

## Streptomyces septicaemia in a neonate

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**Abstract:** Streptomyces species has been commonly reported as a cause of mycetoma. Invasive streptomyces infections are rare. We report a case of late onset neonatal septicemia caused by Streptomyces annulatus in a home delivered baby, which was identified based on morphology and biochemical characteristics. Invasive streptomyces infections may be more common than these isolated case reports.

**Key words:** Streptomyces, mycetoma, neonatal septicemia.

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**INTRODUCTION:** Members of the genus Streptomyces are aerobic actinomycetes known for the production of antibiotics used to treat bacterial, mycobacterial, fungal, and parasitic infections. Streptomyces species can also cause human disease. Mycetoma, a chronic suppurative infection of the skin and underlying soft tissue, is the most common presentation of streptomyces infection; visceral infections with these organisms appear to be rare<sup>1</sup>. We report a case of late onset neonatal septicemia caused by Streptomyces annulatus.

**CASE REPORT:** A male baby of 22 days old presented with cough, fever, increased respiratory rate, since 3 days. He was not feeding well and had increased lethargy. Maternal history was not significant i.e. no history of febrile illness, foul smelling liquor or premature rupture of membrane. Baby was full term, delivered vaginally at home, cried immediately after birth. On examination baby was lethargic. Respiratory rate was 90/min with intercostal and subcostal indrawing and pulse rate was 140/min. He had perioral cyanosis, grunting and sclerema. On examination of respiratory system air entry was decreased on both sides, with bilateral crepitations. Abdominal examination revealed 4 cm palpable liver. Baby was diagnosed as 'Pneumonia with late onset neonatal septicemia with respiratory distress.'

On investigation WBC count was 8800/mm<sup>3</sup> with 20% band cells. C-reactive protein (CRP) test was positive. Chest radiograph showed nodular opacities in both lungs. USG thorax confirmed bilateral consolidation.

**Microbiological investigations:** Blood culture revealed large, circular, chalky white colonies on blood agar (fig. 1) and non lactose fermenting colonies on MaConkey agar. Gram staining of colonies from blood agar showed long, slender, filamentous gram positive nonsporing bacilli without fragmentation (fig.2). Partial acid fast stain was negative. The isolate was sensitive to lysozyme (fig. 3). Tests for hydrolysis of xanthine, tyrosine, and casein (fig.4) were positive. Lung specimen could not be obtained for culture as consent was not given for autopsy. The isolate was identified as Streptomyces annulatus.



Fig. 1 large, circular, chalky white colonies on blood agar



Fig.2 Gram staining showing long, slender, filamentous gram positive nonsporing bacilli without fragmentation



Fig. 3 showing sensitivity to lysozyme

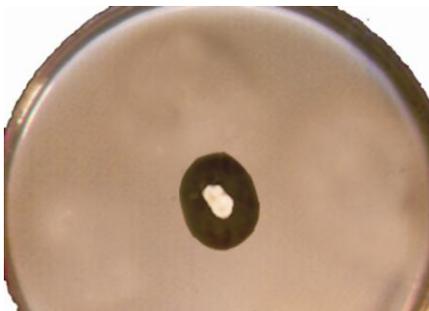


Fig. 4 showing casein hydrolysis

Baby received treatment in the form of vancomycin, meropenem, and amikacin. However, baby's general condition deteriorated clinically and died within 2 days of admission.

**DISCUSSION:** The aerobic actinomycetes, including Streptomyces and Nocardia species, are bacteria that belong in the order Actinomycetales. Species of the genus Streptomyces are characterized by formation of extensive, branched aerial hyphae with long chains of conidia and the cell-wall peptidoglycan L-diaminopimelic acid.<sup>2</sup>

Nocardia and Streptomyces are dry to chalky in consistency, usually heaped or folded, Nocardia spp. are commonly shade of yellow, Rhodococcus equi are pink or salmon color whereas Streptomyces spp. are frequently gray-white.<sup>2</sup> We got large, circular, chalky white colonies on blood agar.

Nocardia and Streptomyces are slender long gram positive filaments, whereas Rhodococcus are short gram positive bacilli with chinese letter clustering.<sup>2</sup> Nocardia and Rhodococcus spp. are partially acid fast, in contrast Streptomyces spp. are not.<sup>2</sup> All Nocardia spp. are resistant to lysozyme, whereas almost all Streptomyces spp. are susceptible.<sup>3</sup>

Various aerobic actinomycetes can be differentiated by their differential ability to hydrolyse casein, xanthine & hypoxanthine. Two common species of Streptomyces with clinical significance S. somaliensis and S. annulatus can be differentiated on the basis of xanthine hydrolysis.<sup>2</sup> Casein and xanthine hydrolysis tests were positive in our isolate. The organism was identified as Streptomyces annulatus on the basis of morphology; negative partial acid-fast staining; sensitivity to lysozyme; and hydrolysis of xanthine, and casein.<sup>2</sup>

Streptomyces isolate was considered as the primary pathogen because it was isolated in pure form from blood. In a review aerobic actinomycetes by McNeil et al<sup>4</sup> it was found that, of 366 isolates received during the 29-month study period, S. annulatus (7.7%) was the third most isolated species after N. asteroides and A. madurae. Mishra and coworkers<sup>5</sup> studied 110 clinical isolates of Streptomyces species from humans and animals. The majority of their isolates were identified as either S. annulatus (53%) or S. somaliensis (25%). They also found that S. annulatus was the third best represented species, after N. asteroides and N. brasiliensis, among strains isolated from patients.

The present case is rare, as only four other cases of streptomyces pneumonia have been reported.<sup>1,6,7,8</sup> It clearly illustrates the potential of Streptomyces species to cause invasive infection. Mycetoma is the most common clinical presentation of streptomyces

infection, and *S. somaliensis* has been identified as one of the principal etiologic agents of actinomycetoma in South America, Africa, India, Mexico, Malaysia, and the United States<sup>9,10</sup> There have been only a few reports of *Streptomyces* species causing infection other than mycetoma.<sup>1</sup> *Streptomyces* species have been described as the cause of brain abscess (*S. annulatus*), abdominal abscess with peritonitis (*S. somaliensis*), septicemia and primary lung involvement, chronic pericarditis and endocarditis. The present case illustrates the potential of *Streptomyces* spp. to cause invasive infection.

**CONCLUSION:** Invasive streptomyces infections may be much more common than the published isolated case reports. Though *Streptomyces* species are not commonly recovered from clinical specimens, this organism can cause invasive infections, especially in immunocompromised host.

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