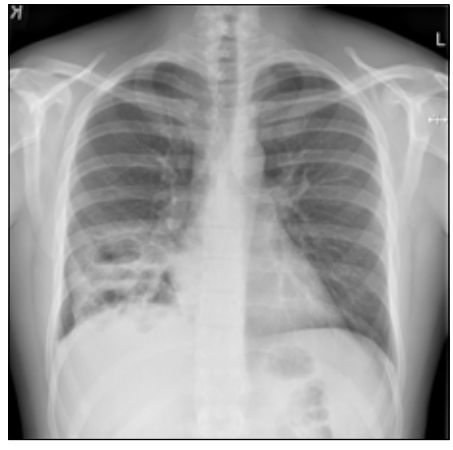
Discussion

Carcinoid tumours of the lung are not common but are well described, comprising 1–6% of all lung tumours. Unlike this case, the most common age of presentation is 40–50 years of age. They are thought to represent an indolent form on a spectrum of neuroendocrine tumours that includes small cell lung cancer at its most extreme end. Typical carcinoid (as in this case) with mediastinal metastases is more unusual and the management more contentious.

Atypical carcinoid tumours (10% of the total) present and behave more aggressively than typical carcinoid tumours. Carcinoid syndrome is usually described in association with very large tumours or in the presence of hepatic or widespread metastatic disease (only in 2% of those with bronchial carcinoid). In this particular case, there were no features of the syndrome. They most commonly originate within a subsegmental bronchus although 10–20% are located in the lung periphery and rarely in the trachea.

The aetiology of carcinoid in the lung remains unclear although the cells are thought to be Kulchitsky cells which are endodermal in origin from the bronchial epithelium. Between 25 and 39% can have no symptoms. Most have symptoms of bronchial obstruction as a result of local airway-related effects. In this particular case, obstruction of the airway led to distal infection on presentation. Complications therefore can include atelectasis, recurrent pneumonia, lung abscess and bronchiecta-

Figure 1. Chest radiograph showing multiple air-fluid levels within opacified lung in the right lower zone and an associated small pleural effusion.



Case Report

A 25-year-old man, with no prior history of lung disease or relevant occupational exposure, presented with a 2-week history of fever, purulent sputum, dyspnoea with mild weight loss and lassitude. Significant examination findings included pyrexia of 39°C, and right basal crackles with a pleural rub. Bloods showed an elevated C-reactive protein level of 254 mg/litre, an elevated white cell count of 12.9 x 10^9/litre (with a neutrophilia). His chest radiograph showed multiple air-fluid levels in opacified lung, suggestive of cavitating pathology in the right lower zone, and a small pleural effusion (*Figure 1*).

He responded very well to a course of augmentin but in view of his young age with the unusual radiographic appearances, computed tomography was undertaken (*Figure 2*). This showed a 4.7 cm soft tissue mass with patchy calcification occluding the basal bronchus of the right lower lobe, resulting in atelectasis and marked distal airway dilatation with endoluminal air-fluid levels. Subcarinal and subaortic adenopathy were also seen.

He was bronchoscoped and this revealed a vascular polypoid lesion occluding the posterior basal segment of the right lower lobe suspicious for a carcinoid. Biopsies confirmed this to show morphological and immunophenotypic features of a typical carcinoid. Tumour cells showed no mitoses and no necrosis and were mildly nuclear polymorphic. They expressed chromogranin (*Figure 3*), CD56 and thyroid transcription factor-1 (TTF-1). The patient underwent lobectomy.

Macroscopic appearance (*Figure 4*) revealed a 12 x 10 x 6 cm well-circumscribed endobronchial tumour abutting the visceral pleura along with distal cystic bronchiectatic change. Histology confirmed a typical carcinoid characterized by nests and trabeculae of cells with round nuclei, stippled chromatin and moderate amounts of amphophilic cytoplasm. The tumour elicited a fibrous pseudocapsule. The hilar nodes were reactive but metastatic carcinoid tumour completely replaced the subcarinal node. The patient was referred to an oncologist for consideration of postoperative chemotherapy in view of the nodal involvement.

Dr ARL Medford *is Consultant and Honorary Senior Clinical Lecturer in Interventional Pulmonology and Thoracic Medicine in the North Bristol Lung Centre, Southmead Hospital, Westbury-on-Trym, Bristol BS10 5NB,* **Dr N Bhatt** *is Consultant in the Department of Pathology, Bristol Royal Infirmary, Bristol, and* **Dr AJ Edey** *is Consultant in the Department of Radiology, Southmead Hospital, Westbury-on-Trym, Bristol*

Correspondence to: Dr ARL Medford (andrewmedford@hotmail.com)

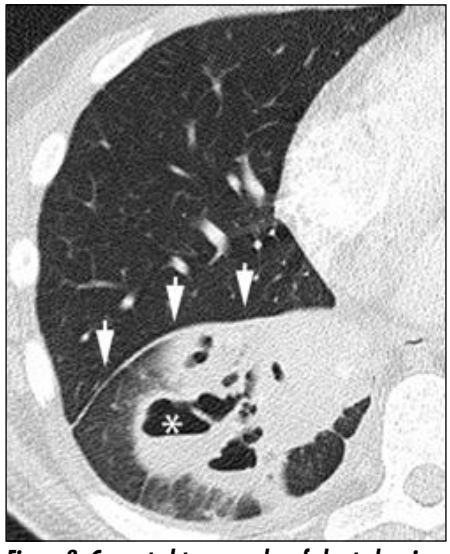


Figure 2. Computed tomography of chest showing marked volume loss in the right lower lobe and thus retraction of the right oblique fissure (short arrows), as well as cystic bronchiectasis, with endoluminal air-fluid levels (asterisk).

sis, many of which occurred in this case. Owing to a ball-valve effect of the tumour, distal hyperinflation of lung tissue can sometimes occur. The tumour is very vascular and haemoptysis is common (Chong et al, 2006).

Around 75% of lung carcinoids are visible at bronchoscopy (as in this case). Bleeding following biopsy can be more extensive than for other tumours. The presence of punctate necrosis and increased proliferation index (2–10 mitoses per high powered field) favours atypical carcinoid. The presence of mediastinal lymph node involvement (as in this case) would render this a stage 3 typical carcinoid tumour, which is unusual.

Surgical resection is the treatment of choice for cure provided there is no distant metastatic disease (Ducrocq et al, 1998).

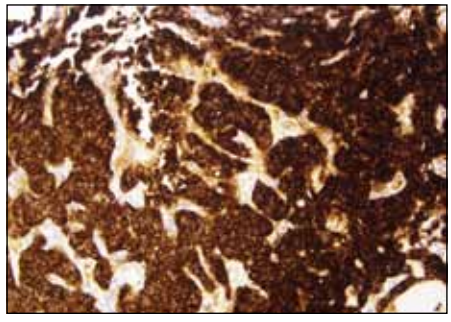


Figure 3. Bronchoscopic biopsies showing atypical cells strongly positive for chromogranin.

Lymph node dissection is important as evident in this case showing oligometastatic nodal disease. Bronchoscopic resection has been used for patients unsuitable for surgical treatment but this is palliative rather than curative (Sutedja et al, 1995).

Chemotherapy and radiotherapy have been used for metastatic disease but with limited success. Newer data suggest everolimus might have potential by inhibition of mammalian target of rapamycin (mTOR) (Dong and Yao, 2011). Octreotide has been used for carcinoid syndrome.

The 5-year survival for bronchial carcinoid is 78–95% overall but reduced to 40–60% for atypical carcinoid. In the presence of nodal metastatic disease (as in this case), 5-year survival is reduced to 37–80% even in typical carcinoid. Primary tumour

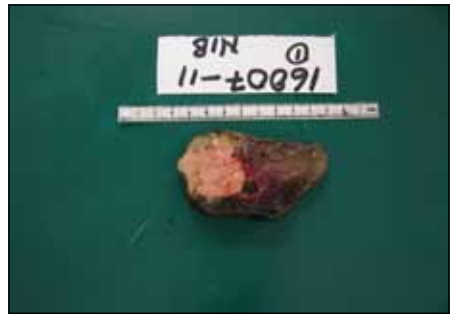


Figure 4. Macroscopic appearance of resected specimen: 12 x 10 x 6 cm well-circumscribed tumour present within the lobar bronchus abutting the visceral pleura with cystic bronchiectatic lung adjacent to the tumour.

volume may also influence prognosis (Stanic et al, 2010). BJHM

Chong S, Lee KS, Chung MJ (2006) Neuroendocrine tumours of the lung: clinical, pathologic, and imaging findings. *Radiographics* **26**(1): 41–57

Dong M, Yao JC (2011) mTOR inhibition, a potential novel approach for bronchial carcinoids. *Endocr Relat Cancer* **18**(3): C15–18

Ducrocq X, Thomas P, Massard G (1998) Operative risk and prognostic factors of typical bronchial carcinoid tumours. *Ann Thorac Surg* **65**: 1410–14

Stanic J, Zaric B, Anjelkovic A et al (2010) Clinical prognostic factors and outcome of surgical treatment in patients with early-stage bronchial carcinoid tumors. *J BUON* **15**(3): 524–8

Sutedja TG, Schreurs AJ, Vanderschueren RG (1995) Bronchoscopic therapy in patients with intraluminal typical bronchial carcinoid. *Chest* **107**(2): 556–8

LEARNING POINTS

- Bronchial carcinoid tumours can occur in young adults (although more common in the fifth decade) and should be considered as a cause of proximal obstruction in unexplained cases of cavitating infection and bronchiectasis.
- Mediastinal lymph node metastases are more common in atypical bronchial carcinoid but can also occur in typical carcinoid and have prognostic significance regardless of histological type of carcinoid.
- Chemotherapy regimens are currently disappointing for metastatic carcinoid but everolimus via inhibition of mammalian target of rapamycin (mTOR) holds promise for the future.