

Bacteremia Due to *Serratia Rubidaea* in ICU: Case Series

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1. Abstract

Bacteremia due to *S. Rubidaea* is rarely described comparing with other species of Enterobacteriaceae. It interests immunocompromised patients undergoing invasive procedures. Herein, we report four cases of bacteraemia due to this pathogen in patients admitted in ICU for ketoacidosis with history of diabetes mellitus. Commonly, a catheter-related infection complicated with deep vein thrombosis was present. Catheter site was femoral in all four cases. All patients were female. Commonly, a poorly-tolerated fever was the main clinical manifestation. The pathogen was isolated in several peripheral blood cultures (>4) for the same patient with the same profile in all four cases.

2. Introduction

Serratia Rubidaea is a gram-negative bacterium belonging to the Enterobacteriaceae species. It is known as a zoonotic bacterium, mostly found in the environment: water, soil and vegetables [1]. It causes sporadic nosocomial infections comparing with the other species of Enterobacteriaceae [2-3].

It interests immunocompromised patients, undergoing invasive procedures, or receiving prolonged broad-spectrum antibiotics [4]. When identified in clinical specimens, *S. Rubidaea* is largely isolated from respiratory tract samples, skin wounds and bile. Its identification in blood samples is rarely described [5].

Herein, we report four cases of *S. Rubidaea* bacteremia in critical patients that we will try to identify the common factors to better support the occurrence of this rare healthcare infection.

3. Case Reports

3.1. Case 1:

Female, 21 years old, with a history of diabetes mellitus and hyperthyroidism admitted in ICU for diabetic ketoacidosis requiring intravenous insulin therapy via a left femoral catheter. During her hospital stay, the patient presented an ST elevated myocardial infarction. Coronary angiography showed no stenosis. Additional cardiac MRI revealed an acute oedematous myocarditis in the context of cardiomyopathy. Five days after admission, the patient presented a persistent fever at 40°C with clinical intolerance: chills, tachycardia. A C-TAP scan was performed revealing the presence of a left deep vein thrombosis extended to the common femoral vein without other cause explaining the fever. Curative anticoagulation with empiric broad spectrum antibiotic therapy was started. Bacteriological investigation revealed the presence of *Serratia Rubidaea* in eight consecutive peripheral blood cultures related to the catheter infection. Indeed, the catheter tip culture isolated the same pathogen having the same antimicrobial susceptibility (Figure 1). Targeted treatment combined Ciprofloxacin 400mg/bid with trimethoprim-Sulfamethoxazole 400/80mg/tid. The outcome was favourable and the patient was discharged 26 days after admission.

3.2. Case 2:

Female, 66 years old, with a history of hypertension, diabetes mellitus, chronic kidney disease and dyslipidemia admitted in ICU for diabetic ketoacidosis due to urinary tract infection. Intravenous insulin therapy via a left femoral catheter was initiated in addition to antibiotic therapy including cefotaxime 6g/d and ofloxacin 200mg/

bid. Doppler echography revealed a thrombosis of the external and internal iliac vein extended to the common left femoral vein. Curative anticoagulation was started. Eight days after her admission in ICU, the patient presented a persistent poorly-tolerated fever. Investigations showed a carbapenem-resistant klebsiella pneumoniae in a catheter-tip culture. Antibiotic therapy was escalated switched to Imipenem, colistin and tigecycline considering a catheter-related infection. Further investigations showed the presence of Serratia Rubidaea in four consecutive peripheral blood cultures (Figure 1). Targeted treatment combined Ciprofloxacin 400mg/bid with trimethoprim-Sulfamethoxazole 400/80mg/tid. After 72 hours of this combined therapy, trimethoprim-Sulfamethoxazole was stopped because of an acute kidney injury requiring haemodialysis and deep pancytopenia. The patient presented a refractory septic shock with a multi-systemic-organ failure and died 21 days after her admission in ICU.

3.3. Case 3:

Female, 21 years old, with a history of diabetes mellitus admitted in ICU for diabetic ketoacidosis due to poor compliance with insulin therapy. Intravenous insulin therapy via right femoral catheter was initiated. 3 days after admission; the patient presented a poorly-tolerated fever at 40 degrees with chills and tachycardia. Bacteriological samples (Peripheral blood culture, urine and endotracheal samples) were carried on and the catheter has been removed. A C-TAP scan was performed revealing the presence of a right deep vein thrombosis extended to the common femoral vein associated to a pulmonary embolism. A broad-spectrum antibiotic ther-

apy was initiated in addition to curative anticoagulation. Bacteriological investigation revealed the presence of Serratia Rubidaea in four peripheral blood cultures in addition to its isolation presence in a catheter tip culture (figure 1). Targeted treatment combined Ciprofloxacin 400mg/bid with trimethoprim-Sulfamethoxazole 400/80mg/tid considering a catheter-related infection with deep thrombosis and bacteremia. Trimethoprim-Sulfamethoxazole was stopped after 3 days in the presence of thrombopenia. The outcome was favourable and the patient was discharged 10 days after admission.

3.4. Case 4:

Female, 27 years old, with history of diabetes mellitus, gastro-duodenal ulcer, admitted in ICU for diabetic ketoacidosis due to viral infection. The patient received insulin therapy via a femoral catheter in addition to standard treatment. Three days after admission, she presented fever at 40 degrees with sepsis. C-TAP scan showed a bilateral extended venous thrombosis from the femoral common vein to the primitive iliac vein. Curative anticoagulation was started with empiric broad spectrum antibiotics. Bacterial investigations showed Serratia Rubidaea in five peripheral blood cultures besides the catheter tip culture to the same bacteria (Figure 1). Targeted treatment combined Ciprofloxacin 400mg/bid with trimethoprim-Sulfamethoxazole 400/80mg/tid. Mechanical ventilation was required because of a respiratory distress. The issue was fatal with the occurrence of a sudden cardiac arrest (pulmonary embolism was highly suspected).

Hemoculture

NUMERO D'ORDRE..... 1558/70/72
 TYPE D'HEMOCULTURE
 CULTURE..... POSITIVE

* GERME : Serratia Serratia rubidaea

ANTIBIOGRAMME

Antibiotiques	Résultat
AMOXICILLINE	RESISTANT
AMOXICILLINE/AC. CLAVULANIQUE	RESISTANT
CEFTAZIDIME	SENSIBLE
CEFOTAXIME	SENSIBLE
IMIPENEME	SENSIBLE
LEVOFLOXACINE	SENSIBLE
PIPERACILLINE (30ug-SWEDISH)	SENSIBLE
TRIMETHOPRIME/SULFAMIDES	SENSIBLE
TICARCILLINE	SENSIBLE

Figure 1: Profile of Serratia Rubidaea isolated in blood cultures and catheter tips for the four studied cases

4. Discussion

The study presents four cases of bacteraemia due to *Serratia Rubidaea*. Commonly, a catheter-related infection with deep vein thrombosis in the same site was present. This site was femoral in all four cases. All studied cases were admitted in ICU for diabetic ketoacidosis with history of diabetes mellitus. All cases were female. Commonly, a poorly-tolerated fever was the main clinical manifestation. The pathogen was isolated in several peripheral blood cultures (>4) for the same patient with the same profile in all four cases.

S. Rubidaea, a red-pigmented, rod-shaped bacterium was stated by Stapp in 1940 as *Bacterium Rubidaeum* and reassigned as *Serratia Species* in 1973 [6]. *S. marcescens* and *S. liquefaciens* are the commonest causes of infections due to *Serratia*. *Serratia*-related infections caused by *S. Rubidaea* are not common. It is an opportunist pathogen rarely identified in man [5]. In a study aiming to evaluate the Gram-negative microbiota of healthy equine oral cavities and their antimicrobial susceptibilities, two multi-drug resistant strains of *S. Rubidaea* were found in the mouth of two out of eight healthy horses. All strains were resistant to macrolides; aminoglycosides as well to carbapenems [1]. *S. Rubidaea* was isolated from food in Italy on 2018. Chicken wurstel had developed an atypical fuchsia pink color a few minutes after the package was opened by the consumer. Culture revealed the presence of *S. Rubidaea* [7]. Commonly, this pathogen is found in soil, water or food with potential for transmission to humans [8].

S. Rubidaea is rarely isolated from clinical specimens, but clinical significance cannot be totally excluded [8]. *S. Rubidaea* is naturally resistant to Penicillin G, oxacillin, cefazolin, cefuroxime, macrolides, lincosamides, streptogramins, glycopeptides, fusidic acid and rifampicine. It is naturally sensitive to several aminoglycosides, piperacillin, piperacillin/Tazobactam, carbapenems, some cephalosporins, fluoroquinolones and folate-pathway inhibitors [9]. This pathogen developed many mechanisms of antibiotic resistance: multidrug efflux system affecting quinolones and enzymatic system “betalactamas” affecting betalactams [9]. The strain isolated in our four cases was only sensitive to quinolones, aminoglycosides and folate-pathway inhibitors.

This pathogen interested debilitated patients undergoing surgeries or other invasive procedures such as urinary tract catheterization [10]. It occurs in patients receiving broad-spectrum antibiotics [11]. This pathogen was isolated from the bile and blood of a patient with a bile tract carcinoma obstructing the common bile duct and who underwent invasive procedures [12]. The infection was cleared after adequate treatment with ceftriaxone (1g/12h) and tobramycin (100mg /8h) [12]. Moreover, the case of a 44-year-old

woman who was treated for methicillin-resistant *Staphylococcus aureus* causing abdominal wall cellulitis was reported. Incision/drainage and intravenous daptomycin delivered via a midline catheter was reported. The patient presented 5 days later with abdominal pain and fever. A chest x-ray demonstrated a new right upper lobe infiltrate, and the blood culture grew *S. Rubidaea*. The midline catheter was removed, and the patient was successfully treated with intravenous ceftazidime with clinical and bacteriological resolution [13]. Common points with our patients were: Female gender, young age and invasive procedures. Furthermore, Okada T and al reported the case of a 48-year-old male who had a past history of alcoholic pancreatitis and diabetes mellitus. He was admitted to hospital due to chills and vomiting. His body temperature was 38.0 degrees C, and he had consciousness disturbance, tachypnea, tachycardia and hepatomegaly. Laboratory findings showed highly inflammatory reaction and hepatorenal dysfunction. Abdominal computed tomography revealed multiple liver abscesses with portal vein thrombus. *S. rubidaea* was detected in the blood culture. Sulbactam/Cefoperazone and Tobramycin were administered with favourable outcome [14]. Common points with our four cases were: Diabetes mellitus, clinical intolerance of fever and presence of deep vein thrombosis.

SB Mossad reported the first case of *S. Liquefaciens* intravascular catheter -related suppurative thrombophlebitis and native valve endocarditis; He was a 55-year-old man who had developed short gut syndrome as a complication

of chronic pancreatitis. He had been dependent on parenteral nutrition for the preceding 6 months. He presented with fever, and pain in the right side of the neck, along the tunnel of the indwelling intravenous central catheter. Four blood cultures grew *S. liquefaciens* within 48 h of inoculation. Ultrasound revealed an occlusive clot in the right internal jugular vein surrounding the central venous catheter. Echocardiography showed a mobile thrombus originating in the superior vena cava [15]. There were no cases reported of central catheter-related infections complicated or not with deep vein thrombosis due to *S. Rubidaea*.

Differently, another case was reported presenting thoracic empyema caused by *S. Rubidaea* which is isolated from the pleural fluid of an immunocompetent patient [16].

5. Conclusion

We concluded that the most cases reported had common risk factors: All studied cases were admitted in ICU for diabetic ketoacidosis with history of diabetes mellitus. A poorly-tolerated fever was the main clinical manifestation and invasive procedures: femoral venous catheter, mainly when it complicated with vein thrombosis was found in our four cases.

References

1. da Costa Pimenta J, Saavedra MJ, da Silva GJ, Cotovio M. Multidrug-resistant *Serratia rubidaea* strains in the oral microbiota of healthy horses. *Open Vet J.* 2021; 11(4): 598-602.
2. Bonnin RA, Girlich D, Imanci D, Dortet L, Naas T. Draft Genome Sequence of the *Serratia rubidaea* CIP 103234T Reference Strain, a Human-Opportunistic Pathogen. *Genome Announc.* 2015; 3(6): e01340-15.
3. Gentile D, Pérez M, Centelles MJ. Bacteremia by a *Serratia rubidaea* with an atypical quinolones resistance phenotype. *Rev Chilena Infectol.* 2014; 31(3): 351-2.
4. Litterio ML, Arazi S, Hernández C, Lopardo H. Isolation of *Serratia rubidaea* from a mixed infection after a horse bite. *Rev Argent Microbiol.* 2012; 44(4): 272-4.
5. Karkey A, Joshi N, Chalise S, Joshi S, Shrestha S, Thi Nguyen TN, et al. Outbreaks of *Serratia marcescens* and *Serratia rubidaea* bacteremia in a central Kathmandu hospital following the 2015 earthquakes. *Trans R Soc Trop Med Hyg.* 2018; 112(10): 467-72.
6. Mahlen SD. *Serratia* infections: from military experiments to current practice. *Clin Microbiol Rev.* 2011; 24(4): 755-91.
7. Chiaverini A, Di Domenico M, Del Matto I, Rossi F, Centorotola G, Cornacchia A, et al. Draft Genome Sequence of *Serratia rubidaea*, a Potential Opportunistic Pathogen Isolated from Food in Italy. *Microbiol Resour Announc.* 2021; 10(30): e0070721.
8. Karnaker VK, Ashraf AA, Veetil SS, Chand B, Nair S, Varma SR. A rare occurrence of *Serratia rubidaea* in a patient with ear discharge. *J Infect Public Health.* 2023; 16(1): 1-3.
9. Stock I, Burak S, Sherwood KJ, Gruger T, Wiedemann B. Natural antimicrobial susceptibilities of strains of 'unusual' *Serratia* species: *S. ficaria*, *S. fonticola*, *S. odorifera*, *S. plymuthica* and *S. rubidaea*. *J Antimicrob Chemother.* 2003; 51(4): 865-85.
10. Yao X, Sun Q, Liu W, Yin X, Pei G, Wang Y, et al. Complete Genome Sequence of *Serratia rubidaea* Isolated in China. *Genome Announc.* 2016; 4(2): e00283-16.
11. Chmel H. *Serratia odorifera* biogroup 1 causing an invasive human infection. *J Clin Microbiol.* 1988; 26(6): 1244-5.
12. Ursua PR, Unzaga MJ, Melero P, Iturburu I, Ezpeleta C, Cisterna R. *Serratia rubidaea* as an invasive pathogen. *J Clin Microbiol.* 1996; 34(1): 216-7.
13. *Serratia rubidaea* as a Rare Cause of Gram-Negative Bacteremia. *Infectious Diseases in Clinical Practice [Internet].* 2023.
14. Okada T, Yokota E, Matsumoto I. Community acquired sepsis by *Serratia rubidaea*. *Kansenshogaku Zasshi.* 2002; 76(2): 109-12.
15. Mossad SB. The world's first case of *Serratia liquefaciens* intravascular catheter-related suppurative thrombophlebitis and native valve endocarditis. *Clin Microbiol Infect.* 2000; 6(10): 559-60.
16. Uzunoğlu E, Sahin AM, Celik A, Tosun A. A Case of thoracic empyema secondary to *Serratia rubidaea*. *Middle Black Sea Journal of Health Science.* 2017; 3(2): 31-35