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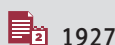
# *Serratia marcescens* Infection-Associated Loss of Vision: A Case Report in a Patient with a History of Intravenous Drug Use

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Data Collection B  
Statistical Analysis C  
Data Interpretation D  
Manuscript Preparation E  
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**Corresponding Author:** Shirisha Pasula, e-mail: [dr.shirisha.pasula@gmail.com](mailto:dr.shirisha.pasula@gmail.com)**Conflict of interest:** None declared**Patient:** Male, 53-year-old  
**Final Diagnosis:** Disseminated *Serratia marcescens* infection  
**Symptoms:** Loss of vision  
**Medication:** —  
**Clinical Procedure:** Enucleation of the eye • tricuspid valve replacement  
**Specialty:** Infectious Diseases**Objective:** Rare disease**Background:** *Serratia marcescens* infections have historic association with injection drug use. The present report is about a 53-year-old man with a history of intravenous (IV) drug use who presented with acute loss of vision due to endophthalmitis associated with disseminated *S. marcescens* infection.**Case Report:** A 53-year-old man with a history of active illicit IV drug use presented with a chief complaint of loss of vision in his left eye for 5 days. He also reported having a fever, chills, and shortness of breath. While in the Emergency Department, he became hypotensive and hypoxic. He needed to be intubated and was started on vasopressor support. An ophthalmological examination was suspicious for endophthalmitis. The patient underwent a vitreous tap with injection of intravitreal antibiotics on the day of admission. An echocardiogram showed severe tricuspid endocarditis requiring valve replacement. He also was found to have a left lung/pleural abscess, which was surgically drained. Later, a left eye vitrectomy was performed and the intravitreal antibiotics were repeated; the treatment was unsuccessful and enucleation eventually was required. In addition, the patient had gastric bleeding and underwent esophagogastroduodenoscopy, which showed ischemic stomach ulcers suggestive of septic emboli. Cultures of the patient's blood, tricuspid valve, lung abscess, and vitreous fluid revealed *S. marcescens*. He was treated long term with a 2-drug antibiotic regimen and discharged in stable condition.**Conclusions:** We have presented a rare case of acute loss of vision due to endophthalmitis in a patient with a history of IV drug use, which was associated with disseminated infection with the Gram-negative saprophyte *S. marcescens*.**Keywords:** Endocarditis, Bacterial • Endophthalmitis • *Serratia* Infections • Street DrugsFull-text PDF: <https://www.amjcaserep.com/abstract/index/idArt/929116>

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## Background

*Serratia* strains are motile, non-lactose-fermenting Gram-negative bacilli in the *Enterobacteriaceae* family [1,2]. This organism is ubiquitous in the environment. Of all the *Serratia* species, *Serratia marcescens* is the one most commonly recovered in human infections, followed by *S. liquefaciens* [1,2]. *S. marcescens* most commonly causes urinary tract infections, wound infections, and pneumonia, and less commonly bacteremia; it is rarely associated with endocarditis, or central nervous system (CNS) and ocular infections [2].

In intravenous (IV) drug users, the most common microorganisms isolated are *Staphylococcus aureus*, *Streptococcus* species, and *Pseudomonas aeruginosa*. *Serratia* species have a historical association with infections in IV drug users but infections with them are still uncommon [1]. Fifteen percent of all IV cases of drug use-associated endocarditis at the University of California, San Francisco hospitals from 1968 to 1974 were due to *S. marcescens*. Reports published in 1976 and 1980 described 36 cases of infective endocarditis from *Serratia* in the San Francisco Bay area, 89% of which involved IV drug use. Phadke et al described only 19 cases of *Serratia* endocarditis reported in the English-language literature between 1980 and 2016 [1]. Interestingly, only 2 of those cases were in IV drug users. Most of the patients had chronic medical illnesses, were immunocompromised, or had undergone recent surgery, which suggests that this entity recently has been associated with frequent health care exposure [1].

Fungal pathogens are the most common causes of endogenous endophthalmitis. The bacterial organisms most often responsible for endogenous endophthalmitis are Gram-positive organism, *Streptococci* and *Staphylococci*. The Gram-negative bacterial organisms reported to cause endogenous endophthalmitis are *Klebsiella* and *Escherichia coli* [3]. *Serratia marcescens* can cause endophthalmitis, which is typically exogenous after trauma or surgery [4]. It is a rare cause of endogenous endophthalmitis.

The present report is about a 53-year-old man with a history of IV drug use who presented with acute loss of vision due to endophthalmitis associated with disseminated *S. marcescens* infection.

## Case Report

A 53-year-old man presented to the Emergency Department (ED) with a chief complaint of sudden loss of vision in his left eye, which had begun 5 days previously. He also complained of feeling unwell, shortness of breath, generalized body pains, fever, and chills. The patient denied headache, extremity weakness

or numbness, chest pain, cough, abdominal pain, nausea, or vomiting. His medical history included chronic obstructive lung disease; an exploratory laparotomy had been done 12 years previously for a gunshot wound. He smoked tobacco daily and had a history of active, illicit IV drug use.

The patient's vital signs were as follows: temperature 36.8°C, heart rate 92 bpm, blood pressure 91/55 mmHg, respiratory rate 18 breaths/min, and oxygen saturation 92% on 2 L of oxygen. On examination, he appeared to be in moderate respiratory distress. On lung auscultation, there were diffuse bilateral rhonchi. The patient had a regular heart rate and rhythm with an ejection murmur in the tricuspid area. His abdomen was soft and nontender. An ophthalmological examination was concerning for left eye endophthalmitis. The results of the patient's ocular examination are listed in **Table 1**. A photo of his left eye is shown in **Figure 1**.

Soon after arriving in the ED, the patient became increasingly short of breath and hypotensive. He was intubated and fluid resuscitation and vasopressor therapy were initiated. A vitreous tap was performed with injection of 0.1 mL of vancomycin (1 mg/0.1 mL) and 0.1 mL of ceftazidime (2 mg/0.1 mL). Empiric antibiotic therapy was started with IV vancomycin, ceftepime, and moxifloxacin eye drops.

Laboratory studies showed an elevated white blood cell count of 28 000/mm<sup>3</sup> (reference range, 3500-10 600/mm<sup>3</sup>), hemoglobin 8.4 g/dL (reference range, 13.3-17.1 g/dL), platelet count 210 000/mm<sup>3</sup> (reference range, 150 000-450 000/mm<sup>3</sup>), and creatinine 1.45 mg/dL (reference range, 0.7-1.3 mg/dL); a urine drug screen was positive for benzodiazepine and opiates. Blood cultures were obtained. HIV antigen/antibody testing was nonreactive.

A chest X-ray showed left upper lobe reticulonodular infiltrates, prominent pulmonary arteries, and coarse left basilar and right upper lung zone markings. Further imaging of the thorax with a computed tomography (CT) scan showed multiple scattered cystic-like areas of opacity surrounded by consolidation, mainly in the upper lungs and periphery. The findings were suspicious for multifocal pneumonia. A CT scan of the orbit showed minimal edema of the left preseptal soft tissues with subtle thickening of the sclera of the left globe. Slight intraconal fat stranding also was identified. These findings were suspicious for concomitant preseptal and postseptal cellulitis. A transthoracic echocardiogram (TTE) showed a large, mobile echo density measuring 2.3×2.4 cm on the anterior tricuspid leaflet and a small echo density on the septal leaflet, both consistent with vegetation.

The timeline for the course of the patient's infection is shown in **Figure 2**. On Day 2, blood cultures revealed *S. marcescens*.

**Table 1.** Ophthalmological examination on the day of admission.

	Right	Left
Visual acuity	20/50	No light perception
Intraocular pressure	14	17
Pupil response	Reactive	Nonreactive
Extraocular movements	Normal	Limited
<b>Slit lamp</b>		
<b>Anterior segment</b>		
Lids/lashes/adnexa	Normal	Mild edema, keeps lids closed, mucoid discharge
Conjunctiva/sclera	Clear and white	Injection, 1+ inferior chemosis
Cornea	Clear	Edema
Anterior chamber	Formed	Formed, deep, no hypopyon
Iris	Round and reactive	Nonreactive
Lens	Clear	Clear
<b>Posterior segment</b>		
Vitreous	Clear	No view secondary to vitreous haze
Cup	Disc ratio 0.4	No view
Macula	Flat	No view
Vessels	Normal	No view
Peripheral retina	Dot blot hemorrhage with central clearing inferiorly	No view



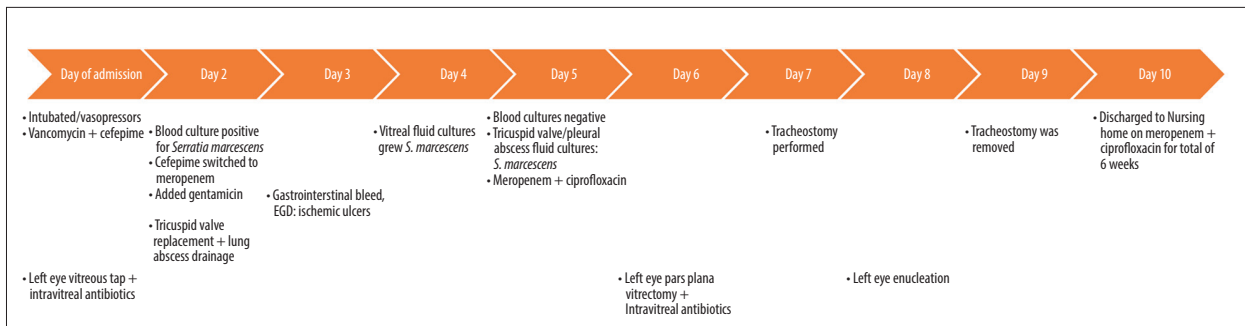
**Figure 1.** Left eye on presentation. There was 2+ conjunctival injection and extensive chemosis.

**Table 2** lists the antibiotics to which the organism was susceptible. He was switched from cefepime to meropenem because *Serratia* species are known to produce ampC beta-lactamase. Gentamicin was added to the regimen and vancomycin was continued to cover possible Gram-positive organisms for pneumonia. A cardiothoracic surgeon was consulted for surgical management of the patient's endocarditis. A tricuspid valve replacement and left upper lung/pleural abscess drainage

were performed on Day 2 of admission. During the procedure, the patient's tricuspid valve was found to be heavily encased in endocarditic vegetation with involvement of all 3 leaflets with severe regurgitation. A 33-mm Epic porcine tissue valve was placed in the tricuspid position. Tissue cultures from the tricuspid valve and the lung abscess showed *S. marcescens*.

On Day 3, the patient was found to have dark red blood coming out of his nasogastric tube and his hemoglobin level was low. Gastrointestinal bleeding was suspected. An esophago-gastroduodenoscopy showed esophagitis and a large amount of clotted blood in the fundus of the stomach. Four ischemic ulcers were seen, which were believed to be due to septic emboli. Two of the ulcers measured 3 to 4 cm in diameter and had black-yellow necrotic bases. In these ulcers, visible vessels were identified and hemoclips were successfully placed.

On Day 4, the patient was still critically ill in the Intensive Care Unit. A culture of vitreous taken from the patient's left eye on the day of admission also grew *S. marcescens*. Ophthalmological examination of the eye showed that it was stable with no hypopyon. The patient was receiving topical moxifloxacin in his



**Figure 2.** Timeline of main events. The top line includes days of hospitalization. The clinical events correspond to the days of hospitalization.

**Table 2.** Antimicrobial susceptibilities of *Serratia marcescens*.

Antimicrobial	MIC	ET1 susceptibility	Interpretation	Et1 interpretation
Amp/Sulbactam	>16/8		Resistant	
Ampicillin	>16		Resistant	
Aztreonam	≤1		Susceptible	
Cefazolin	>32		Resistant	
Cefepime	≤0.5		Susceptible	
Cefoxitin	>16		Resistant	
Ceftazidime	≤0.5		Susceptible	
Ceftriaxone	≤0.5		Susceptible	
Ciprofloxacin		0.12		Susceptible
Ertapenem	≤0.125		Susceptible	
Gentamicin	2		Susceptible	
Imipenem	1		Susceptible	
Meropenem	≤0.125		Susceptible	
Piperacillin/Tazobactam	≤4/4		Susceptible	
Tobramycin	2		Susceptible	

MIC – minimum inhibitory concentration; ET – epsilon test.

left eye and was switched to ciprofloxacin for better antimicrobial coverage. IV vancomycin was discontinued. He was continued on IV meropenem and gentamicin.

On Day 8, follow-up blood cultures became negative. An Epsilon test showed that the *S. marcescens* from the initial blood culture was susceptible to ciprofloxacin (Table 2). Gentamicin was switched to IV ciprofloxacin because of the ease of dosing and the better safety profile of fluoroquinolones.

A follow-up ophthalmological examination of the patient's left eye showed persistent chemosis and the anterior chamber was cloudy, suggesting possible progression of his infection. A repeat CT scan of the orbit showed minimal asymmetric preseptal swelling in the left periorbital soft tissue and no abnormal fluid collection. A repeat intravitreal injection of ceftazidime was

performed. A B-scan ultrasound of the left eye, performed on Day 14, showed increased vitreous debris, suggesting posterior hyaloid detachment or retinal detachment, and small loculations. The patient underwent a pars plana vitrectomy on Day 15. Three ports were placed behind the limbus. Because subconjunctival pus was noted, a 360-degree conjunctival peritomy was performed. His lens was completely hazy and it was removed by phacofragmentation. The infection had eroded through the sclera and there was purulent intraocular drainage. Vitreous biopsy and anterior chamber paracentesis were performed. The iris membrane was removed with forceps and a vitrectomy was performed. Intravitreal vancomycin, 1 mg, and ceftazidime, 2.25 mg, were injected. A posterior perforation was found during the procedure; because it was not repairable, a left eye enucleation was performed on Day 19. Vitreous cultures and left eye cultures also grew *S. marcescens*.

Antibiotic therapy with IV meropenem, 2 g every 8 h, and oral ciprofloxacin, 750 mg twice a day, was continued for a total of 6 weeks. The patient was discharged to a nursing home on Day 35. Unfortunately, he was lost to follow-up, but 6 months later, he was admitted to the hospital with *Staphylococcus aureus* bacteremia from continued IV drug use.

## Discussion

Caring for patients with a history of IV drug use requires special attention because it poses unique challenges. These individuals are at high risk for developing infections with uncommon, drug-resistant organisms and septic complications. In a recent study of the epidemiology and outcomes of non-HACEK (*Haemophilus* species, *Aggregatibacter* species, *Cardiobacterium hominis*, *Eikenella corrodens*, and *Kingella* species) Gram-negative infective endocarditis in the southeast United States, 40 of 43 patients reported IV drug use [5]. *S. marcescens* was the second most common organism (20%) after *P. aeruginosa* (68%). Sixty-five percent of patients had septic emboli and IV drug use was associated with poor prognosis [5].

In the few cases of septic emboli from *S. marcescens* endocarditis associated with IV drug use reported in the literature [6-8], the spleen, kidneys, and CNS were commonly involved. Vascular complications of superior mesenteric artery mycotic aneurysm also have been reported [6]. In our patient, the stomach, lung, and eye were involved. *Serratia* is a rare cause of endogenous endophthalmitis, accounting for 4% of cases [9,10]. In the last 5 years, 6 cases of *Serratia* endogenous endophthalmitis in adults have been reported in the literature. IV drug use was reported in 2 patients who described “needle licking” behavior and poor dental hygiene was the likely source [4]. Other patients had chronic medical illnesses that resulted in use of hemodialysis, ventilator dependency, or chronic urinary catheters, which suggests that chronic comorbidities are risk factors [10-13]. The most common clinical presentation is a decrease in vision, as in our patient. The other classic features

include eyelid edema, conjunctival injection, circumcorneal congestion, pain, photophobia, and the presence of floaters, depending on the extent of infection [3]. *S. marcescens* endophthalmitis can present with pink hypopyon because of its ability to produce the reddish-orange tripyrrole pigment prodigiosin [4]. Diagnosing endogenous endophthalmitis requires a high index of suspicion and the presence of risk factors and/or characteristic ocular findings on a detailed ophthalmoscopic examination [3]. Confirmation of the diagnosis is done with vitreous aspiration and diagnostic vitrectomy, followed by culture and histological examination. Treatment for endophthalmitis is surgical management with early pars plana vitrectomy and intravitreal antibiotics along with systemic antibiotics. *Serratia* endophthalmitis has an extremely poor prognosis and can result in complete loss of vision or a need for enucleation. The late presentation of our patient to the hospital, rapid progression of his condition, and the high virulence of the organism were likely the factors that contributed to his poor outcome.

Regarding management of *Serratia* infections, there are no clear guidelines. *Serratia* species along with *Enterobacter* and *Citrobacter* are known to have an inducible ampC beta-lactamase gene responsible for resistance to penicillin and first-generation cephalosporins. Using higher-generation cephalosporins may induce resistance during treatment, leading to treatment failure. Many experts now recommend against the use of all cephalosporins for any ampC-producing organism [1] and it is common practice to start patients on a carbapenem. For endocarditis, the Infectious Diseases Society of America recommends dual antibiotic therapy with a beta lactam and an aminoglycoside or a fluoroquinolone [14].

## Conclusions

The present case was a rare instance of acute loss of vision due to endophthalmitis in a patient with a history of IV drug use which was associated with disseminated infection with the Gram-negative saprophyte *S. marcescens*.

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