A Case of Empyema Thoracis Caused by Actinomycosis

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Summary

A female patient who presented with left empyema thoracis caused by *Actinomyces odontolyticus* is reported. She responded to treatment with penicillin and metronidazole but after 3 weeks developed leucopenia complicated by gram-negative septicaemia. Leucopenia improved rapidly on withdrawal of metronidazole. Treatment was continued with a prolonged course of penicillin and she made an uneventful recovery.

Key words: Actinomycosis, empyema thoracis, leucopenia

Introduction

Actinomycosis is a rare bacterial infection which occurs worldwide. Although clinically actinomycosis behaves more like a mycosis, the causative agent is now recognised and classified as a higher order bacterium. Cervicofacial, abdominal pulmonary and pelvic forms are well described. *Actinomyces israeli* is the most common causative organism, although *A. naeslundi, A. odontolyticus, A. meyeri* and *Arachnia propionica* may occasionally be involved[1]. It is common in actinomycosis to isolate 'associate' bacteria such as *Actinobacillus actinomycetemcomitans*, bacteroides and *Streptococcus milleri* which may behave as synergistic pathogens.

In this report we highlight a case of thoracic actinomycosis; the patient also developed leucopenia, an adverse reaction attributed to metronidazole.

Case Report

FCH, a 38 year old Malay lady, was referred by a surgeon from a private hospital to Penang General Hospital for further management of left-sided pleural effusion in June 1991. She complained of unproductive cough, breathlessness and left-sided chest pain of one month's duration associated with fever, loss of weight and loss of appetite. There was no history of contact with tuberculosis and she was a non-smoker. She had no past illnesses apart from left corneal opacity following injury from a foreign body at the age of 2 and spontaneous abortion 12 years previously. She worked as a clerk and for the past 11 years (after her divorce) had been living with her mother in a village house in Baling, Kedah. On examination she looked well and was afebrile. She had halitosis and poor dental hygiene but no pallor, clubbing or lymphadenopathy. Her left eye was blind due to a dense corneal opacity and in the left chest there were signs of a large pleural effusion.

She was admitted to the Chest Ward for further investigation. Chest X-ray showed a large left-sided D-shaped shadow on the lateral film (Figs 1a and 1b).

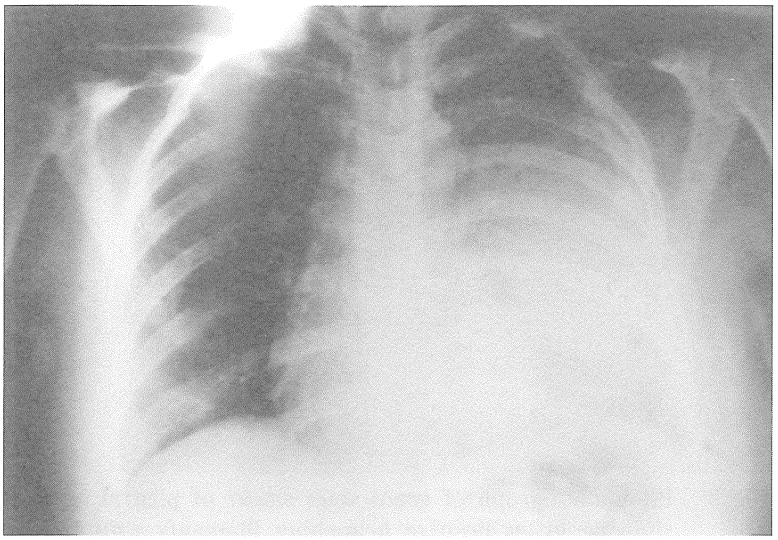

Fig 1a: Chest X-ray showing a large left pleural shadow

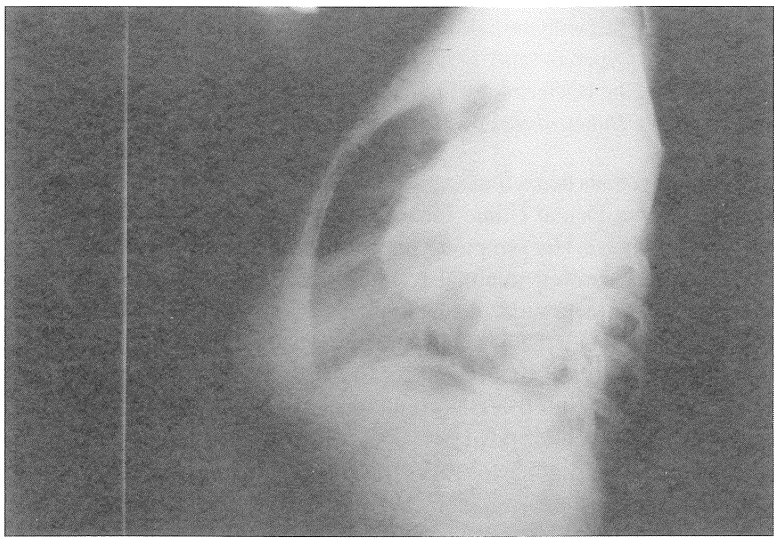

Fig 1b: Lateral chest X-ray showing D-shaped shadow

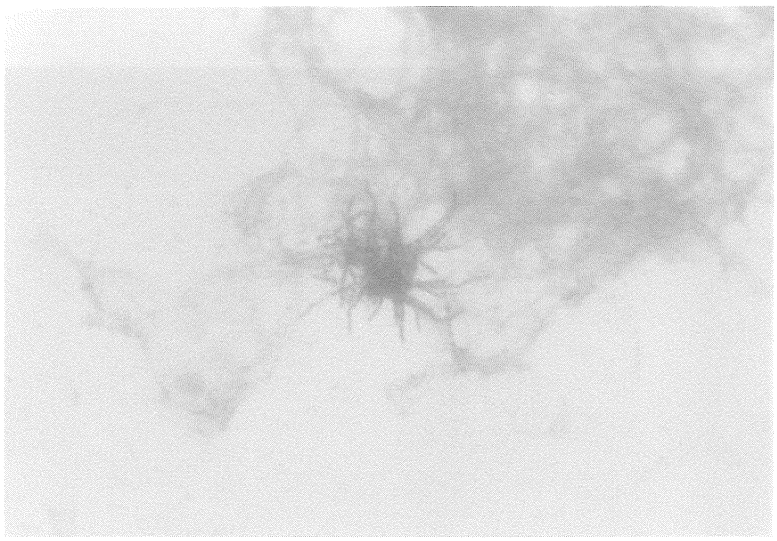

Fig 2: Photomicrograph of gram stain smear of pleural aspirate showing gram positive branching filaments with beaded appearance suggestive of *Actinomyces* species (x1,000 oil)

Random blood sugar, urea and electrolytes, and liver function tests were all normal. Full blood count showed haemoglobin 12.1 g/dl, total white count 12.1 x 10^3/µl; differential:/polymorphs 75%, lymphocytes 24%, monocytes 1%, eosinophils 0%. Erythrocyte sedimentation rate was 10 mm/hour. On the second day of admission she started coughing up foul-smelling sputum which grew *Acinetobacter* in one of two specimens. Left pleural aspiration yielded about 100 cc of foul-smelling pus which on gram staining revealed gram positive branching filaments with beaded appearance suggestive of *Actinomyces* (fig 2).

The organisms were not acid fast with the modified Ziehl-Nielson stain. On culture the pus grew organisms suggestive of *Actinomyces* species and gram negative anaerobic bacteria. These organisms were subsequently confirmed by the Bacteriology Division, Institute of Medical Research, Kuala Lumpur, as *Actinomyces odontolyticus, Bacteroides corodens* and *Bacteroides splanchnicus*.

She was treated with intravenous benzylpenicillin 2 mega units 4-hourly and oral metronidazole 400 mg 8-hourly and referred to the Dental Clinic for treatment of periodontal disease. She also had chest percussion and postural drainage. Her symptoms improved dramatically after one week of antibiotics and ultrasound of the left chest showed minimal residual fluid in the pleural cavity. After 3 weeks on intravenous penicillin and oral metronidazole she suddenly developed fever, sore throat and chills and was found to have bilateral tonsillar enlargement and purulent tonsillar exudate. A full blood count at this time showed haemoglobin 10.6 g/dl, total white count 2 x 10^3/µl, differential:/polymorphs 10%, lymphocytes 86%, monocytes 4% and eosinophils 0%. Blood cultures grew *E. coli* after subculture. Since leucopenia is a known though rare side-effect of metronidazole, this drug was stopped and she was treated with intravenous cefoperazone and netilmicin for 1 week. A week later her symptoms had resolved completely and repeat full blood count showed haemoglobin 11.2 g/dl, total white count 11.8 x 10^3/µl, differential: polymorphs 83%, lymphocytes 5%, monocytes 0% and esonophils 2%.

By this time she had received 4 weeks of high dose intravenous benzylpenicillin and repeat chest X-ray showed considerable clearance of the left pleural shadow. She was discharged home on oral penicillin 500 mg 4 times a day and followed-up monthly. By January 1992 she had completed 6 months of oral penicillin

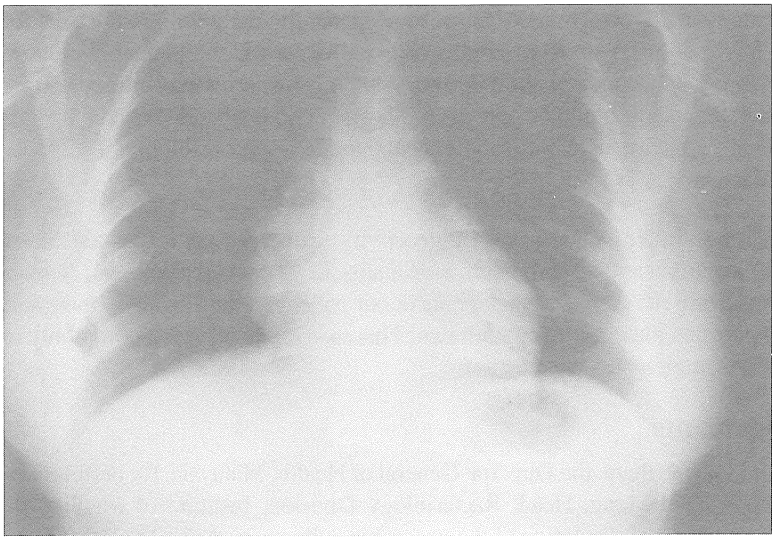

Fig 3: Chest X-ray showing complete clearance of the left-sided lesion after 7 months of penicillin treatment.

therapy; a chest X-ray done at this time was normal (Fig 3), and treatment was stopped. She has since remained well with no recurrence of symptoms.

Discussion

Actinomycotic infection usually arises from endogenous sources such as infected gums and carious teeth and case-to-case transmission occurs only through human bites. Malnutrition and alcohol abuse may be predisposing factors but the primary cause of thoracic actinomycosis appears to be poor dental hygiene, oral trauma and aspiration of infected material into the lung. This is the most likely cause in our patient since she had poor oral hygiene. Pulmonary infection may also result from extension downward into the trachea of a cervicofacial lesion.

Actinomycosis characteristically transgresses tissue planes; in the lung it may cause consolidation, fibrosis, cavitation, abscesses and empyema and may extend to invade adjacent structures such as chest wall, pericardium and mediastinum. In chronic cases, abscesses pointing on the chest wall may cause multiple discharging sinuses and there may be associated periostitis of ribs or destruction of bone. Thoracic actinomycosis may sometimes become disseminated to produce abscesses in skin, subcutaneous tissues or muscles[2].

Patients with thoracic actinomycosis often present with non-specific symptoms such as cough, purulent sputum, fever and weight loss, and diagnosis depends upon microscopic examination of pus or biopsy material for the organism and the presence of characteristic 'sulphur granules' in the pus. Gram stains of pus will show slender, gram positive, long branching filaments characteristic of actinomycosis and definitive diagnosis can be established by anaerobic culture for the organism. Positive culture from sputum cannot establish a diagnosis of thoracic actinomycosis because the organisms are present in normal oral flora and culture may be positive in the absence of invasive disease. 'Sulphur granules' are yellow or white granules 1 to 2 mm in diameter and consist of clumps of thin bacterial filaments that possess peripheral radiations with or without clubbing at their ends.

Differential diagnosis is from other chronic lung infections including tuberculosis, other causes of empyema and carcinoma.

Treatment is with 10 to 20 mega units of intravenous penicillin daily for 4 to 6 weeks followed by oral penicillin in a lower dose for up to 6 months or even longer[3]. If the patient is allergic to penicillin, tetracycline, erythromycin, clindamycin and parenteral cephalosporins may be used. Appropriate therapy for any associated organism should be given for a shorter period. Abscesses and empyema may need to be drained and lung resection or decortication may be necessary for resolution if response to antibiotics alone is unsatisfactory.

Metronidazole is an antimicrobial drug with high activity against anaerobic bacteria. Side effects include gastro-intestinal disturbance and peripheral neuropathy in prolonged treatment; leucopenia has been described but it is a rare side-effect[4]. Leucopenia in our patient was attributed to metronidazole because it rapidly resolved when the drug was withdrawn. This case reminds us that commonly used antibiotics can give rise to uncommon adverse reactions.

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