CASE REPORT

Metastatic renal cell carcinoma presenting with mediastinal eggshell calcification

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SUMMARY

An 81-year-old South Asian man normally resident in the UK presented with night sweats for over 2 months on a background of weight loss of 4 kg in 6 months. His medical history was significant for metastatic renal cell carcinoma treated 5 years previously with cytoreductive nephrectomy and adjuvant chemotherapy. Following an abnormal chest radiograph showing an ill-defined right paratracheal mass, a CT scan showed eggshell calcification (circumferential calcification) of enlarged low right paratracheal lymph nodes. An endobronchial ultrasound-guided transbronchial needle aspiration of an involved large paratracheal lymph node showed cytology consistent with metastatic renal cell carcinoma.

INVESTIGATIONS

The patient's blood tests showed a white cell count of $9.4 \times 10^9/L$ and C reactive protein of 214 mg/L. A chest radiograph (figure 1) showed an ill-defined mass in the right paratracheal region that was not previously known to the attending medical team.

Owing to the appearance of the patient's chest radiography, a CT scan of his chest was performed, with the findings as shown (figure 2). The CT scan showed eggshell calcification (circumferential calcification) of enlarged low right paratracheal lymph nodes. The low right paratracheal lymph nodes had combined dimensions of $63 \times 61 \times 59$ mm.

BACKGROUND

Eggshell calcification of pulmonary lymph nodes has a distinct appearance and is associated with a range of conditions. Recognising eggshell calcification is therefore essential in investigating for the possible conditions that are known to be associated with it. These conditions range from neoplastic and occupational, to infectious and inflammatory. However, to the best of our knowledge, this is the first reported case of metastatic renal cell carcinoma associated with eggshell calcification. Although this association is hitherto unknown, the fundamental approach towards a patient presenting with eggshell calcification should remain the same—with a focused history and examination as well as appropriate investigations to diagnose the underlying condition.

CASE PRESENTATION

An 81-year-old South Asian man normally resident in the UK presented with night sweats for over 2 months on a background of weight loss of 4 kg in 6 months. He denied any cough or haemoptysis. His medical history was significant for metastatic renal cell carcinoma, with mediastinal and pulmonary metastases, treated with left-sided cytoreductive nephrectomy and adjuvant interferon α -2b 5 years previously. His disease progressed 2 years later with enlarging mediastinal and pulmonary metastases and he underwent a course of sunitinib therapy. He also had atrial fibrillation with a permanent pacemaker fitted for slow ventricular rate. He was a retired driver and had no previous occupational exposure concerning for pneumoconiosis. He had no notable ill contacts.

On examination, the patient's chest was clear to auscultation with normal breath sounds and no stridor. He was haemodynamically stable and afebrile.

Figure 1 Chest X-ray of patient showing an ill-defined right paratracheal mass.

Figure 2 CT Scan of chest (axial view) of patient showing eggshell calcification of enlarged low right paratracheal lymph nodes.

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DIFFERENTIAL DIAGNOSIS

- ▶ Solid malignancy—primary pulmonary neoplasia or pulmonary metastases
- ▶ Post-irradiation lymphoma
- ▶ Tuberculosis
- ▶ Histoplasmosis
- ▶ Coal worker's pneumoconiosis
- ▶ Silicosis
- ▶ Sarcoidosis.

TREATMENT

The patient was treated empirically with broad-spectrum antibiotics for a presumed underlying lower respiratory tract infection.

OUTCOME AND FOLLOW-UP

The patient's Mantoux test reaction measured 20 mm. However, serial induced sputum samples were negative for *Mycobacterium* on Ziehl-Nielsen stain and culture.

Owing to his history of malignancy and the lack of a definite diagnosis, the patient underwent an endobronchial ultrasound (EBUS), which showed nodal calcification consistent with the findings on his CT scan. EBUS-guided transbronchial needle aspiration was performed on a large calcified paratracheal lymph node, the cytological examination of which revealed flat cohesive aggregates as well as single large atypical cells with abundant pale and finely-vacuolated cytoplasm. The atypical cells had distinct cell borders, relatively bland and rounded nuclei with prominent nucleoli and minimal pleomorphism. These histological appearances were consistent with those of metastatic renal cell carcinoma.

At last follow-up, the patient was being followed up by the Oncology team for the possibility of palliative chemotherapy and by the infectious diseases team for treatment of latent tuberculosis.

DISCUSSION

In 1967, Jacobson *et al*¹ first described criteria for diagnosing eggshell calcifications on the radiographs of coal and metal miners to minimise over detection of incidental concentric calcium concentrations and to avoid misreading of bronchial ends appearing as ring shadows. These criteria are, namely:

1. Circumferential calcifications up to 2 mm thick in the peripheral zone of at least two lymph nodes
2. Calcifications may be solid or broken
3. In at least one lymph node, the calcification must form a complete ring
4. The central part of the affected lymph nodes may show additional calcifications
5. At least one affected lymph node must be 1 cm or larger and its greatest diameter

The differential diagnosis for this appearance include solid malignancy,² lymphoma treated with radiotherapy,³ tuberculosis,⁴ silicosis and coal worker's pneumoconiosis,¹ as well as sarcoidosis.⁵ Rarer causes include histoplasmosis,⁶ amyloidosis,⁶ blastomycosis⁷ and scleroderma.⁸

In this case, the patient has no history of occupational exposure to suggest pneumoconiosis nor does his history suggest histoplasmosis exposure. Sarcoidosis is unlikely in view of the asymmetric appearances,⁴ and calcification is only seen in the late stages.⁹ Tuberculosis and malignancy are possibilities in view of his background and previous history of malignancy involving these nodes. Lymphoma enters the differential diagnosis in the context of post-treatment lymphoproliferative disease

(PTLD), although this classically only calcifies several years following treatment.³

The workup for eggshell calcification in pulmonary nodules is primarily to exclude or ascertain the different conditions mentioned above and should be undertaken in the context of clinical history and physical examination. Occupational history may be highly suggestive of pneumoconiosis.

Initial investigations may include a Mantoux test for tuberculosis, serum ACE levels for sarcoidosis, and an autoimmune panel including antinuclear antibody (ANA), Scl-70 antibody and/or anticentromere antibody for scleroderma. Thin-section CT may help to further characterise the lung nodules and may detect further calcification not seen on conventional chest radiographs.¹⁰

In general, calcification in a pulmonary nodule on chest radiographs indicates a high probability that the lesion is benign, with the estimated prevalence of calcified lung cancers identified on conventional chest radiographs in the region of 1%.¹¹ However, as mentioned in the differential diagnosis, not all calcified pulmonary nodes are benign, and the differential considerations include a primary central lung carcinoid, metastasis and a primary bronchogenic carcinoma. As CT becomes more ubiquitous, the sensitivity of detecting calcification in malignant tumours has also increased up to 10% in lung cancers.¹² Calcifications in malignant masses may be due to a malignant tumour enveloping a pre-existing granuloma, tumour necrosis giving rise to dystrophic calcification or primary calcification in a mucinous adenocarcinoma.¹¹ Malignant calcified pulmonary nodules may present as single nodules, multiple large nodules or small diffuse calcified nodules.^{11 13} As calcification in malignant lung nodules is still uncommon on the whole, it may lead to misdiagnosis as a benign lesion.

If clinical suspicion is high for malignancy or the underlying diagnosis remains indeterminate, lymph node biopsy can be used to differentiate the cause of these lesions. These can be sampled by mediastinoscopy or endobronchial ultrasound.

Learning points

- ▶ Eggshell calcification of pulmonary lymph nodes is known to be associated with a range of conditions.
- ▶ A focused history and examination is essential in the initial work up of eggshell calcification.
- ▶ Investigations can be tailored based on the history and examination of the patient.
- ▶ If the diagnosis remains in doubt, biopsy of an affected lymph node can ascertain the underlying cause.

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Patient consent Obtained.

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