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A CASE OF PURULENT PLEURAL EFFUSION DUE TO ACTINOMYCETES.

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Introduction

Thoracic actinomycosis appears not to be common and empyema has scarcely been reported (1.5.8.9.11) Because of the lack of laboratory facilities in rural areas, however, cases may remain undiagnosed while the disease is treatable. We therefore think it would be helpful to publish the case of a young woman with empyema due to actinomycosis who responded successfully to medical treatment.

Case Report.

Miss E.B., aged 20 years, a carpet-weaver from the Kashan area of central Iran, was admitted on 19.2.1972 to the Medical Ward, Pahlavi Hospital, complaining of right side chest pain and a cough over the last two

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months. Five months prior to admission she had had a fall which gave her a tear in the forehead and a pain in the right side of her chest. She was able to continue work until two months before admission when she developed a dry cough, fever and profuse sweating.

Past history n.a.d. Her menstruation started when she was 14 years old but for two months prior to admission she had had no periods.

On examination her general condition was poor; she was afebrile but was drowned in sweat. No clubbing, edema or lymphadenopathy. Pulse 110/ min. regular, B.P. 105/60, apex beat in the 4th left intercostal space along the midclavicular line. Heart sounds were normal. The right hemithorax appeared to bulge posteriorly. The lower half of the right hemithorax was dull to percussion with breath sounds absent. She was anorexic and constipated. Several teeth were badly carious. She had no dysphagia. The liver border was palpable 5 cms. below the costal margin with smooth surface and tenderness. Spleen was not palpable. She had a concomitant strabismus due to impaired sight of the right eye since childhood.

LABORATORY FINDINGS: Hemoglobin 7.3G/100 ml, hematocrit 30 %, W.B.C. 6000 with 64 % Polymorphs, 30 % Lymphocytes, 4 % Monocytes, and 2 % Eosinophiles. Slight anisocytosis and poikilocytosis. Platelets normal, ESR 90 mms. first hour and 130 mms. second hour. Blood urea 20 mg 100 ml, glucose 105 mg, cholesterol 152 mg, bilirubin 0.9 mg (0.5 mg conjugated, 0.4 mg unconjugated), urine normal. Sputum negative for acid-fast bacilli. Mantoux test negative with 20 units of PPD. Stools negative for ova. Chest X-ray on admission showed a dense, homogeneous opacity in the lower half on the right side (Fig 1). No localised pulmonary lesion could be detected. ECG: right axis deviation with right ventricular strain.

Follow up and treatment: On 20.2.72 about 1800 ml of turbid, light brown fluid was aspirated from the right pleural space. Ampicillin, 500 mg, and Cloxacillin, 250 mg were injected locally and the same doses of the drugs started intramuscularly every 6 hours. Chest X-ray after the aspiration did not reveal any localised pulmonary lesion and the ribs were not involved (Fig 2) There was a remarkable initial improvement in her general condition

and she was able to sleep undisturbedly after two months of insomnia. The lower border of liver was elevated to the normal level. Aspirations were repeated on the following days with the amount of fluid yielded decreasing each time; the same doses of ampicillin and cloxacillin being injected locally. However, she developed an induced pneumothorax with a persisting fluid level and her condition started to deteriorate.

Bacteriology of the pleural fluid: the first specimen (20.2.72) was negative for acid-fast bacilli and no germs were grown on culture; however, no culture was made anaerobically. Two days later the second aspiration yielded only 15 ml of a thick pus which contained some sulfur granules. Microscopy revealed gram positive filamentous organisms with characteristic branching and breaking up into bacillary and coccoid elements (Fig 3) some branches were club shaped. Cultures were made on two blood agars, two Lowenstein-Johnson, and a Thioglycollate broth. To differentiate Nocardia from Actinomycetes one of each media was put under striclty anaerobic condition with 10% CO2; after two days the aerobic media were negative but in the anaerobic culture a few small, irregular and dead white colonies were grown. Wet mount examination showed filamentous organisms. There was no growth on Lowenstein-Johnson medium after 60 days. A third aspiration on 3.3.72 yielded 850 ml of pus which on direct examination revealed the same elements in smaller numbers (Fig 4)but the cultures were negative.

On 10.3.72 a catheter was inserted into the right pleural space for continuous drainge and three days later treatment was changed to Penicillin I mega units four hourly intramuscularly with 500 mg Tetracycline every six hours orally. The patient gradually improved and further Chest X-rays showed diminuation of the opacity in the right lung field except for a circumscribed area in the middle zone posteriorly (Fig 5 & 6). This was due to an encysted collection of pus which was aspirated successfully on several occasions and gradually became smaller; on the X-ray of 2.5.72 it had almost disappeared. The rubber tube was taken out on 5.4.72. Thoracotomy was not required and the patient was discharged on 6.5.72 in good condition. Penicillin was stopped but Tetracycline was recommended to be continued for another week. On a futher outpatient follow-up she remained well.

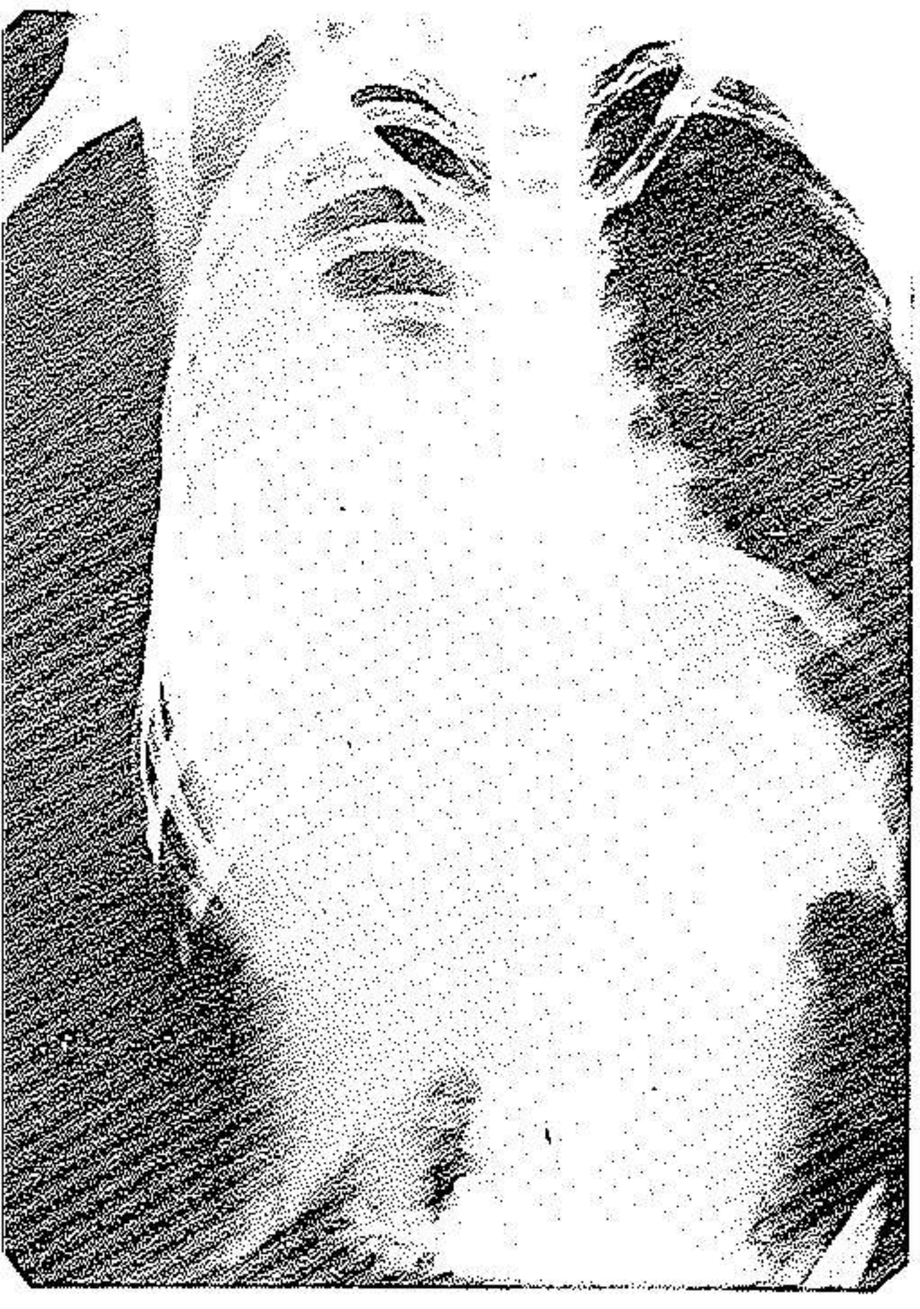
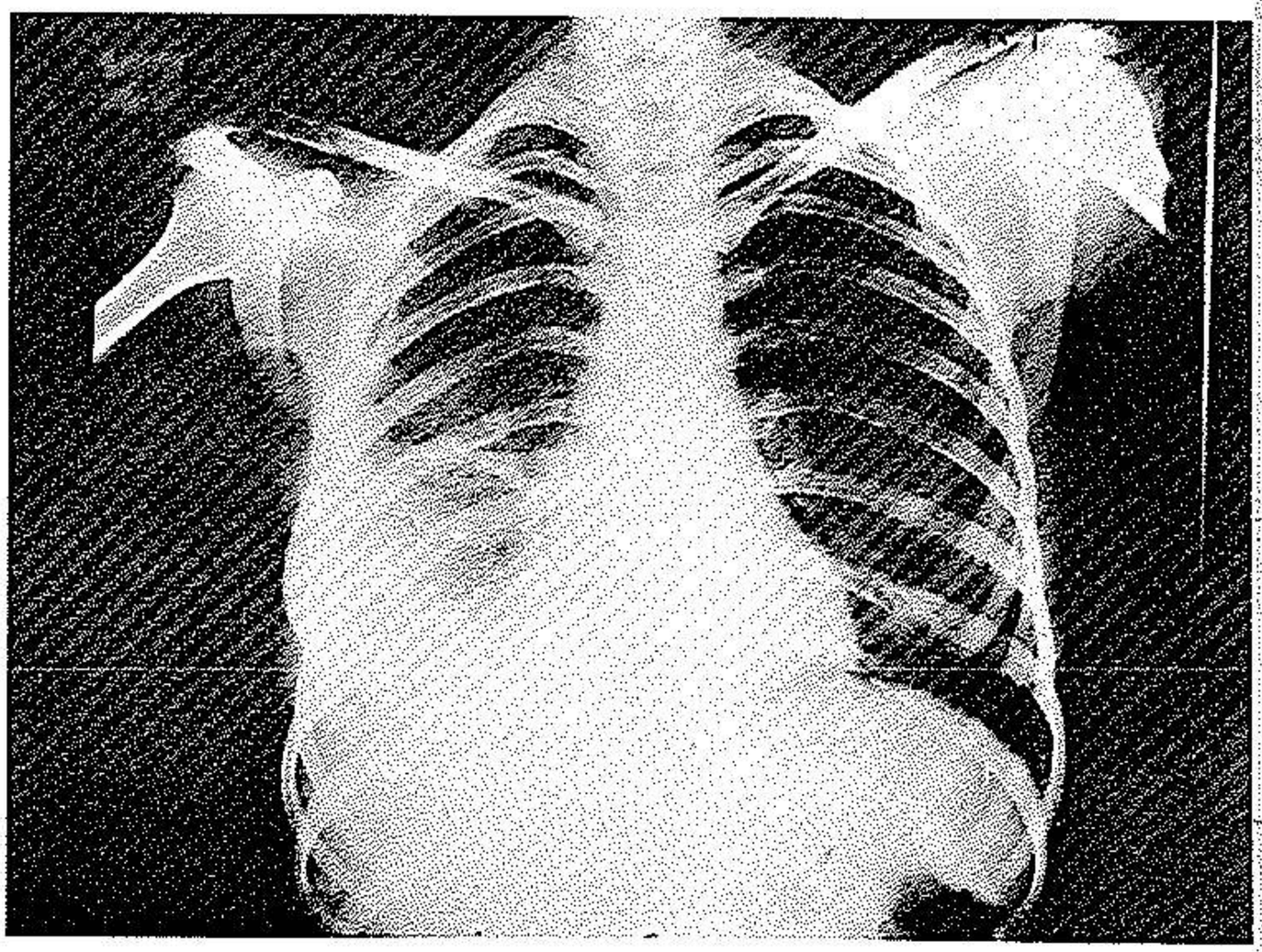


Fig 1. Chest x-ray on admission, demonstrating massive right pleural effusion.

Fig 2. Chest x-ray after aspiration. The right lung is expanded but there is a shallow induced pneumothorax.



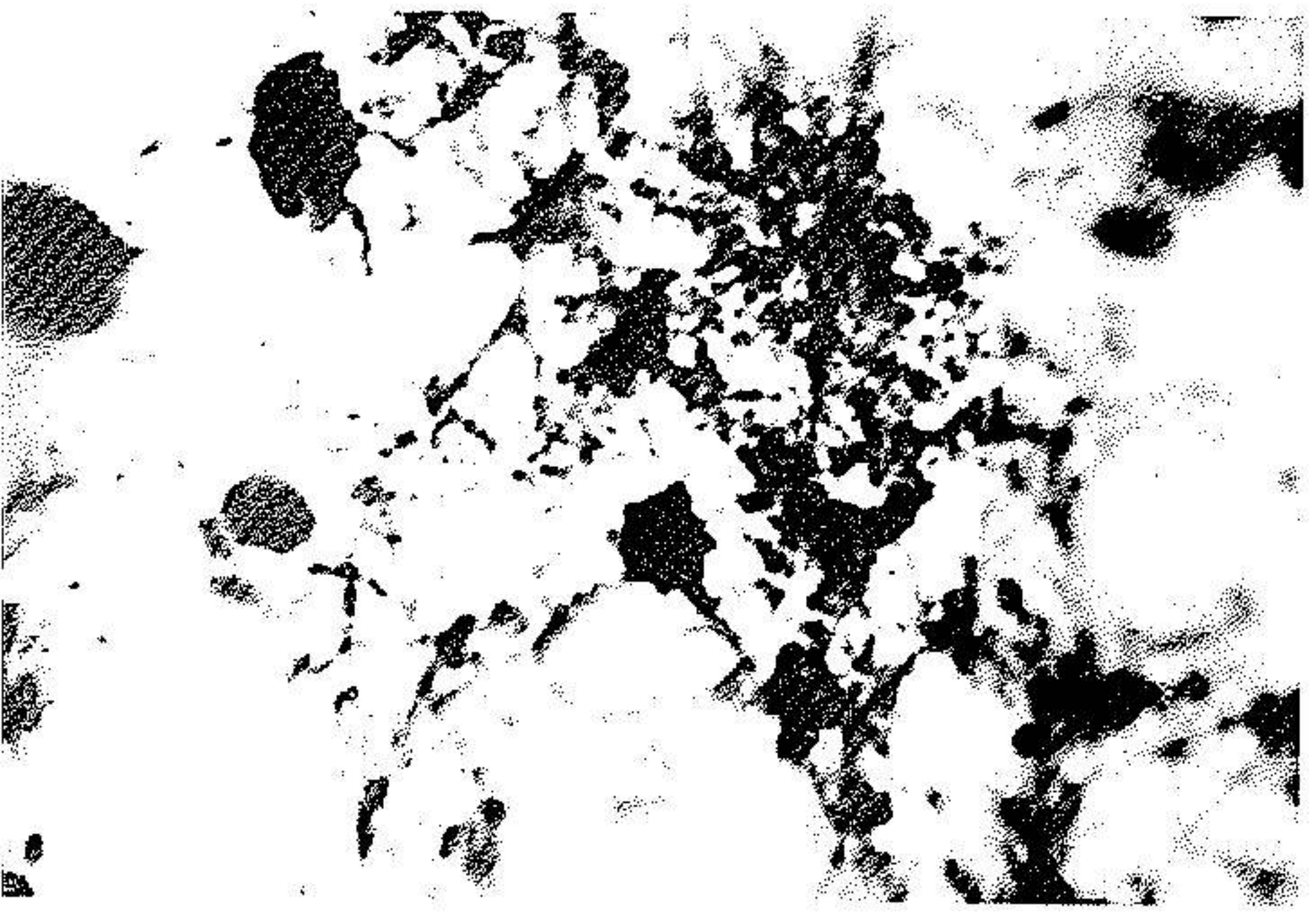


Fig 3. High power photomicrographe of actinomyces in the second specimen of pleural aspirate.

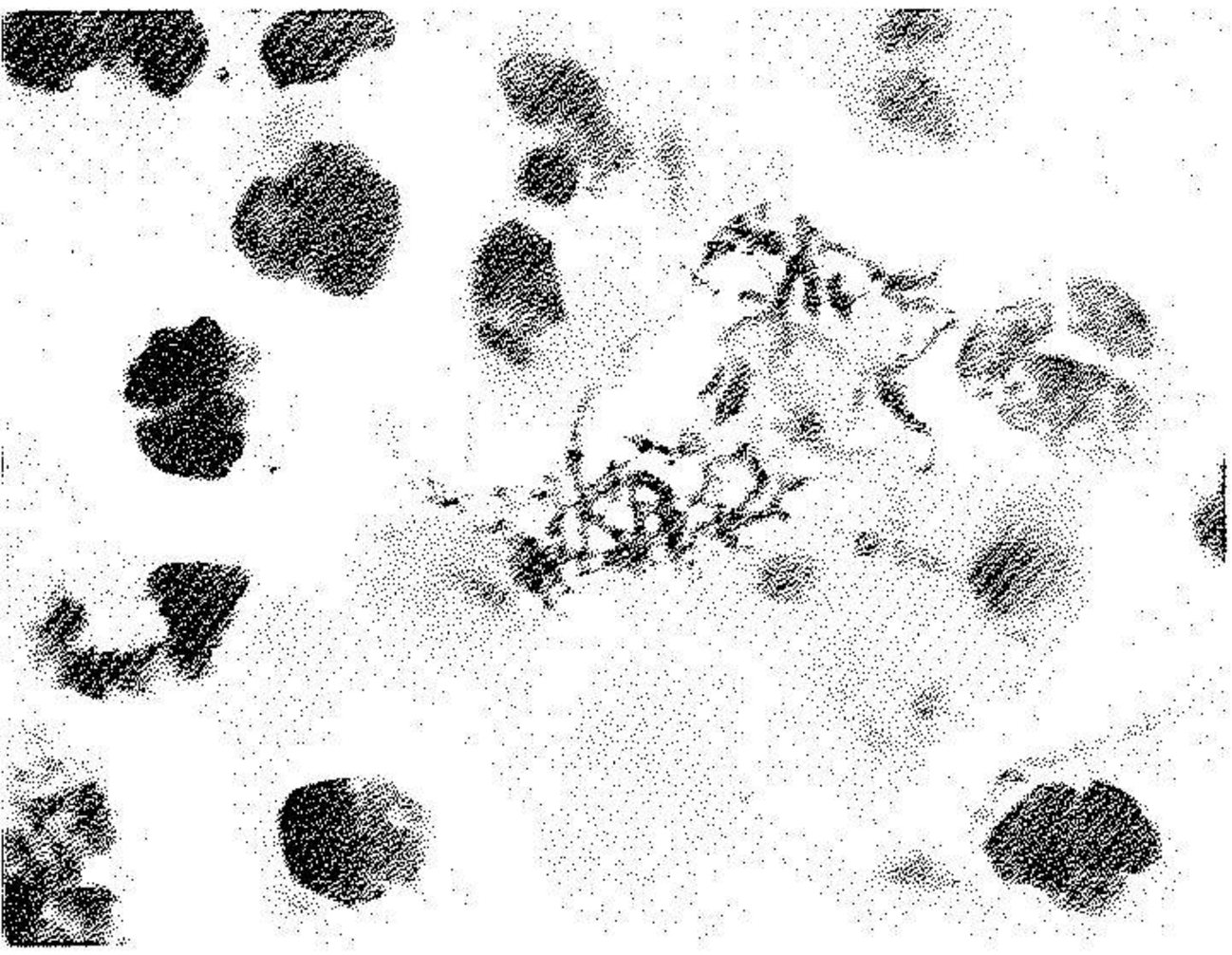
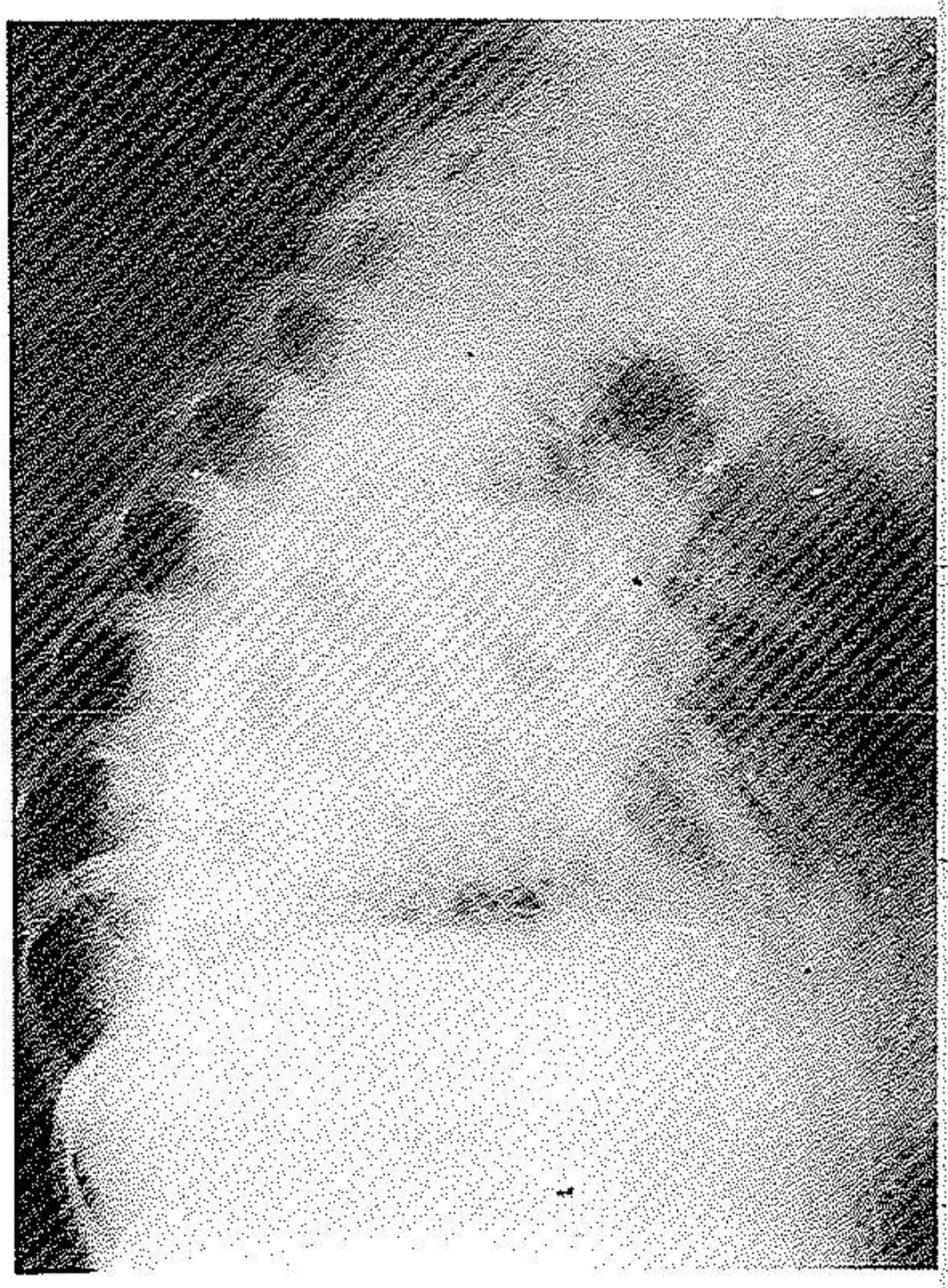


Fig 4. Gram positive filaments in the third specimen of pleural fluid in smaller numbers.



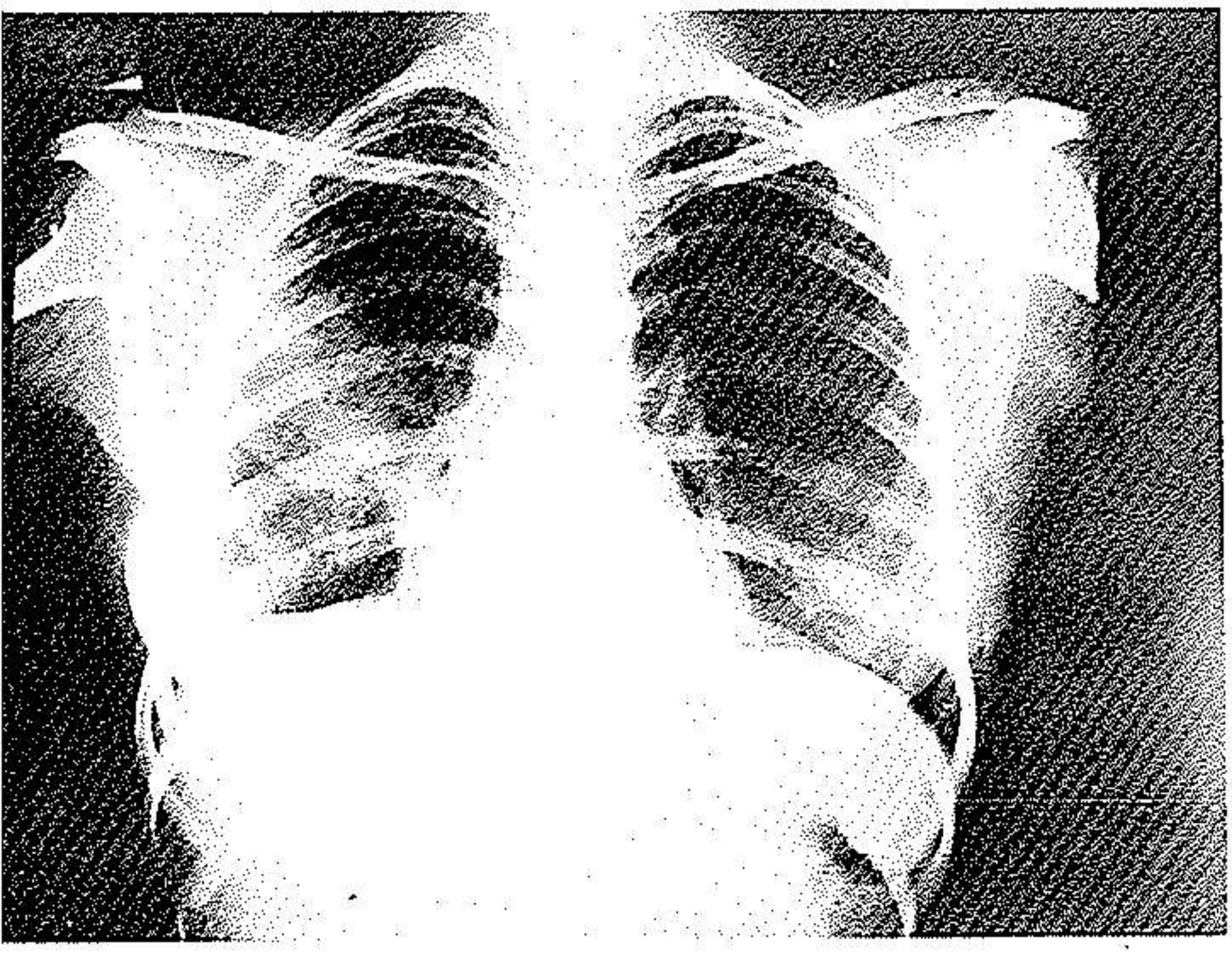


Fig 5 and 6. A small circumscribed collection of pus persists in the right middle zone,located posteriorly as shown in the right lateral.

Discussion

Actinomycosis is a disease caused by species of Actinomycetes, A. bovis in cattle and A. israeli in man (6 — 14). The organisms live as saprophytes in the mouth specially around the carious teeth and have been isolated from the throat and cryptic tonsils. (3) It was first described in man by Lebert in 1857 and later on in cattle by Bollinger in 1876 (2). The actionmyces genus belongs to the family of actinomycetaceae which are now grouped under Mycelial Eubacteria (3.7.14). Although they have many characteristics of the fungi, morphologically and physiologically they are bacteria and are susceptible to antibiotics, including penicillin and the sulfas; fungi are not.

No reliable immunological test has been developed for actinomycosis. Slack et al, by fluorescent antibody, separated actinomycetes into 4 serotypes A,B,C, and D (12-13). Single injections of culture of actinomycetes did not regularly produce disease in laboratory animals.

Actiomycosis is world wide in distribution, the prevalence being higher in rural areas. In the developed countries the incidence has been decreasing in recent decades probably in relation to the introduction of antibiotics. The lesions are chronic with granulomatous infiltrations consisting of mononuclear and giant cells but occasionally with abundant polymorphonuclear cells in acute lesions. The commonest form of the infection is the cervicofacial type originating from carious teeth, infected tonsils or regional trauma. Thoracic and abdominal forms are next in frequency; involvement of central nervous system, heart valves and skin tissues occur rarely.

Lesions in the lung and pleura can occur through:

1. inhalation of the germ from mouth and throat, 2. infection from the oesophagus into the mediastinum. 3. extension of the abdominal disease via the diaphragm, and 4. as a metastatic infection.

Pulmonary lesions occur in one lung, although the infection may spread to the other side. They are variable in size and distribution but occur more often in the mid and lower zones and may cavitate.

The pathogenesis of thoracic actinomycosis has been subject to discussion and there has been controversy about the role of actinomycetes as the cause of the disease in cases when the germ is recovered from pulmonary lesions and pleural pus.

In our patient, however, no other germ was grown from the empyema fluid on several cultures. The fact that her symptoms started after a fall suggest inhalation of actinomycetes from her carious teeth probably to injured areas in the lung when she fell on her right side, resulting in focal devitalization. Chest X-rays following aspiration did not reveal localized lesions but in view of the remaining fluid and some thickening of pleura the right lung could not be visualised in detail.

The main step in the treatment of actinomycotic empyema as in any purulent pleural effusion, is to get rid of the pus by intubation with a tube wide enough to maintain a continuous drainage (15). Prior to the antibiotic era a variety of methods were used: vaccination was carried out by Wynn (16); iodine preparations have been instilled locally to resorb the fibrous tissue so that antibiotics have a wider access to the germs. Radiotherapy has not always been successful.

Antibiotics have changed the outlook for curing the disease. Prior to 1940, the mortality of thoracic actinomycosis was reported as 75 to 100 % but with the introduction of penicillin the recovery rate has been raised to 40 %. Penicillin has been used since 1944 and seems to be the treatment of choice although some reports claim the superiority of tetracycline especially with regard to the associated bacteria. In any case high doses of penicillin should be used for at least six weeks even with apparent improvement. (4,10) The dose recommended is 4 to 20 million units/24 hours by injection, and tetracycline 500 mg six hourly.

Summary

A case of massive actinomycotic empyema, the first report in Iran, in a girl of 20 years old is presented with complete cure after treatment by drainage, penicillin and tetracycline. The pathogenesis of actinomycetes and of other saprophytes is discussed. Although the incidence of actinomycosis has decreased in the antibiotic era, the possibility of the infection should be kept in mind especially in rural areas for a serious infection that is easily treatable.

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