

## Case Reports

# An Unusual Cause of Haemoptysis in an Adolescent: Bronchial Mucoepidermoid Carcinoma

AOL FOK, DD RASALKAR, KF TO, WCW CHU

### Abstract

Tracheo-bronchial mucoepidermoid carcinoma (MEC) is a rare tumour. So far, less than 80 cases were reported in paediatric population, with none reported in Hong Kong. Although it has a predilection for large airways, it lacks a specificity of clinical symptoms and signs. Computed tomography is the ideal radiological imaging modality to detect such endobronchial lesion, and the diagnosis is usually established with bronchoscopy. The majority of paediatric MEC tumours are low-grade and easily amenable to conservative resection. In this case report, a 14-year-old adolescent who had been treated as recurrent pneumonia, presented to our unit with non-remitting cough and haemoptysis. Subsequent work-up diagnosed low grade MEC of left lower lobe bronchus. With the knowledge of MEC being a potential disease entity, it should alert the paediatrician to consider further work-up especially in the context of respiratory symptoms that fail to respond to the usual medical therapy.

### Key words

Cough; Pneumonia; Haemoptysis; Endobronchial tumour; Low grade tracheo-bronchial mucoepidermoid carcinoma

### Introduction

Here, we reported an adolescent boy, who presented with non-remitting cough and haemoptysis. Work up revealed an endobronchial mass, and biopsy confirmed the diagnosis of tracheo-bronchial mucoepidermoid carcinoma (MEC).

**Department of Paediatrics, Prince of Wales Hospital, The Chinese University of Hong Kong, Shatin, N.T., Hong Kong, China**

AOL FOK (霍愛玲) *MBCChB, FHKAM(Paed)*

**Department of Imaging and Interventional Radiology, Prince of Wales Hospital, The Chinese University of Hong Kong, Shatin, N.T., Hong Kong, China**

DD RASALKAR *DNB, FRCR, DMRD*  
WCW CHU (朱昭穎) *MD, FRCR*

**Department of Anatomical and Cellular Pathology, Prince of Wales Hospital, The Chinese University of Hong Kong, Shatin, N.T., Hong Kong, China**

KF To (杜家輝) *MBCChB, FRCPA, FHKAM(Path)*

**Correspondence to:** Dr AOL FOK

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### Case Report

#### **Non-remitting Cough and Haemoptysis**

A 14-year-old healthy Chinese male presented with cough and mild intermittent haemoptysis for 1 week. He had been treated in the private sector in the past few months as recurrent pneumonia for persistent cough episodes. There were no constitutional symptoms. On assessment, he was febrile and mildly tachypnoeic, but his vitals including oxygen saturation in room air were stable. Reduced chest expansion and air entry were noted over his left lower chest. There was no wheezing.

A chest radiograph showed a triangular patch of increased density behind the cardiac shadow, suggesting a left lower lobe consolidation and atelectasis. The costophrenic angles were clear. There were no lymphadenopathy and no miliary nodules.

After admission, haemoptysis resolved spontaneously, and his clinical condition remained stable. Antibiotics including amoxicillin-clavulanic acid and azithromycin were commenced for possible bacterial pneumonia. Blood tests were essentially unremarkable, with no leucocytosis and anaemia. The erythrocyte sedimentation rate was normal. Sputum culture did not yield any bacterial growth.

Tuberculin skin test, acid-fast bacilli smear and culture were all negative.

On flexible fiberoptic bronchoscopy, an endobronchial mass (around 2 cm x 2 cm) with a papilloma-like appearance arising from the proximal end of the left lower lobe bronchus was identified. It caused mild luminal narrowing, and there were no active bleeding points. No acid-fast bacilli and no cytological abnormalities were yielded from bronchoalveolar lavage.

High resolution computed tomography (HRCT) scan of the thorax reviewed a 2.1 cm x 2.5 cm x 2.7 cm (anteroposterior x transverse x cranio-caudal) papillomatous, non-calcified lesion posterior to the left lower lobe bronchus, causing mild luminal narrowing. The rest of the tracheobronchial tree and lung parenchyma were unremarkable. No enlargement of mediastinal, hilar, or peribronchial lymph nodes was observed. It remained homogeneously enhanced after contrast administration (Figure 1).

Rigid bronchoscopy confirmed the presence of a polypoid left endobronchial tumour located at 2 cm from the medial wall of left lower lobe bronchus and 1 cm from carina. The tumour was friable with contact bleeding. Multiple biopsies were taken. Histology and culture did not reveal any acid-fast bacilli. Grossly, the endobronchial biopsy mass appeared as a whitish firm lobulated mass. Microscopic examination revealed tumours comprising haphazardly dispersed mucin-filled cysts and small irregular tumour nests, which consisted of mucous cells and intermediate cells with eosinophilic cytoplasm and bland nuclei. No marked nuclear pleomorphism, mitosis, peri-neural or intravascular invasion or necrosis was noted. The overlying respiratory type epithelium was unremarkable. The features suggested low-grade MEC.

Abdomen ultrasound examination did not reveal any metastatic diseases. Pulmonary function test revealed a FEV1 of 78% predicted value.

Subsequently, video-assisted thoracoscopic lobectomy of the left lower lobe and removal of the left peri-bronchial, hilar and subcarinal lymph nodes were performed as curative surgery. The whitish solid polypoid tumour measured 2.5 x 2.0 x 2.0 cm in size and appeared confined within the left bronchus. No gross invasion into the lung parenchyma was apparent. There was prominent mucus plugging in the distal bronchial branches (Figure 2a).

Microscopic examination revealed a mixture of mucus-secreting, squamous and intermediate cells with a mixed solid and cystic appearance. There were mild features of

atypia with mild to moderate hyperchromic, pleomorphic nuclei with absent mitotic figures. No prominent tumour necrosis and no lympho-vascular permeation were apparent. The features were consistent with low to intermediate grade MEC. Resection margins appeared clear. Specimens including left lower lobe bronchus and lymph nodes were negative for neoplastic infiltration (Figure 2b).

Molecular test detected a *MECT1-MAML2* (mucoepidermoid carcinoma translocated 1-mastermind-like 2) fusion gene transcript.

The postoperative course was uncomplicated. Full expansion of the left upper lobe was achieved, and the boy was discharged 10 days after surgery. At 6 months after resection, computed tomography (CT) scan did not reveal any recurrence or residual tumour nor metastatic diseases. Pulmonary function test demonstrated an improved FEV1 of 108% predicted value.

## Discussion

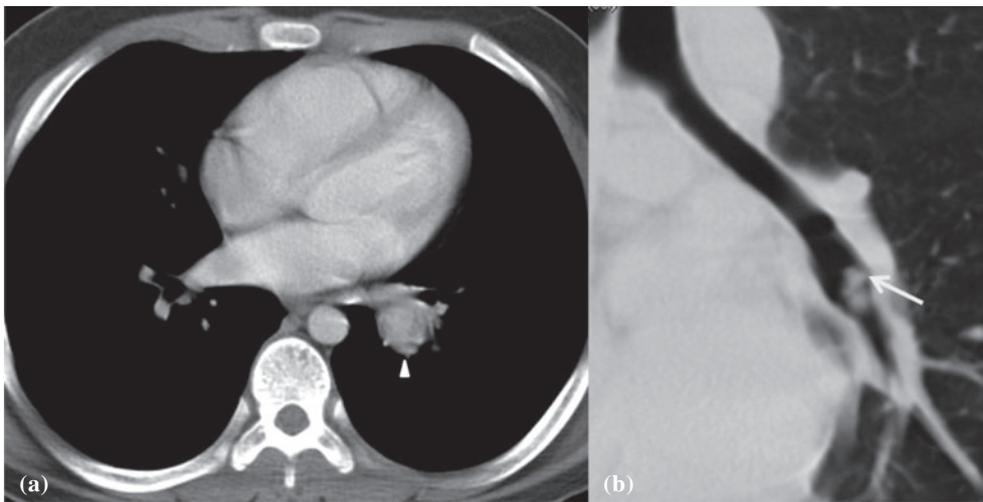
### **Background, Classification, Histology and Cytogenetics**

First described in 1952 by Smetana et al, tracheo-bronchial MEC arises from the excretory ducts of the submucosal bronchial glands,<sup>1</sup> and was later discovered to have malignant potential. MEC comprises 0.1-0.2% of all primary lung tumours, and has a similar sex distribution.<sup>2</sup> 50% of cases are younger than 30 years of age, and it accounts for approximately 10% of paediatric primary lung tumours.<sup>3,4</sup> Less than 100 cases were reported.

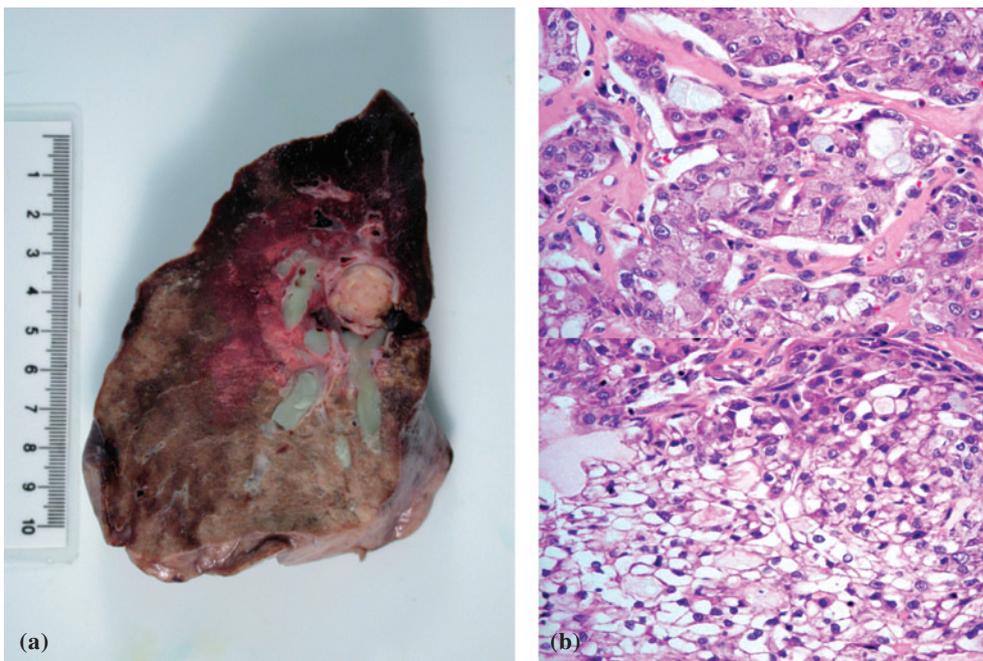
MEC of the lung is defined by the World Health Organization as a tumour with a combination of mucus-secreting, squamous and intermediate cell types.<sup>5</sup> Low grade MEC is characterised by the coexistence of these 3 cell types. It is usually confined to the bronchus.

In contrast, high grade MEC commonly demonstrates necrosis, nuclear pleomorphism, active mitosis, and a solid or nested growth pattern for intermediate or squamous cells. It may infiltrate into the lung parenchyma or lymph nodes. Bone and cutaneous metastases were reported. It should be treated as well-differentiated non-small cell or squamous carcinomas.<sup>2,3</sup>

The predominance of MEC in the paediatric population suggests genetic abnormalities, with the reciprocal t(11;19)(q21;p13) being the major chromosomal abnormality. A novel fusion protein, mucoepidermoid carcinoma translocated 1-mastermind-like 2 (*MECT1-MAML2*) was identified at this breakpoint.<sup>6</sup>



**Figure 1** (a) Contrast enhanced axial CT image showing a homogeneously enhancing soft tissue tumour (arrowhead) in the left segmental bronchus; (b) Coronal multiplanar reformat image showing intraluminal lobulated lesion (arrow) in the left segmental bronchus.



**Figure 2** (a) Gross specimen of left lower lobe displaying a whitish solid polypoid tumour mass occupying the main bronchus. The tumour measured 2.5 x 2.0 x 2.0 cm in size. No gross invasion into the lung parenchyma was apparent. There was prominent mucus plugging in the distal bronchial branches; (b) Histomorphology of mucoepidermoid carcinoma. Nests of tumour cells amixing the mucin-containing glands and small squamous cell parts among the stroma. The tumour cells exhibited mild to moderate hyperchromatic, pleomorphic nuclei with small nucleoli and exhibit amphophilic cytoplasm or abundant mucous cytoplasm. No prominent necrosis or haemorrhage was noted.

### **Presentation**

MEC has a predilection for large airways, and could cause obstruction. Common clinical presentations include recurrent atelectasis or pneumonia and persistent cough. Less commonly, it could present as haemoptysis or airway obstruction such as bronchitis, wheezing, dyspnoea or chest pain; or rarely, clubbing. Nine to twenty-eight percent of the patients are asymptomatic.<sup>2-4</sup>

### **Imaging**

On chest radiograph, lung MEC can appear as a solitary nodule (approximately 66%-71%) or consolidation, atelectasis, bronchiectasis due to endobronchial obstruction. It may also appear normal.<sup>2,4</sup>

HRCT, with a sensitivity of 80%, is currently the most sensitive non-invasive imaging for bronchial abnormalities such as MEC. MEC appears as a smooth or lobulated intraluminal mass which adapts to the branching features of the airways. It remains controversial whether there is marked contrast enhancement. Secondary findings such as distal dilatation of the bronchial lumen, atelectasis and mucoid impaction, may be present.<sup>7</sup> Moreover, any regional lymph node(s) or distant metastases can be detected.

There are only a few reports on the use of fluorine-18 fluorodeoxyglucose (<sup>18</sup>F-FDG) positron emission Tomography (PET) in bronchial MEC. MEC demonstrates raised standardised uptake values (SUV) varying from zero to 6.2 in low-grade MECs and from 2.86 to 23.4 in high-grade MECs. This might help to differentiate it from lesions such as bronchogenic cysts, pulmonary carcinoid, and bronchoalveolar carcinoma.<sup>8</sup>

### **Bronchoscopy**

Either flexible fiberoptic or rigid bronchoscopy has the superior capability of directly identifying the mass and obtaining tissue for definitive diagnosis. Macroscopically, MEC appears as a well-circumscribed, smooth, polypoid, sessile or pedunculated endoluminal mass. Since bronchial MECs are usually covered by respiratory epithelium, bronchial lavage and brushing are seldom diagnostic.

### **Differential Diagnosis**

The differential diagnoses include foreign body aspiration, asthma, pneumonia, atelectasis, middle lobe syndrome, and pleural effusion. Recurrent pneumonia in the same region of the lung should raise clinical suspicion of an endobronchial mass, such as foreign body, mucoepidermoid carcinoma, carcinoid tumour and other tumours.<sup>2,3</sup> Bronchial carcinoid, the commonest paediatric

primary malignant endobronchial tumour, gives rise to a marked enhancement on CT, and low metabolic activity (SUV<2.5) on <sup>18</sup>F-FDG PET imaging.<sup>4</sup>

### **Treatment**

Bronchial MEC in children are usually benign, and are easily amenable to conservative resection. They are not sensitive to radiotherapy or chemotherapy.<sup>3,4,9</sup> Complete surgical resection with preservation of as much lung parenchyma as possible is the treatment of choice for low-grade MEC. Simultaneous lymph node sampling should be performed.<sup>9</sup>

### **Prognosis**

Important predictors of prognosis of tracheo-bronchial MEC include tumour, node, metastases staging and the ability to achieve complete surgical resection. Histology with a higher proportion of squamoid cells was associated with a higher tumour grade and more aggressive clinical behaviour.<sup>10</sup>

Better prognosis was demonstrated in patients with complete tumour resection margin and lymph node excision, early stage (stage I or II) of disease (10 year survival 87.5%), and low grade tumour (1 year and 5 years survival of 80% and 57% respectively, *versus* 1 year survival of 20% in high grade MEC).<sup>10</sup>

MECT1-MAML2 fusion protein-positive MEC patients are substantially younger at clinical presentation, have smaller tumours and have a preponderance of highly differentiated low-grade tumours. They also have a significantly lower risk of local recurrence, metastases, or tumour-related death (p=0.0012) and longer median survival time (>10 years versus 1.6 years in fusion-negative patients).<sup>6,10</sup>

In a review report involving 45 paediatric MEC patients with disease-free follow-up ranging from 8 months to 21 years; 1 patient had lymph node metastasis and died, 1 patient developed lymph node metastasis at 5 years of follow-up, and 1 patient had questionable lymph node metastasis.<sup>3</sup> These data suggest that long-term follow-up is warranted.

### **Conclusion**

Mucoepidermoid carcinoma of the tracheobronchial tree is an unusual tumour with a wide spectrum of clinical manifestations and non-specific radiographic presentation. They should be considered in the context of respiratory

symptoms that do not respond to the usual medical therapy. The usually low malignant potential of MECs makes conservative pulmonary resection a preferred and usually adequate therapeutic approach.

### Declaration of Interest

There is no affiliation with any organisation with a financial interest, direct or indirect, in the subject matter or materials discussed in the manuscript that may affect the conduct or reporting of the work submitted.

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