

Secondary Bloodstream Infection caused by *Streptococcus pneumoniae* Primary Source either from Respiratory Pneumonia or Pneumococcosuria: A Case Report

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ABSTRACT

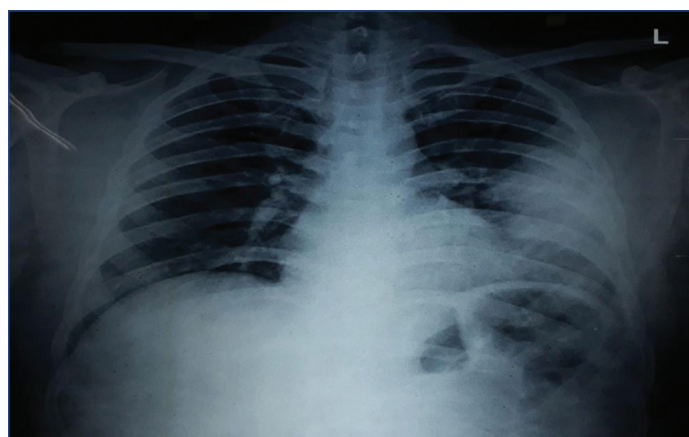
Streptococcus pneumoniae (*S. pneumoniae*) is one of the bacterial aetiologic agent in otitis media, Community Acquired Pneumonia (CAP), meningitis and septicaemia. Bacteriuria is the isolation of the microorganisms as $\geq 10^5$ Colony-Forming Unit (CFU)/mL in association with clinical signs of Urinary Tract Infections (UTIs) and urinalysis. However, the isolation of *S. pneumoniae* in urine specimen is a rare event as it can only survive in environment for several hours in pH between 5 to 6 has short duration between collection of the urine sample and culture, and due to immune clearance mechanism. The primary source of infection originates from distant sites such as respiratory tract. The predisposing factors include immunosuppression and asplenia leads to UTI. The literature details showing lack of information regarding *S. pneumoniae* as a cause of UTI. Present case report describes *S. pneumoniae* isolate in the blood and sputum specimen from 53-year-old male presented with fever, shortness of breath, cough with chest pain and mild clinical symptoms of UTI.

Keywords: Community acquired pneumonia, Pyelonephritis, Urinary tract infection

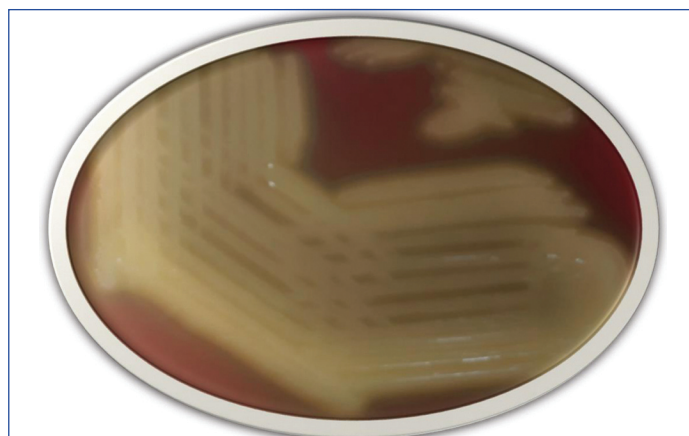
CASE REPORT

A 53-year-old male was presented in Medicine Department with fever, shortness of breath, vomiting and loose stools and cough with chest pain for four days. Fever was progressive in nature and intermittent. He was a known case of CAP and left acute uncomplicated pyelonephritis followed by secondary Bloodstream Infection (BSI). The patient had past history of typhoid fever six months back. On examination the patient was conscious, oriented and febrile. His temperature was 39°C. There was no pallor, jaundice, cyanosis, clubbing and pretibial oedema. He had a pulse rate of 100 bpm, blood pressure of 110/60 mm of Hg, oxygen saturation at 95% on room atmosphere. On chest examination there were coarse crackle on left middle lobe, increased vocal resonance on auscultation and dullness on percussion. A chest X-ray taken, shows left middle lobe consolidation [Table/Fig-1]. Cardiovascular, abdominal and central nervous system examinations were normal. Complete Blood Count (CBC) showed a raised leukocytosis (26,800/mm³). Ultrasound revealed mild left renal upper pole calyx dilatation. The urine microscopy findings showed leucocyturia (50 White Blood Cells (WBC)/High Power Field (HPF)). Sputum sample was cultured on 5% blood agar and *Streptococcus pneumoniae* was observed. Blood sample was sent for culture on 5% sheep blood agar and chocolate agar plate which showed alpha haemolytic colonies of *S. pneumoniae* with greenish discoloration and bleaching effect, respectively [Table/Fig-2].

Urine sample showed no growth in culture. Further on biochemical analysis, *S. pneumoniae* showed optochin sensitivity, bile solubility and ferment inulin sugars. Antibiotic susceptibility test was done which showed that the isolated organism was sensitive to oxacillin, ceftriaxone, azithromycin, erythromycin, clindamycin, cotrimoxazole. In addition, ceftriaxone E-strip test was performed in Mueller Hinton Blood Agar (MHBA) plate to determine minimum inhibitory concentration and was sensitive (0.32 µg/mL) to *S. pneumoniae*. The patient was initially treated symptomatically and with intravenous injection amoxiclav for three days. After blood culture report obtained, treatment was shifted to intravenous ceftriaxone for 10 days. Blood



[Table/Fig-1]: Chest X-ray showing left middle lobe consolidation.



[Table/Fig-2]: Sheep Blood Agar (SBA) showing alpha haemolytic colonies with greenish discoloration.

sample was taken after complete antibiotic course and came out sterile. The urine analysis did not show any findings. His symptoms improved markedly, and being discharged in stable condition. He recovered with no recurrence on further follow-up.

DISCUSSION

This is an unusual case as the focus of infection was distant from either the respiratory tract or urinary tract system are the primary site causing secondary BSI by *S. pneumoniae*. The presence of bacteria, leukocytes in urine and the clinical signs and symptoms of UTI indicated a potential agent of the infection. The pathogenesis of pneumococcal infection in urine is not well understood but due to the innate immune system mechanism of the urinary tract it is difficult for *S. pneumoniae* to cause infection [1]. In this case, although UTI symptoms were present, culture did not grow this organism. Basically, *S. pneumoniae* isolated from the urinary tract as the focus from the respiratory tract [2]. Immunocompetent patient with pneumonia and bacteriuria caused by *S. pneumoniae* also had multiple soft tissue abscess [3]. The cause of BSI in presented patient from the focus of infection in respiratory tract was due to the absence of *S. pneumoniae* in urine culture. BSI frequency is secondary to skin and soft tissue infection followed by UTI and Lower Respiratory Tract Infection (LRTI) [4]. A 10-year study by Javaloyas M et al., at a Spanish hospital found that the UTI, followed by LRTI is the most frequent cause for BSI [5]. A study by Lubarsky D, in three-year-old child who presented with a pyelonephritis, fever, leukocytosis, elevated C-reactive protein and procalcitonin, tenderness at costovertebral angle, painful micturition showed positive blood culture but urine culture did not yield the isolate same. Considering, *S. pneumoniae* as a possible aetiological agent for UTIs contributing to the urosepsis [6].

In this case, patient presented with a fever, pyelonephritis, leukocytosis, leukocyturia may be due to *S. pneumoniae* a possible cause of UTIs, especially if the patient has a septicaemia picture but urine culture was negative. In addition patient also had clinical signs and symptoms like breathlessness, productive cough suggestive of pneumonia caused by *S. pneumoniae* with sputum culture being positive. According to this case study, secondary BSI is probably due to primary source from lung infection rather than UTI. Evidence suggestive of organism isolated in sputum culture and urine culture did not grow this organism. However, it is rare to isolate *S. pneumoniae* from urine sample because of several contributing factors. Prevention of pneumococcal infections by antibiotics and vaccinations are essential to reduce the bacterial load. However, antibiotics misuse can lead bacteria to become resistant. Recently, resistant penicillin strains spreading worldwide and also being resistant to erythromycin, tetracycline and chloramphenicol. This antibiotic resistance increases the number of physician and hospital visits. Vaccines development reduces the necessity for antibiotics and protection prior to infection. At present two types of vaccines are available: Pneumococcal Polysaccharide Vaccine 23 (PPSV23) and the Pneumococcal Conjugate Vaccine (PCV). The elder patient, infants and young children may recover from CAP, but has the high chance of developing recurrence of the disease. *S. pneumoniae* may also cause bacteraemia, the most common complication. *S. pneumoniae* causing pneumonia and other pneumococcal infections are invasive if the bacterium is related

to BSI. Elderly patients are at high-risk for complication, therefore early diagnostics, treatments and vaccinations for this age group is important [7]. Empiric treatment for CAP require ward admission can be started either a β -lactam and macrolide antibiotics or only with respiratory fluoroquinolone. High-risk patients require Intensive Care Unit (ICU) admission can be treated with a β -lactam and macrolide or fluoroquinolone. Pneumococcal pneumonia with bacteraemia should be treated with penicillin G or ampicillin in susceptible strains. Penicillin resistant strains should be treated with cefotaxime, ceftriaxone, fluoroquinolone after invitro antimicrobial susceptibility testing [8]. Pneumococcal vaccines recommended for adults a) 65 years and older b) 19 to 64-year-old with medical illness or risk factors should receive PCV15 followed by PPSV23 or PCV20 [9]. The main source of bacteraemia was the LRTI in 46 (68.6%) patients in a study from Spain [10]. Therefore, healthcare workers should have awareness about the pneumococcal infection in order to recommend the use of the vaccine in susceptible patients in the general population [10].

CONCLUSION(S)

In this case, patient presented with a CAP, secondary BSI and UTI which led to pyelonephritis most probably caused by *S. pneumoniae*. Vaccination against pneumococcal infection significantly reduced the pneumococcal pneumonia incidence rate in elderly patients. Vaccination can be difficult because one need to target the large population which is aged 60 years and above. All elderly individuals must be vaccinated to this common fatal disease thereby preventing the complications. Physicians should be aware of this bacterium as cause for several infections in susceptible patients.

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