Fatal *Strongyloides* hyperinfection in a case of adenocarcinoma lung

Pillay B[1], Azman Abdul Wahab[2] and Lim Gaik Lan[1] [1]*Institute for Medical Research, Jalan Pahang, 50588 Kuala Lumpur;* [2]*Department of Medicine, General Hospital Johore Baru, Malaysia*

Abstract

Routine cytologic evaluation of sputum from an elderly male patient clinically suspected ro have acute bronchopneumonia and gastroenteritis, revealed abundant malignant cells classified as adenocarcinoma and numerous larvae of *Strongyloides stercoralis* which were also identified subsequently in stool examination. The patient died soon after admission. The clinical manifestations and fatal course are compatible with a *S. stercoralis* hyperinfection syndrome resulting from the cachexia, malnutrition and depressed immunity associated with the lung carcinoma.

Key words: cytodiagnosis, strongyloidiasis, adenocarcinoma lung

Introduction

Strongyloides stercoralis is an intestinal helminth causing a chronic, benign infection in the majority of cases. It can be harboured within a host for prolonged periods of time but disseminates to produce widespread disease once cell-mediated immunity is suppressed (Simpson *et al.*, 1993). Though sputum cytology is commonly used to detect pre-malignant and malignant lesions of the respiratory tract, non-neoplastic lesions due to certain viruses, fungi and parasites can be unexpected findings. This paper describes a case of *S. stercoralis* infection complicating adenocarcinoma of the lung, in which the diagnosis was made from suptum cytology.

Case Report

A 65 year old Malay male presented at the Emergency Unit of the General Hospital, Johore Bahru with severe dyspnoea, orthopnoea, wheezing, cough with mucoid sputum, abdominal pain and distension, vomiting and diarrhoea. He was acutely ill, dehydrated, severely emaciated and febrile. The liver was enlarged two fingers below the costal margin and tender. Bowel sounds were hyperactive and there was generalised tenderness over the entire abdomen. Chest examination revealed bilateral diffuse inspiratory rales, rhonchi and diminished breath sounds. Chest X-ray showed soft patchy infiltrates involving both lung fields. A provisional diagnosis of acute bronchopneumonia with gastroenteritis was made. Sputum was sent for cytological evaluation as a routine procedure. The patient's haemoglobin was 8.0 g/dL with a total white cell count of 17,600/µL, 70% of which were neutrophils. Eosinophils were absent. Stool examination, requested for when the cytology report was sent in, confirmed the presence of the nematode identified in the sputum specimen. The patient's condition deteriorated rapidly and he died five days after admission. Autopsy was not performed.

Cytologic findings

In the sputum smears there were abundant malignant cells with eccenteric nuclei, granular chromatin and prominent nucleoli. The cytoplasm was cyanophilic and characteristically vacuolated. The tumour cells were mostly discrete but poorly cohesive cell clusters were also seen (Fig. 1). A striking additional feature was the presence of numerous coiled filariform larvae of *S. stercoralis* (Figs. 2 & 3) measuring 342.3 ± 40.0 x 12.1 ± 3.1 µm. The larval buccal cavity was short and the oesophagus occupied half its length. The tails were notched in some and pointed in others. A cytology report of poorly differentiated adenocarcinoma associated with *S. stercoralis* was made.

Discussion

S. stercoralis, an intestinal nematode, though world-wide in distribution, is generally encountered in tropical and sub-tropical countries. The free-living adult worms are found in the soil and develop from the first-stage rhabditiform larvae passed out in the faeces. These first

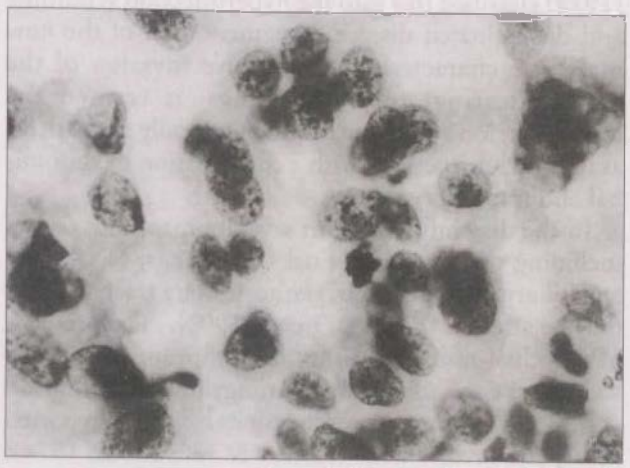

Fig. 1. Adenocarcinoma cells lying singly and in loose clusters (Papanicolaou stain, x 250).

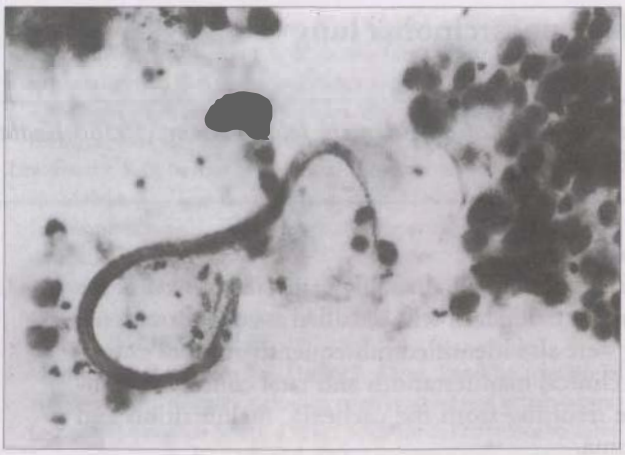

Fig. 2. Larva of *Strongyloides stercoralis* amidst tumour cells (Papanicolaou stain, x 100).

Fig. 3. Coiled *Strongyloides stercoralis* larva (Papanicolaou stain, x 250).

stage larvae after several successive moulting, transform into filariform larvae which infect man, commonly by penetrating the skin of the foot. They then circulate in the venous system, go through the right heart and lungs to ascend up the respiratory tract to the glottis, from where they are swallowed to reach the gastro-intestinal tract to mature into adult females that lay eggs. The eggs develop into rhabditiform larvae, thus completing the cycle. Sometimes, however, the rhabditiform larvae are not expelled and instead are transformed into filariform larvae, to initiate the autoinfection process within the human host, a feature peculiar to *S. stercoralis*. Maturation of the filariform larvae can occur in any organ outside the intestine resulting in disseminatd strongyloidiasis with widespread tissue damage.

About 50% of healthy individuals who harbour the nematode are asymptomatic and the clinical manifestations of those with symptoms are mild and non-specific (Botam *et al.*, 1985). Under certain conditions an overwhelming infection with protean manifestations can occur, termed systemic strongyloidiasis. Scowden *et al.* (1978) classified this into the hyperinfection syndrome and disseminated disease. Augmentation of the normal cycle characterised by massive invasion of the gastrointestinal tract and lungs, is termed the hyperinfection syndrome in which typically the patient, as in this case, presents with a combination of abdominal and respiratory disease.

In the disseminated form several organs and tissues including the gastrointestinal tract, lungs, CNS, liver and biliary tract, pancreas, genito-urinary tract and skin may be affected (Pires & Dreyer, 1993). The presence of petechial rash in an immunocompromised patient should raise the suspicion of strongyloidiasis (Simpson *et al.*, 1993). Granulomatous lesions have been reported in hepatic involvement (Poltera & Karsimbur, 1974). The patient in this report may have had more extensive disease, since he had a render enlarged liver but there is no autopsy or histopathological evidence to support this. The predisposing condition in this patient was probably the lung carcinoma with its attendant cachexia, malnutrition and depressed immunity.

In the immunosuppressed patient, hyperinfection, widespread disease or death may occur. Mortality from disseminated strongyloidiasis is reported to be around 80% (Simpson *et al.*, 1993). Several fatal cases have been reported in the literature (Rivera *et al.*, 1970; Bezares *et al.*, 1983) and Purrilo *et al.* (1974) reporting on 32 fatal cases, described a variety of clinical conditions which resulted in faral hyperinfection. They considered depressed cell-mediated immunity as the mechanism responsible. The conditions documented include Hodgkin's lymphoma, lymphatic leukemia, cachexia from malnutrition or malignant tumours, kwashiorkor, burns, leprosy, tuberculosis, SLE, radiation sickness and syphilis. In recent years AIDS is also considered a condition at risk for strongyloidiasis, as was reported in a fatal case (Vieyra-Herrera *et al.*, 1988). Patienrs on cytotoxic drugs and corticosreroid therapy also succumb readily to this infection. A most interesting case of disseminated strongyloidiasis in a patient with oat cell carcinoma and hypercortisolism due to adrenocorticotrophic hormone produced by the tumour, was reported by Cummins *et al.* (1978). Eosinophilia was documented in about 20% of patients with hyperinfection and the absence of eosinophilic response, as in this case, is generally interpreted as a poor prognostic sign (Wilson & Thompson, 1964).

The incidental finding of *S. stercoralis* in routine cytological material is becoming increasingly frequent (Avagnina *et al.*, 1980; Gocek *et al.*, 1985; Kenny & Webber, 1974; Wang *et al.*, 1980). This is particularly seen in respiratory material, because the lungs are involved both in the normal cycle of the nematode and in the hyperinfection syndrome. Since early recognition and prompt treatmenr of strongyloidiasis, particularly in the high risk group, can successfully eradicate the disease and prevent fatal complications, the need for

both the clinician and the pathologist to be aware of this condition, cannot be overemphasised.

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