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Rhizobium radiobacter induced sepsis - an unusual presentation in post COVID patient
A case report

Eshutosh Chandra[1], Prachi Saxena[2*], Sanjay Sahay[3]
[1]*MBBS, Post graduate student, Department of Respiratory Medicine, Santosh Medical College and Hospital*
[2]*DNB, Assistant professor, Department of Respiratory Medicine, Santosh medical college and Hospital*
[3]*MD, DIH, professor and Head, Department of Respiratory Medicine, Santosh medical college and Hospital*

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ABSTRACT
Rationale: Rhizobium radiobacter(formally, Agrobacterium tumefaciens), is a gram-negative bacteria present in plant and soil. There have been few cases reported sporadically which were caused by R radiobacter in immunocompromised patients. However, septic shock due to R radiobacter is exceedingly rare.
Patient concerns: Here, we report a post covid elderly patient having co morbidities with altered sensorium and shortness of breath and rapid progression to septic shock. Blood result showed raised total leukocyte counts and CRP along with hypoxia and increased lactate in arterial blood gas analysis. Blood culture showed gram negative bacteria which was later confirmed as R radiobacter.
Diagnosis: septic shock due to R radiobacter in post covid elderly patient.
Intervention: patient was given intravenous Meropenem and Tigecycline.
Conclusion: R radiobacter may be considered as of potential micro-organism that may lead to severe sepsis in immunocompromised patient associated with several comorbidities.
Abbreviations:R. radiobacter = Rhizobium radiobacter
Keywords: Post covid, Rhizobium radiobacter, infection, sepsis

I. INTRODUCTION

Rhizobium radiobacter is also known as Agrobacterium tumefaciens previously. It is an aerobic, gram negative, motile, rod-shaped bacterium with one to six flagella. It is about 1.5-3.0 x 6.0-1.0 µm in size and causes the formation of galls on plant hosts[1]. R radiobacter infection in humans is exceedingly rare [2,3]. Sporadic cases of R radiobacter infection have been reported in immunocompromised hosts and those with indwelling catheters. Symptoms are caused by the insertion of a small segment of DNA (also known as T- DNA) from plasmid into the plant cell, which is incorporated at a semi-random location into the plant genome [4]. Here we present a case of R radiobacter infection in an elderly female with post covid status with several co-morbidities. The patient rapidly progressed to septic shock and eventually died on 18th day of re- admission.

II. CASE REPORT

A 69-year-old diabetic, hypertensive female was brought to emergency department of Santosh Medical college andHospital Ghaziabad with complaints of fever on and off since 10 days, cough with sputum since 8 days, breathlessness since 4-5 days and chest heaviness since 3-4 days with known history of COPD. Patient was admitted and her chest x-ray showed heterogenous patchy opacities in bilateral lung fields. RT-PCR for covid-19 was done which came to be positive. Meanwhile, patient was given oxygen support, antibiotics, IV fluids, systemic steroids, Remdesivir, blood plasma, nebulization with salbutamol and budesonide. D-dimer was raised with 14200 TLC and 25 CRP. Enoxaparin was started. Course during hospital stay remained uneventful and patient condition improved. Repeat RT-PCR after 16 days was negative. Patient was stable hemodynamically clinically hence was discharged. Two days after discharge patient was again brought to ED in altered sensorium and with shortness of breath since 10 hours. Patient was admitted with vitals BP- 92/57mmHg, PR- 126 bpm, temperature- 101 F, RR- 30/m. Arterial blood gas analysis was done which showed pH- 7.44, Pco2 – 35.1, PO2 – 60, SO2- 92%. Blood was sent for investigation which showed raised TLC – 23420, CRP- 7.56. IV fluids resuscitation was done, antibiotics, antipyretics were given. Urine was sent next day for routine and microscopy which revealed 15-20 pus cells, 80-100 RBCs, 3-5

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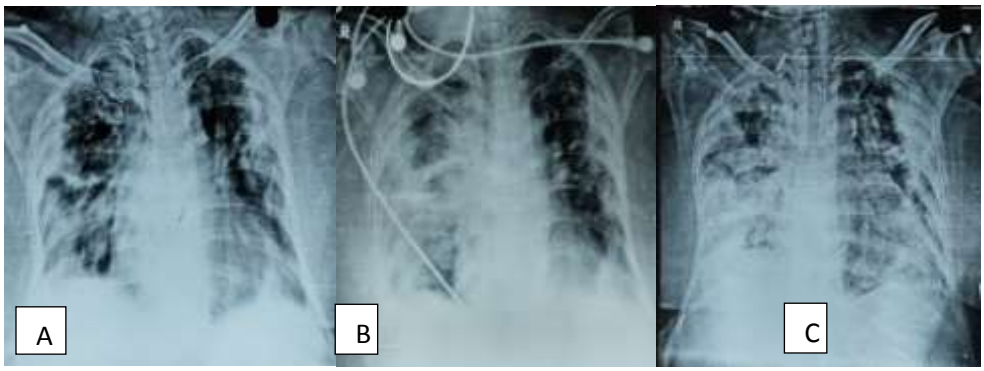
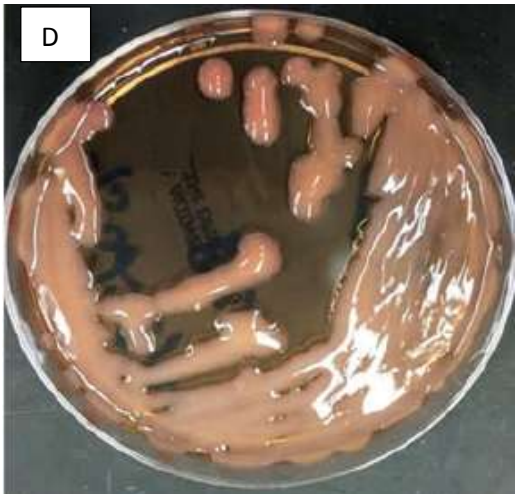
epithelial cell and albuminuria. Patient had continuous fever inspite of broad spectrum antibiotics. A diagnosis of septic shock was established. Patient's condition showed no improvement. Blood was sent for culture and sensitivity. Aerobic blood sample showed gram negative bacteria the next day after incubation. Bacteria was transferred on to a MacConkey agar plate and cultured in a 5% CO2 incubator. The isolate was Rhizobium radiobacter by VITEK-2. Antibiotics were started as per the sensitivity. Patient rapidly progressed to ARDS and septic shock and AKI. On 8th day, patient had cardio-pulmonary arrest, CPR and inotropic drugs were given according to ACLS guidelines, but patient could not be revived and declared dead after ECG showed flat wave lines.



Picture A, B,C: Serial chest x-rays showing right lung pneumonia progressing rapidly to ARDS



Picture D: MacConkey agar Tenacious colonies of Rhizobium radiobacter in isolates from blood specimens from our patient. We identified the isolate recovered from our patient was identified as R. radiobacter based on colony morphologic characteristics, motility, Gram staining characteristics, biochemical profile

III. DISCUSSION

The genus Rhizobium (formerly Agrobacterium) includes pathogens of plants and agriculture soil, which are usually associated with plant tumorigenic diseases. [5] Several species of Rhizobium have been identified so far; these include, R radiobacter, R rhizogenes, R rubi, R undicola, and R vitis. Among these, R radiobacter is the most commonly reported opportunistic pathogen in humans.[6] Infection caused by R radiobacter is typically community acquired and affects immunodeficient or chronically debilitated hosts with underlying conditions such as human immunodeficiency virus (HIV) infection, malignancies, bone marrow transplant recipients, chronic renal failure with dialysis, diabetes, and those receiving corticosteroid therapies.[2,7,8] In this case, the patient was of old age and had multiple underlying co-morbidities such as hypertension, diabetes and COPD.

R radiobacter infection in humans have included urinary tract infection, and rarely

bacteremia, endocarditis, endophthalmitis, peritonitis, brain abscess, pneumonia, and spondylodiscitis. [8–12] Catheter- or plastic surgery-related R radiobacter infection has been the most commonly reported presentation. [2,3,7,13] In early summaries of R radiobacter infection, the majority (77%) were directly associated with foreign bodies. [2,14]

R radiobacter has been reported as a potential pathogen in pediatric patients because of the underdeveloped immune system. The reported frequency of R radiobacter infection in pediatric patients with in-dwelling catheter is approximately 2.56%. [15]

However, due to the low incidence, there has been no large-scale epidemiological investigation of the incidence of R radiobacter in adults; the published literature largely pertains to sporadic case reports. In our patient, probable cause was multifactorial like catheterization, CVP line and long-term use of systemic steroids. The condition rapidly progressed to septic shock. Of note, no mortality has been attributed directly to R radiobacter infection in previously reported cases. [2,13].

R radiobacter infection may be potentially fatal, especially in elderly patients with multiple comorbidities. [16] The optimal antibiotic treatment for R radiobacter infection has not been determined due to its low incidence. Our antimicrobial susceptibility results showed thatR radiobacter was sensitive to third generation cephalosporins, carbapenems, fluroquinolones, aminoglycosides and tigecycline. Hence, we selected meropenem and tigecycline as the initial empirical therapy. Previous studies showed that R radiobacter may be resistant to aminoglycosides, including gentamicin. [2,17]. But in our case, it was sensitive to aminoglycosides. In this case, the duration of treatment wasapproximately 1 week. In previous studies, blood culture become sterile in 2-3 weeks course of antibiotics to which it was sensitive but, in our case, patient did not recover due to presence of other co-morbidities.

IV. CONCLUSION

R radiobacter is an opportunistic Gram-negative organism that affects mainly immunocompromised patients and children, especially those with in-dwelling catheters or plastic implants. However, it may occur in elderly patients with several comorbidities.Rradiobacter is sensitive to third generation cefoperazone/sulbactam, carbapenems and fluroquinolones. Although, in previous studies it showed resistance to aminoglycosides but in our case, it was sensitive to it. Although it typically exhibits low virulence, it may cause septic shock and may be potentially fatal in the absence of prompt treatment.

Early and accurate detection can help take timely decision for directed antibiotic therapy.

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