CASE REPORT

A rare cause of asymptomatic solitary pulmonary nodule: adult *Schistosoma* wormIkram Ulhaq Chaudhry,¹ Wejdan Manah,² Mohammed Alghamdi,² Hadi Mutairi²

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SUMMARY

Solitary pulmonary nodule due to various pathologies has been reported in the medical literature. We report a case of solitary pulmonary nodule in an asymptomatic 60-year-old male smoker, who had a positive family history of pulmonary tuberculosis. His routine screening chest X-ray revealed a 2×1.5 cm nodule in the right lung upper zone. A CT scan of the thorax confirmed the finding. Bronchoscopy, lavage, biopsy and screening for tuberculosis were negative. Owing to its technical difficulty, a CT-guided biopsy was deferred by the radiologist, hence we decided to perform segmentectomy that showed granuloma harbouring an adult *Schistosoma* worm. This is the first case of asymptomatic solitary pulmonary nodule due to adult *Schistosoma* worm 26 years after the exposure.

BACKGROUND

Schistosomiasis, also known as bilharziasis, was first described by a German physician Theodore Bilhartz.¹ This is one of the leading endemic parasitic diseases in the world. In humans, this tropical parasitic disease is caused by the species *Schistosoma haematobium*, *mansoni* and *japonicum*. When fresh water is contaminated by the infected human urine or faeces, containing schistosome eggs, snail ingests eggs which hatch up to form larva cercaria which are released into the water. Cercaria penetrates the human skin or is ingested, and they pass through the lung and liver and finally gets lodged in bladder vesical bed or mesenteric bed and gut, where they mature into adult worm and lay down thousands of eggs. About 200 million people are affected worldwide.² *Schistosoma* ova have been reported in human lungs since 1885.³ Pulmonary manifestations of this parasitic disease can be acute or chronic leading to pneumothorax, pulmonary fibrosis, pulmonary hypertension and the right-sided heart failure.

CASE PRESENTATION

A 60-year-old male farmer, who smokes three packs/day since the age of 15, had a chest X-ray as a screening because of a positive family history of pulmonary tuberculosis. He had no history of cough, shortness of breath, fever, itching, night sweats, weight loss or haemoptysis. He had no history of medical illness. Twenty-six years ago, he visited the Nile River in Egypt. A chest X-ray revealed opacity in the right upper lung zone (figure 1A). A CT scan of the thorax confirmed the same finding (figure 1B, C). His complete blood

count, liver and renal panels were normal. Serum titre for hydatid disease, brucellosis and schistosomiasis, and screening for pulmonary tuberculosis were negative. Pulmonary function test and spirometric study were normal. Physical examination of the chest was unremarkable with no palpable lymphadenopathy. Radiologists deferred the CT-guided biopsy of the nodule due to its technical difficulty. We decided to proceed for surgical resection. Through a right posterolateral thoracotomy approach, segmentectomy was performed and histopathological report revealed a well-circumscribed 2×1.5 cm mass with localised infarcted lung surrounded by chronic granulomatous inflammation with eosinophils. One adjacent artery showed transmural inflammation and numerous calcified tissue structures within the infarcted area. One vein containing an infarcted adult *Schistosoma* worm was identified (figure 2A,B). A follow-up CT scan of the chest showed no abnormality (figure 1D).

INVESTIGATIONS

Chest X-ray and CT scan of the chest.

DIFFERENTIAL DIAGNOSIS

- Granuloma
- Tuberculoma
- Primary lung cancer
- Lung metastasis

TREATMENT

Surgical resection

OUTCOME AND FOLLOW-UP

One year follow-up, complete recovery with no recurrence.

DISCUSSION

Solitary pulmonary nodule is a lesion less than 3 cm which is often an incidental finding in 0.2% of chest X-rays and 1% of routine CT scans of the thorax. Commonly, they are due to benign pathology such as granuloma (autoimmune, tuberculosis and fungal), and hamartoma. Twenty per cent of them could be due to a malignant disease.⁴ Adult *Schistosoma* worm is exceedingly a rare cause of solitary pulmonary nodule. About 200–300 million people suffer from schistosomiasis in 74 countries, out of that 85% people are in sub Saharan Africa with an annual death rate of 250 000.^{5 6} Early and late pulmonary manifestations have been reported. When *Schistosoma* reaches the lungs via venous flow, they trigger inflammatory reactions and

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Figure 1 (A) Chest X-ray showing opacity in the right upper lung zone. (B) CT of the thorax (lung window) showing a nodule in the upper lobe of the right lung. (C) CT scan of the thorax (mediastinal window) showing a nodule. (D) Postoperative CT of the thorax revealing no abnormality.

inflammatory cytokines can be detected in the blood, and as a result of that eosinophils are sequestered into the lungs. The patient may present 3–8 weeks after penetration as acute pulmonary schistosomiasis, also known as (Katayama syndrome) characterised by fever, myalgia headache, dyspnoea, cough, diarrhoea and abdominal pain. Radiological findings of the chest X-ray and CT scan of the chest may show multiple nodules or diffuse infiltrates.⁷

Once parasites pass through the lungs, they enter into the systemic circulation. They reach maturity after 6–8 weeks while feeding on red blood cells. After mating, they move towards the final destination, mesenteric bed in case of *S. mansoni* and *S. japonicum* and vesical bed in case of *S. haematobium*. Female fluke lay down thousands of eggs.⁸ In the liver, eggs initiate intense immunoinflammatory reactions which cause hepatic fibrosis, portal hypertension and hepatosplenomegaly. Portal hypertension opens up more venous collaterals which increase pulmonary arterial blood flow, so that eggs are sequestered into the lungs. Thus, *Schistosoma* eggs trigger immunoinflammatory

reactions leading to the release of tumour necrotic factor, interleukin-1, interleukin-6 and interferon which cause chronic pulmonary schistosomiasis leading to tissue destruction, fibrosis, and granuloma formation, consolidation, collapse and massive haemoptysis. Perivascular fibrosis and increased pulmonary flow due to portal hypertension cause pulmonary hypertension and eventually the right-sided heart failure. Haematological investigations reveal abnormal liver function tests, leucocytosis with eosinophilia and raised IgG levels.⁹ One study from Brazil showed that pulmonary hypertension developed in 5–21% of the patients suffering from schistosomiasis.^{10 11} Diagnosis is based on clinical and detailed travel history; routine stool and urine examination for ova has a poor yield. Serological examination using fast ELISA provides almost 100% specificity for diagnosing *Schistosoma* species 4–6 weeks after exposure. This test remained positive for a long time even though the patient had been treated with medication (praziquantel).¹² We report a very rare case of asymptomatic solitary pulmonary nodule caused by infarcted adult *Schistosoma* worm in a patient who

Figure 2 (A) H&E staining. (B) Trichrome staining of the resected specimen showing intravascular-infarcted adult worm consistent with *Schistosoma*.

travelled to an endemic area 26 years ago. Praziquantel was not given to this patient as advised by the infectious disease control department.

Learning points

- ▶ Diagnosis of solitary pulmonary nodule is challenging.
- ▶ Detailed social and travel history is very valuable.
- ▶ Even if the patient is a smoker and has a positive family history of tuberculosis, parasitic granuloma is a rare cause of solitary pulmonary nodule.

Contributors IUC is the thoracic surgeon who operated on the case and wrote the abstract and discussion. WM and MA were involved in the patient care. HM is the thoracic surgeon involved in the operation and wrote the case report and the references.

Competing interests None.

Patient consent Obtained.

Provenance and peer review Not commissioned; externally peer reviewed.

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