IUG Journal of Natural Studies
Peer-reviewed Journal of Islamic University-Gaza

ISSN 2790-1653

IUGNS
Vol 32, No 01, 2024, pp 01-05

Case report Serratia ficaria isolated from septicemia patient

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https://doi.org/10.33976/IUGNS.32.1/2024/1

Abstract

We report a case of *Serratia ficaria* induced septicemia in a 1.5 month-age old male. The patient admitted to Al Nasr pediatric hospital in Gaza strip. His clinical history included febrile reaction with no vomiting, diarrhea, skin rash, or convulsions. Urine and blood culture was performed. Microbiological data showed negative urine culture and positive blood culture for a Gram-negative bacilli bacterium. The isolate was sent to the Communicable Diseases Surveillance Center (CDSC) at the Islamic University of Gaza and identified as *S. ficaria*. This microbe is a part of the fig tree's close environment. It is rare to be recovered as a causative agent of infection from clinical samples. Once it is discovered as an agent of the disease, the case can be treated successfully with no leftover complications. Hence, clinical evidence showed it can cause an opportunistic yet mild infection. In the presented case, *S. ficaria* was treated with cefotaxime and ampicillin. The case supported the belief that newborns are among the most susceptible patients.

Keywords:
Serratia ficaria, septicemia, opportunistic infection, Gaza strip, Palestine

1. Introduction:

Serratia ficaria is a Gram-negative straight bacillus, motile with peritrichous flagella, non-spore-forming. This bacterium belongs to the *Serratia* species and was first described in 1979. It can grow well on nutrient agar at temperature ranges from 4 to 40°C giving whitish colonies. Colonies' size varies from 1.5 to 2.5 mm in diameter. It inhabits figs wasp certainly in the specific fig pollinator *Blastophaga psenes* **(1)**.

Generally, *Serratia spp.* were not reported as a pathogenic bacteria species until the the second half of the 20th century. *Serratia* was used as a tracer microorganism by the United States military between the 1940s and 1960s because of its distinct reddish-orange color **(2)**. Infections caused by *Serratia spp.* have been reported in other organs, such as the lungs **(3)**, skin **(4)**, and the central nervous system **(5)**. It has been reported as a causative agent of several purulent infections **(6,7)**, including leg ulcer **(7)**, endophthalmitis **(8)**, upper respiratory tract infection **(9)**, acute respiratory distress **(10)**, septicemia **(11)**, oppurtionistic infections for animals **(12)**, urinary tract and wound infections **(13)**, and Cholecystitis, cholecystectomy, and renal stone **(14)**. Infections due to *Serratia ficaria* can be caused by eating habits, recent contact with figs, or wound infection **(1, 15)**.

Test	Results	Normal
WBC count	5.7	5.0-13.0x10^3/µL
Hb	10.9	12.0-15.0 g/dL
Platelet count	406	175-550x10^3/µL
Urea	8	5.0-30.0 mg/dL
Glucose	96	60.0-100.0 mg/dL
Sodium	136.7	135-145 mmol/L
Potassium	5.7	3.5-5.0 mmol/L
Calcium	1.24	2.2-2.7 mmol/L
Chloride	107.9	90-110 mEq/L
Urine culture	Negative	Negative
Blood culture	Positive	Negative

2. Case Report:

A 1.5-month-old male infant was admitted to Al Nasr pediatric hospital in Gaza strip in July 2022. He suffered from unexplained fever. It was suspected that he had a potential sepsis. Symptoms showed a febrile reaction with no vomiting, diarrhea, skin rash or convulsions. The patient had no history of a previous admission. On examination of the chest, heart, and abdomen there was nothing abnormal detected. The chest was good. The central nervous system was normal. Clinicians decided -on day 1 of admission- to use cefotaxime and ampicillin at 150 mg/6 hrs, and paracetamol 250 mg if necessary, and wait until the results of the urine and blood cultures are available. On day 6 of admission as well as day 6 of cefotaxime and ampicillin intravenous injections, the patient showed good status with normal vital signs and no fever. Clinicians approved his discharge from the hospital.

3. Laboratory findings and discussion:

Laboratory testing after the first day of admission showed normal CBC, urea, glucose, and sodium, elevated potassium and chloride, and low calcium (Table 1).

Table 1 *Laboratory test results from clinical samples collected on the first day of admission*

The initial microbiological reports showed negative urine culture and positive blood culture for a Gram-negative rod bacterium, capable of growth on MacConkey agar media, delayed lactose fermenter, oxidase negative, and catalase positive. This was in agreement with previous case studies **(8, 9, 11)**. Upon API-20E Identification, it yielded a profile number of 1206773. Possible identification suggested by API software was *Serratia ficaria*. The isolate identity was confirmed as *S. ficaria* by the Communicable Diseases Surveillance Center (CDSC) at the Islamic University of Gaza. Additional biochemical tests were performed. Both laboratories identified the organism as *S. ficaria*. Biochemical testing of the clinical isolate shown in Table 2.

Table 2 *Characteristics of the isolate using API 20E profile and other biochemical tests.*

Biochemical tests	Results
Oxidase	Negative
Catalase	Positive
Pigmentation production	Negative
Potato-like odor	Positive
ONPG	Positive
Arginine dihydrolase ADH	Negative
Lysine Decarboxylase LDC	Negative
Ornithine decarboxylase ODC	Negative

Citrate utilization	Positive
H_2S production	Negative
Urease	Negative
Tryptophan Deaminase TDA	Negative
Indole production	Negative
Voges–Proskauer VP	Negative
Gelatinase	Positive
Acid production from:	
Glucose	Positive
Mannose	Positive
Inositol	Positive
Sorbitol	Positive
L-Rhamnose	Positive
Sucrose	Positive
D-Melibiose	Positive
Amygdalin	Positive
L-Arabinose	Positive

The biochemical characteristics matched the identity of *S. ficaria* as shown in the literature **(1, 9)**. Antibiotic susceptibility test was performed using the modified Kirby-Bauer test. The isolate was susceptible to amikacin, colistin, cefuroxime, ceftazidime, cefotaxime, ciprofloxacin, gentamicin, meropenem, trimethoprim-Sulfamethoxazole, and cefazolin and resistant to ampicillin. This was in agreement with a previous finding that reported *S. ficaria* as a causative agent of endophthalmitis **(8)**. In general, the antibiogram of *S. ficaria* showed their sensitivity to numerous antibiotics **(1, 10, 19)**. Their resistance to ampicillin was reported previously in the literature **(1, 7, 16, 17)**.

A later report for blood culture released at day 5 of admission showed negative culture.

In the present case, isolate pathogenicity was clear because the patient developed signs of sepsis. This was in agreement with a previous case study that reported that *S. ficaria* infection was responsible in developing septic shock signs including febrile waves, chills, mottling of the skin, and cyanosis. However, the same study showed that *S. ficaria* infection can be accompanied by leukocytosis **(11)**, while, the current case showed normal WBCs count. This may be due to strain variation and different age groups. Several cases represented a mild form of infections or colonization **(7, 9, 10, 16, 17)**. Most case studies showed that elderly patients were suffering from serious underlying diseases **(7, 9-11, 16-18)**. This suggests that the infection is an opportunistic one, and this could explain why it causes an infection in 1.5-month age infant.

To explain the colonization or infection of their patients, some authors **(7, 9, 10, 17)** investigated the consumption of fresh figs, but only one patient had a history of fig consumption **(9)**. Fig plays a secondary role in human colonization. The major source would be *Blastophaga psenes* **(11)**. *B. psenes* activity is in July **(20)**, and the current case was admitted to the hospital in July.

The *B. psenes* flies around and between fig trees would create a bacterial aerosol responsible for extended bacterial spreading. Grimont and Deval isolated *S. ficaria* from figs, fig leaf, and *B. psenes* and from common grass, market mushrooms, and ants **(21)**. Thus, from the fig tree ecosystem, insects, such as *B. psenes* and ants, visiting figs, may spread the bacterium. This environmental spreading might explain the human isolates from respiratory specimens **(9, 10, 16)** or from leg wounds **(7, 17)** and possible oral contamination. In the cases of septicemia and gallbladder empyema, the

source of infection is obviously the gut bacterial flora, *B. psenes* bites, or simply wound infection.

In the present case, it was not possible to suggest a role for figs because of the patient's age. The source of infection in the present study is still wondering. Hence, local studies are needed to detect the presence, *B. psenes* in Gaza strip region, the exact way of *S. ficaria* infection, as well as to investigate whether *S. ficaria* can be considered a gut flora and thus can be isolated from stool or not.

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