

## Case Report

# *Streptomyces* infection in Cushing syndrome: A case report and literature review

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### Abstract

*Streptomyces* are saprophytic soil organisms rarely known to cause invasive infections. *Streptomyces* is the largest genus, producing antibacterial, antifungal and antiparasitic drugs. The case was a 24-year-old man, admitted for sudden dyspnea, fever and sputum and decreased sound in the left lung. The chest X-ray showed hydropneumothorax. After chest tube insertion, lung expansion did not happen. Pleural effusion was exudative with gram-positive bacillus and *Streptomyces* in culture. Owing to symptoms of Cushing in history, examination and laboratory work-up for Cushing was done and finally he underwent bilateral adrenalectomy. The patient was on antibiotic broad spectrum antibiotic and then was changed to antibiotic as organism was sensitive to and discharged with clarithromycin for 6 months. *Streptomyces* happens in immunodeficient patient. Diagnosis is based on culture and contamination was ruled out. Treatment period is longer for patients owing to slow growing nature.

**Key Words:** Cushing syndrome, pulmonary infection, *Streptomyces*

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## INTRODUCTION

*Streptomyces* are saprophytic soil organisms is rarely known to cause invasive infections other than mycetoma.<sup>[1]</sup> *Streptomyces* species are most widely known for their production of antibiotics as secondary metabolites.<sup>[2]</sup>

The genus *Streptomyces* contains more than 500 species. *Streptomyces* is known as saprophytic

soil organisms that lead to non-invasive infection other than in an immunodeficient condition that cause invasive infection. *Streptomyces* species are most popular for antimicrobial drug production. *Streptomyces* is the largest antibiotic-producing genus, producing antibacterial, antifungal and antiparasitic drugs and also a wide range of other bioactive compounds, like immunosuppressants.<sup>[3]</sup> The pulmonary symptoms are pneumonia and may lead to nodular or abscess formation.

## CASE REPORT

Patient was a 24-year-old man, admitted to hospital due to sudden dyspnea for 3 days with cough and yellowish sputum from almost 7 days before admission. He had fever for 5 days before admission. He was healthy until 50 days before admission and

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was sent to the tropical city for military service where he had an insect bite. After the bite, swelling and edema of upper limb occurred followed by edema on the face and body, acne and weakness of proximal muscles 2 days later. During 1 week, body edema decreased while muscle weakness, acne and facial edema remained. Acnes spread to the anterior chest and face.

On physical examination: He was ill and had a moon face appearance; a lot of papulopustular rashes were seen in the face and anterior of the chest. He was febrile with 39.3°C oral temperatures, respiratory rate: 30/min and pulse rate 115/min, blood pressure 145/95 mmHg. O<sub>2</sub> saturation was 86%, White blood cells: 20500/cm, polymorphonuclear leukocyte: 90%, erythrocyte sedimentation rate: 72 mm at 1 h, k: 2.8 mEq/l, pH: 7.52 and he had a decreased sound in left lung with hyper resonance in upper and dullness in the lower portion of the chest, the force of proximal muscle was 3/5. Chest X-ray showed hydropneumothorax [Figure 1].

Chest computed tomography scans showed pneumothorax, plural effusion in the left side accompanied by lung collapse. Also, there were several lung consolidations with pleural thickening [Figure 2].

### Plural effusion, lung consolidations with pleural thickening

Thoracentesis was done and analysis for protein, lactate dehydrogenase, glucose, PH, cytology, culture and smear was sent. Blood culture was asked because of systemic inflammatory response syndrome.

Pleural fluid was indicative of empyema with glucose 30 mg/dl and pH: 7, so chest tube was inserted and a broad spectrum was administered until smear and culture of pleural fluid being ready. After chest tube insertion, chest X-ray was taken which showed decreased pleural effusion, but lung expansion did not occur. Bronchoscopy was normal. Thoracoscopy was done for decortication of pleural thickening [Figures 3 and 4].

Pleural biopsy showed fibrin deposition and chronic inflammatory cell infiltration, with chronic inflammation [Figure 5].

A smear of pleural fluid showed gram positive beaded basil and aerobic culture of pleural fluid confirmed *Streptomyces* with filamentous appearance. Pleural biopsy culture justified *Streptomyces* too. Culture was negative for acid fast bacilli. Bacteriogram reveal sensitivity to co-trimoxazole, meropenem,

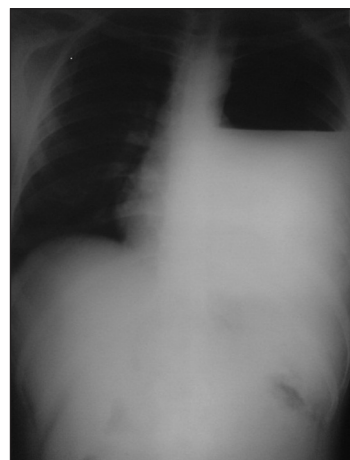


Figure 1: Chest X-ray showed hydropneumothorax

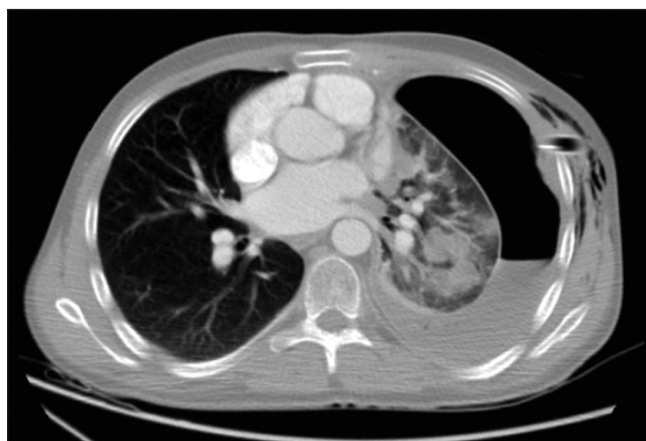


Figure 2: Chest computed tomography scans showed pneumothorax

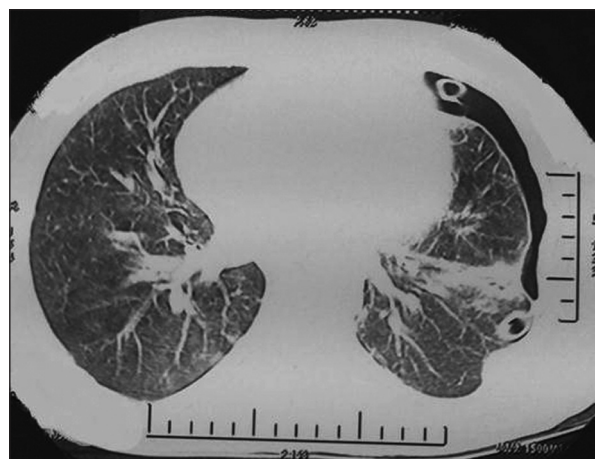


Figure 3: Computed tomography scan shows pleural thickening

ciprofloxacin, cefotaxim, tetracycline and claritromycin and resistance to ampicillin, ceftazidim, cefotaxim and piperacillin-tazobactam. Blood culture was negative for specific organisms.

During hospitalization polyuria occurred. In work-up,

hypokalemia and hyperglycemia happened. Because of symptom, physical examination and laboratory test, a work-up for Cushing was done.

Urinary free cortisol was 600 µg/24 h, over-night dexametason suppression test was positive justified Cushing syndrome. Adrenocorticotrophic hormone (ACTH) was 180 µg/dl that showed ACTH dependent Cushing syndrome. High-dose dexametason suppression test was done and the suppression of cortisol did not occur, brain magnetic resonance imaging (MRI) did not show adenoma. Rapid progression of symptom and normal brain MRI confirm ectopic ACTH, but no origin was found in the work-up.

Bilateral adrenalectomy was done and histopathology confirmed adrenal hyperplasia without malignancy [Figure 6].

Empirical treatment was converted to meropenem for 6 weeks. He was recommended to use claritromycin for 6 months at the time of discharge.

## DISCUSSION

*Streptomyces* is known as soil organisms with highly opportunistic nature of the infections. *Streptomyces* species are gram-positive filamentous bacteria and soil residents.<sup>[1]</sup> Most clinical microbiology laboratories suggest a likely *Streptomyces* species identification i.e., long filamentous gram-positive bacteria that grow aerobically and are negative for partially acid-fast stain.<sup>[2]</sup>

Some antibiotics used for treatment of bacterial, mycobacterial, fungal and parasitic infections are produced by *Streptomyces* genus and among them the most important drugs are: Chloramphenicol, daptomycin, fosfomycin, lincomycin, neomycin, puromycin, streptomycin, tetracycline and clavulanic acid.<sup>[3]</sup> Over a period of time these organisms were known as fungi as they true hyphae, but they are now recognized as bacteria. *Streptomyces* and *Nocardia* species are aerobic actinomycetes.

For *Streptomyces* infection a pre-existing condition such as cancer, acquired immunodeficiency syndrome or human immunodeficiency virus infection, the presence of a central venous catheter and prosthetic heart valve, exogenous glucocorticoid are required.<sup>[2]</sup> Although, Kofteridis *et al.* reported pulmonanary *Streptomyces* infection in immunocompromised patients. The most common presentation of *Streptomyces* infection is mycetoma, which is a chronic suppurative infection of the skin and underlying soft-tissue. Visceral infections with these organisms appear to be rare.<sup>[4]</sup>

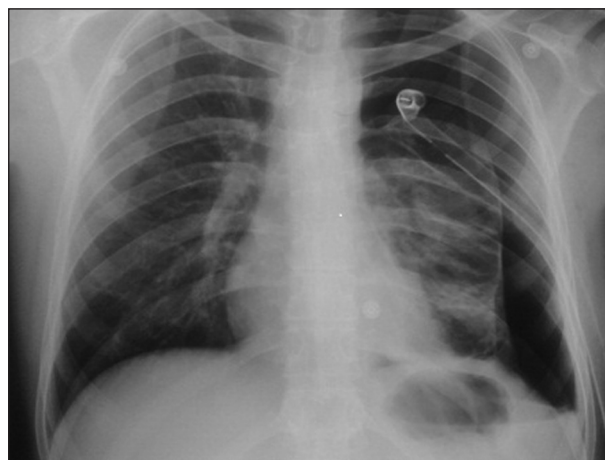


Figure 4: chest X-ray shows persistent pneumothorax after chest tube insertion

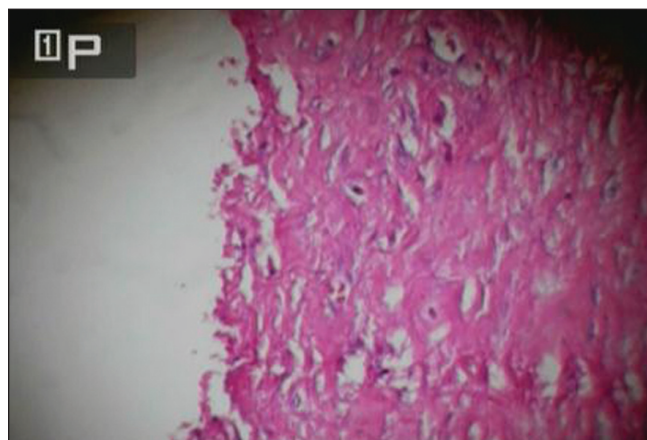


Figure 5: fibrin deposition and chronic inflammatory cell infiltration, with chronic inflammation

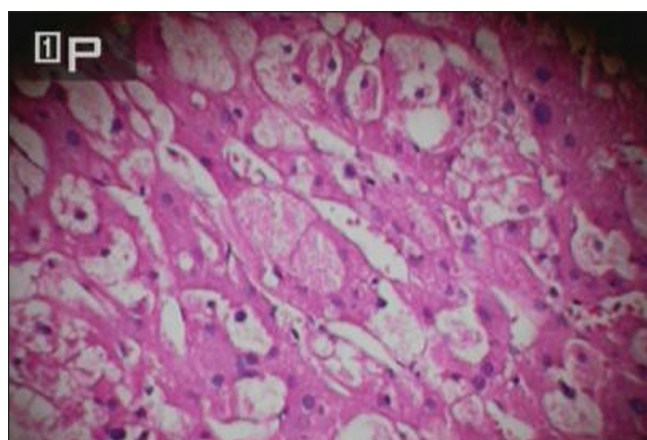


Figure 6: Adrenal hyperplasia without malignancy

Until recently, pneumonia and other symptomatic infections due to *Streptomyces* were considered to be rare and limited to the immunocompromised condition.<sup>[5,6]</sup> There have been only a few reports of *Streptomyces* species causing infection other than



mycetoma. Pneumonia is a rare clinical feature of *Streptomyces* infection as only 8 cases have been reported during the last 59 years.<sup>[5]</sup> Kohn *et al.* reported a septicemia and primary lung involvement due to *Streptomyces* infection. Caron *et al.* described a nodular infiltration of the lung in human immunodeficiency virus (HIV) infected patient and Ahmed *et al.* presented a case of *Streptomyces* pneumonia and monoarthritis in an advanced HIV infection and a case of sarcoidosis with *Streptomyces* infection is reported during November 2012.<sup>[1,7,8]</sup>

Microbiological and pathological correlations are required to differentiate *Streptomyces* infection from contamination. Kapadia *et al.* showed that diagnosis of *Streptomyces* is difficult and clinical and laboratory combination is needed and clinical manifestations, isolation of the organism from sterile sources, direct microscopic identification of infected tissue and exclusion of other causes must be paid attention. By using combinations of at least 2 of these criteria, they could diagnosis true infection.<sup>[2]</sup> Contamination shows usually a single colony from isolator culture. Biotechnology science has led to the development in *Streptomyces* identification through 16s ribonucleic acid gen sequencing, but still is not available in most countries.<sup>[5]</sup>

Differential diagnosis of *Streptomyces* is anaerobic actinomycetes and aerobic *Nocardia* and *Rhodococcus* that are usually partially acid-fast.<sup>[2]</sup>

Kapadia *et al.* showed that *Streptomyces* organisms were consistently susceptible to amikacin; frequently susceptible to imipenem, clarithromycin or erythromycin, minocycline and trimethoprim sulfamethoxazole; and infrequently susceptible to ciprofloxacin and ampicillin.<sup>[2]</sup> Burman *et al.* reported a successful treatment with *clarithromycin* for 6 months that lead to recovery of pulmonary infection.<sup>[4]</sup>

Kofteridis *et al.* has reported that the most potent drug was minocycline, imipenem, erythromycin, doxycycline and aminoglycoside, whereas significant percentage were resistant to trimethoprim-sulfamethoxazole, ampicillin and ciprofloxacin and hence they treat their patient with doxycycline for 6 months. *Streptomyces* is a slow growing bacteria, so the duration required

is a long period of time. In the literature it has been mentioned as 6-24 weeks of duration.<sup>[5]</sup>

Riviere *et al.* in pulmonary *Streptomyces* infection in patient with sarcoidosis, suggested treatment with intravenous imipenem (2 g/day for 14 days) and amikacin (1 g/day for 3 days), after antimicrobial susceptibility tests, the treatment was changed to oral rifampin (1.2 g/day) and ciprofloxacin (1.5 g/day) for 6 months.<sup>[1]</sup>

## CONCLUSION

*Streptomyces* infections are rare and occurred mainly in immunodeficient condition caused by cancer, chemotherapy and other immunosupressed condition. It is important to differentiate true infection from contamination. If *Streptomyces* infection occurred in patients, attention to any condition affected immunity must be done. Its treatment is longer than other typical infection due to slow growing nature.

## REFERENCES

1. Riviere E, Neau D, Roux X, Lippa N, Roger-Schmeltz J, Mercie P, *et al.* Pulmonary *Streptomyces* infection in patient with sarcoidosis, France, 2012. *Emerg Infect Dis* 2012;18:1907-9.
2. Kapadia M, Rolston KV, Han XY. Invasive *Streptomyces* infections: Six cases and literature review. *Am J Clin Pathol* 2007;127:619-24.
3. Watve MG, Tickoo R, Jog MM, Bhole BD. How many antibiotics are produced by the genus *Streptomyces*? *Arch Microbiol* 2001;176:386-90.
4. Dunne EF, Burman WJ, Wilson ML. *Streptomyces* pneumonia in a patient with human immunodeficiency virus infection: Case report and review of the literature on invasive *streptomyces* infections. *Clin Infect Dis* 1998;27:93-6.
5. Kofteridis DP, Maraki S, Scoulica E, Tsioutis C, Maltezas G, Gikas A. *Streptomyces* pneumonia in an immunocompetent patient: A case report and literature review. *Diagn Microbiol Infect Dis* 2007;59:459-62.
6. Kohn PM, Tager M, Siegel ML, Ashe R. Aerobic actinomycetes septicemia report of a case. *N Engl J Med* 1951;245:640-4.
7. Caron F, Borsa-Lebas F, Boiron P, *et al.* *Streptomyces* sp. as a cause of serum concentrations, the most active drugs appeared to be nodular pneumonia in an HIV infected patient? *Medical microbiology minocycline, imipenem, erythromycin, and doxycycline, with Letter* 1992;1:297-303.
8. Ahmed AJ, Ali ST, Weinbaum D, Goldberg E. *Streptomyces* infection at study appeared to have very favorable MICs as well. We used AIDS presenting with pneumonia and monoarthritis. *Infect Dis Clin Pract* 1996;5:207-8.

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