complication of chronic pyothorax has only been reported in Japan\(^1\)\(^-\)\(^3\) and never in Western countries, possibly because of the rarity of chronic pyothorax in the West. Pleural lymphoma was reported in three of 134 patients (2-2\%) with chronic tuberculous pyothorax at a Japanese hospital between 1971 and 1985.\(^1\)

The case reported here is the second from the Taiwan area.\(^7\)

The mean interval between the start of the chronic pyothorax and the onset of pleural lymphoma was 33 years in the study of Iuchi et al,\(^2\) similar to the 25 years in this report. In the patients reported by Iuchi et al and in our patient chest pain, which is not a feature of chronic pyothorax, was the most common presenting symptom of non-Hodgkin’s lymphoma. Positive cytological results may not be obtained by pleural aspiration alone, and thoracotomy may be necessary as in our case.

A diffuse large B cell lymphoma is the most common type of primary pleural non-Hodgkin’s lymphoma developing in chronic pyothorax.\(^1,2,27\) The pathogenesis of pyothorax-associated pleural lymphoma is still unknown. Non-Hodgkin’s lymphoma may develop in patients with autoimmune disease such as chronic lymphocytic thyroiditis by the process of chronic stimulation.\(^69\) Stimulation of a non-autoimmune nature by chronic inflammation could also be an aetiological factor in the development of malignant lymphoma from long standing pyothorax.\(^2\)

In Japan the present treatment for pleural non-Hodgkin’s lymphoma is chemotherapy, with or without combined radiotherapy, and the actuarial two year survival rate is 32-42%.\(^2\) Chemotherapy alone was used in our patient.

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A malignant pleural effusion infected with *Salmonella enteritidis*

G V Gill, A Holden

**Abstract**

A patient is described with a unilateral pleural effusion persistently infected with *Salmonella enteritidis*. The infection was eventually eradicated with ciprofloxacin. A computed tomographic scan and mediastinal lymph node biopsy demonstrated an underlying small cell bronchogenic carcinoma.

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Keywords: pleural effusion, salmonellosis, malignancy.

Food-borne *Salmonella* intestinal infection is increasing in prevalence in the United Kingdom.\(^1\) *Salmonella* infection outside the gastrointestinal tract remains uncommon in western countries and pleural effusions or empyemas infected with *Salmonella* species are extremely rare.\(^28\) We report a patient with a small cell lung carcinoma and unilateral pleural effusion which was infected with *Salmonella enteritidis*.

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**Case report**

A 70 year old man was admitted to hospital with increasing dyspnoea and weight loss of 10 kg in three months. He had a history of ischaemic heart disease with atrial fibrillation and congestive heart failure and was receiving treatment with digoxin, frusemide, and captopril. He had smoked 15 cigarettes per day up to six years previously.

Examination revealed an ill and wasted man who was clinically anaemic and had signs of a large left pleural effusion. The pulse rate was 80/min in atrial fibrillation, blood pressure was 140/85, and there were no signs of heart failure. Chest radiography confirmed the unilateral effusion, and the electrocardiogram showed atrial fibrillation with digitals effect. Haemoglobin was 9-7 g/100 ml with a normochromic normocytic blood film. Serum levels of ferritin, vitamin B\(_12\), and folate were normal, and a subsequent bone marrow aspirate was unremarkable. The erythrocyte sedimentation rate was 65 mm in the first hour. Serum urea, creatinine, and electrolyte levels were normal, as were blood glucose and serum calcium levels. Serum tests of liver and thyroid function were unremarkable, and the serum cholesterol concentration was 5-6 mmol/l.

Pleural aspiration was carried out and 1200 ml of cloudy fluid was obtained. The protein level was 45 g/l and glucose concentration 0-3 mmol/l. No malignant cells were seen but *Salmonella enteritidis* was grown on culture. The patient had no fever or clinical
A malignant pleural effusion infected with Salmonella enteritidis

Ultrasound studies revealed biliary disease. Urine, and aspirated and was 750 mg orally twice daily was begun. This second aspirate again grew S enteritidis. Because of continuing pleural fluid collections a chest drain was inserted two weeks after the second aspirate. At the time of insertion S enteritidis was again grown from the aspirate (despite two weeks of ciprofloxacin treatment to which the organism was fully sensitive in vitro). Ciprofloxacin was continued for a total of four weeks and thereafter all subsequent aspirates were sterile.

A computed tomographic (CT) scan of the patient’s thorax (performed two weeks after ciprofloxacin treatment was started) showed enlarged mediastinal lymph nodes. Repeated cytological examinations of the pleural fluid and also pleural biopsy samples were negative. Thoracosopic biopsy of the mediastinal nodes was performed via an intercostal approach. Histological examination of the specimens obtained revealed small cell lung cancer. The patient was treated with oral etoposide and remains reasonably well 12 months after presentation. He has a moderate residual left pleural effusion but this has not required further therapeutic drainage. Several test aspirate samples have remained sterile on culture.

Discussion
Salmonellosis may occur more frequently and have more diverse clinical manifestations in patients with disseminated malignancy.23 In two series involving a total of 115 patients31 no cases similar to ours were recorded, although Salmonella was occasionally isolated from necropsic lung tissue.

In 1977 Carel et al4 described a patient in Israel with metastatic thyroid cancer and a unilateral pleural effusion. The fluid was brownish red and grew S blockley. Though the source of the infection was not found, the patient did have fever (unlike our case). Prolonged and varied antibiotics were needed, but there was an eventual good recovery. Singh and colleagues5 described a nine year old child in India with a frank empyema due to S typhi and reviewed a small number of similar cases in the literature. Their patient responded to treatment with chloramphenicol and drainage of the pus via an intercostal drain. It seems likely that the empyema arose from an original septicemic typhoid infection. Devi et al6 described a similar case, again in India, but their patient had a small encysted empyema infected with S typhi, and it arose during the course of treatment for pulmonary tuberculosis. Finally, there are two reports of pleural effusions infected with S typhi from the USA7 and UK.8 Both, however, were secondary to subphrenic abscesses below the effusion.

The overall rarity of pleuropulmonary involvement in Salmonella infections in general is demonstrated by a recently published British series of 6250 cases of bacteriologically proven salmonellosis from India over a 12 year period.9 Only three patients had chest involvement (0·05%), all with pyopneumothorax, two due to S typhimurium and one to S typhi.

The patient described here is thus dissimilar from other reported cases. The infection was asymptomatic and not associated with systemic salmonellosis, Salmonella gastroenteritis, or adjacent Salmonella abscess. Salmonella enteritidis is common in the UK, and infection is frequently acquired by eating infected eggs. We assume that in our patient the organism spread from the gut, via the bloodstream, to the malignant pleural effusion – the process presumably facilitated by his immunocompromised state.

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