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Serratia fonticola causing acute meningoencephalitis in a young male: A first case report

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ABSTRACT

Serratia fonticola infections are less common in human beings. The few cases that have been documented mainly speak of infections of the heart, skin, soft tissues, urinary and biliary tracts. Here is the case of a 20-year-old man who brought with altered sensorium, 2 episodes of seizures and high-grade fever due to Serratia fonticola-induced meningoencephalitis infection, which was confirmed with cerebrospinal fluid examination and culture report. The patient had no prior history of recurrent urinary tract infection or fever. The patient received 3 weeks of antibiotic and steroid treatment and recovery went smoothly. Using PubMed and Google Scholar, we conducted a thorough review of the literature and came to the conclusion that this is the first case of meningoencephalitis caused by S fonticola that has been documented.

Keywords: *Serratia fonticola*, meningoencephalitis, Enterobacteriaceae, bradycardia, autonomic dysfunction

1. INTRODUCTION

The most common causes of bacterial meningitis in middle-aged population are pneumococcal meningitis. Enterobacteriaceae are not known to cause meningitis in any age. If it happens, these pathogens are believed to enter the CNS via the bloodstream infection and immune compromised state (Al-Anazi et al., 2008). After entering the CNS, there is substantial damage and most patients pass away shortly due to a rise in intracranial pressure and brainstem herniation. Clinicians treating middle-aged patients with meningoencephalitis sometimes ignore the infection in their differential diagnosis since it is uncommon and clinically like viral and tubercular causes of encephalitis.

As a result, appropriate treatment and diagnostic efforts are frequently postponed or delayed until late in the course of the disease (Ryan and Adley, 2010). We here describe such a unique case of a young individual having bacterial meningitis caused by *Serratia fonticola* bacteria causing autonomic dysfunction, who was successfully managed by intravenous antibiotics and steroids.

2. CASE REPORT

A 20-year-old man with two episodes of seizures that involved tongue biting, eye rolling and mouth foaming was brought to the emergency room with a day's worth of disturbed mental status. The patient recovered consciousness between each episode 15 minutes later. Relatives also complained about high-grade fever of 101°F one spike a day and was every day for 7 days. Patient was evaluated for malaria, dengue, Leptospira, salmonella species, urinary tract infection and scrub infection in outside clinic. Patient did not have history of recent infection of urine, skin, or GI. Also, history was negative for tuberculosis, HIV and hepatitis B and C virus.

With a pulse rate of 120 beats per minute, blood pressure of 110/70 mmHg, a fever of 102°F on contact and a respiratory rate of 22 cycles per minute, the patient's condition was not adequate at the time of admission. On systemic examination, the patient had a Glasgow coma scale of E2V1M5, pupils that reacted to light by 4 millimeters, plantar bilateral flexion, neck stiffness was present and Brudzinski and Kernig signs were positive. The patient was only responding to profound painful stimuli. The patient had no petechiae or rashes on the skin. Patient was taken for MRI brain and contrast study which revealed meningeal enhancement as shown in figure 1 below.

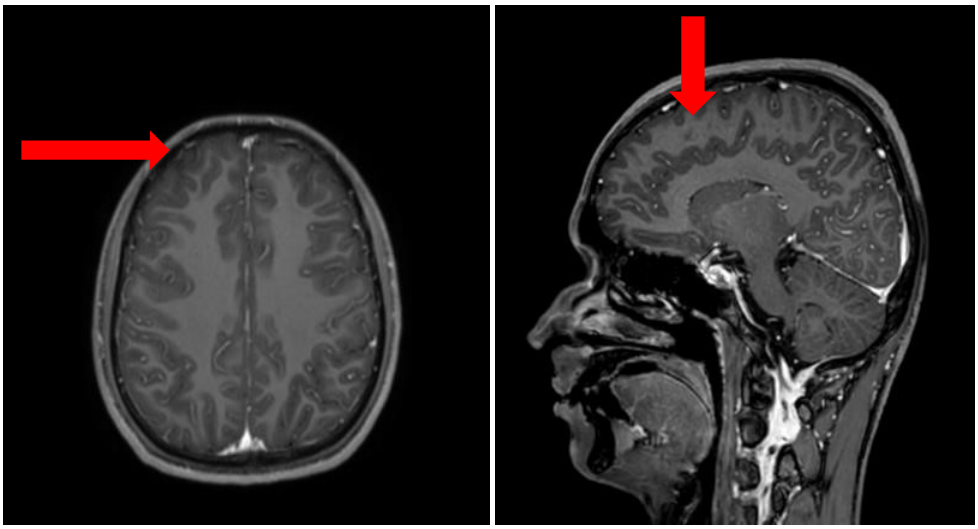

Figure 1 MRI brain and contrast study which revealed meningeal enhancement

Other routine laboratory investigations were done which is shown in table 1. Cerebrospinal fluid analysis was also done which was as shown in table 2.

Table 1 Routine laboratory investigations revealed above value.

Investigation	Patient's report	Reference values
Hemoglobin	12.4 g/dl	13-17 g/dl
White blood cells	19 × 10^3/µl	(4-10) × 10^3/µl
Platelet count	2.3 × 10^4/µl	(1.5-4.10) × 10^4/µl
Serum creatinine	0.5 mg/dl	0.6- 1.25 mg/dl
Serum urea	25 mg/dl	19-43 mg/dl
Serum sodium	135 meq/ltr	135- 155 meq/ L
Serum potassium	4.2 meq/ ltr	3.5- 5.1 meq/ L
Random blood glucose	168 mg/dl	70- 150 mg%
Total Protein	7.4 gm/dl	6.3- 8.2 gm/dl
Albumin	3.7 gm/dl	3.5- 5.0 gm/dl
Aspartate aminotransferase	25 units/l	< 50 units/l
Alanine aminotransferase	29 units/l	17- 59 units/l
Alkaline Phosphatase	101 IU/l	38- 126 IU/l
Total Bilirubin	1.2 mg/dl	0.2- 1.3 mg/dl

Globulin	3.7 gm/dl	2.3- 3.5 gm/dl

Table 2 Cerebrospinal fluid analysis

Cerebrospinal fluid		
Appearance	Transparent	Normal
TLC count	80 cells/ cumm	0 cells
Glucose	68	>60% of serum glucose
Protein	76	10-50
PH	7.2	7.3- 7.4

Cerebro spinal fluid culture was also sent which detected the growth of serratia foncticola species on Mac Conkey agar which was seen in figure 2.

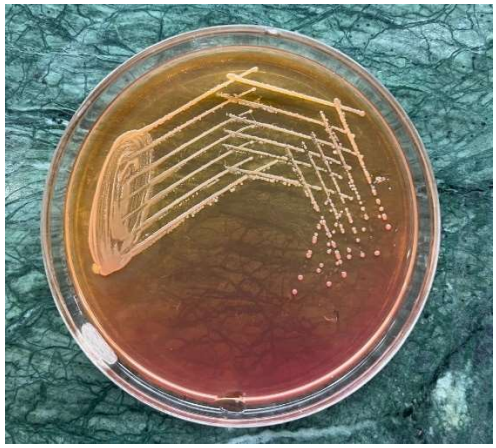

Figure 2 Serratia foncticola species on Mac Conkey agar

Patient was started on started on injectable antibiotics according to sensitivity on inj ceftriaxone 2gm iv bd, inj vancomycin 1gm iv bd, inj dexa 4mg iv tds, inj levipril 1gm iv stat followed by 500mg iv bd and other supportive treatment like mannitol, diuretic and hydration with fluids.

Patient was regularly monitored for Glasgow coma scale, signs of raised intravenous pressure, blood pressure, pulse and oxygen saturation. On the second day of treatment patient developed bradycardia with heart rate of around 46 beats per minute. Blood pressure was within normal limits and the signs of raised ICP was negative such as, pupils were normal reactive to light without evidence of papillaedema and irregular respiration. 2d Echo was done to rule out structural heart abnormality which was normal and there were no signs of infective endocarditis or congenital heart disease.

The patient awoke on the third day and was alert and aware of time, place and people. Blood pressure and other measurements were within normal limits, except for the patient's pulse, which was 50 beats per minute. When the patient was requested to sit up from a supine position and do some activity while sitting, there was a tachycardia with a heart rate of 100 beats per minute. Heart rate stabilised at 50 beats per minute after three minutes. The patient was continued on antibiotics for a period of three weeks despite the discovery of autonomic dysfunction, which was most likely a symptom of sepsis. The patient was discharged after the course and was instructed to follow up after 2 weeks and was stable without any neuro deficit or autonomic dysfunction after 2 weeks.

3. DISCUSSION

This is the first instance of meningitis caused by *S. fonticola* that has been documented in the literature, to our knowledge. The most likely source of infection for our patient was the dirt. The patient was a student who had to work in the mud because his father was a farmer. Because the germs that led to his bacteraemia and subsequent meningitis must have entered his body through the soil, there was a probability of infection (Jorens et al., 2005). When the patient was admitted to the hospital, the meningitis was serious. He went to the general practitioners, but got inadequate treatment. Meningitis worsened and bacteraemia advanced as a result.

We hypothesize that this bacterium may be a component of the microbiota inhabiting the gastrointestinal tract given that the bulk of *S. fonticola* isolates in our medical system originated from urine cultures (Nimkar et al., 2022). The two instances of polymicrobial bacteraemia in individuals who had intestinal mucosal damage (Lin et al., 2010) provide evidence for this. *S. fonticola* hasn't previously been reported in urinary samples, which suggests the notion that it only occasionally inhabits the gut microbiota. *S. fonticola* was discovered by Van Hoek et al. on a range of vegetables sold in stores, indicating that there were several potentials for exposure, including through ingestion (Hajiroussou et al., 1979).

Both immunocompromised patients and healthy individuals can contract infections from *S. fonticola*. It can also result in septicemia and bacteraemia, which can both lead to septic shock. Meningoencephalitis caused by *S. foncticola* may manifest as an arterial thrombosis, occlusive necrotizing vasculitis, or septic cortical thrombophlebitis (Beheti et al., 2019). Usually, the infarctions are limited to the grey matter. Global and local ischemia and hypoxia can harm the basal ganglia. Magnus et al. (2011), on the other hand, described a case of a new born with *S. fonticola* meningoencephalitis who developed severe vasculitis and a unique basal ganglia necrosis (Magnus et al., 2011).

Studies on patients with meningitis caused by the S fonticola species and research on autonomic dysfunction in these meningitis cases are non-existent. In this case of cns involvement, the autonomic nervous system's malfunction is less well known.

4. CONCLUSION

Serratia fonticola species are typically associated with infections of the skin and soft tissues, urinary system and biliary tract. Due to the rarity of meningoencephalitis caused by such species, great consideration should be given to susceptibility testing and antibiotic selection to avoid the development of resistance when treating *S. fonticola* and causing morbidity and mortality.

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Author Contributions

M P had written the manuscript, S K and S A edited the manuscript, culture report was provided by G M and J B, S P and A A helped in data collection.

Informed consent

Informed consent was obtained from participant for whom identifying information is included in this manuscript.

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Conflict of interest

The authors declare that there is no conflict of interests.

Data and materials availability

All data sets collected during this study are available upon reasonable request from the corresponding author.

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