

CASE REPORT

Serratia marcescens, Uncommon Pathogen, Causing Orbital Cellulitis in Uncontrolled Diabetes Melitus

Authors:

Stevie Kresentia*^{ORCID}
Amir Surya^{ORCID}

Affiliations:

Department of Ophthalmology,
Rumah Sakit Pusat Angkatan
Laut dr. Ramelan, Surabaya,
East Java, Indonesia.

Corresponding author:

Stevie Kresentia
steviekresentia@gmail.com

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Abstract

Introduction: Orbital cellulitis is a rare ophthalmic infection. Special attention should be given because it can be fatal, either to vision or life. **Case presentation:** A 49-year-old man complained of swelling and pain in his left eye for two weeks, along with lethargy and fever. One month previously, the patient was admitted to the hospital with a diagnosis of sinusitis and was planned for surgery, but he refused. He also had a history of uncontrolled diabetes. The examination showed proptosis and adhesions of the upper and lower eyelids covered with crusts. After debridement, his visual acuity was no light perception. There was a lot of necrotic tissue and pus covering the sclera and conjunctiva. Intraocular pressure was soft by palpation. He was planned for hospitalization. The results of the pus culture showed the growth of *Serratia marcescens*, and the antibiotics usage was following the bacterial culture. Unfortunately, after 72 hours of intravenous antibiotics, there was no clinical improvement. We decided to do evisceration to reduce local infection and prevent the infection spreading systemically. The patient's condition was gradually improve after surgery. **Conclusions:** Orbital cellulitis is an infection that can be harmful unless the treatment starts immediately and effectively. Redness and swollen eyelid accompanied by proptosis and painful ocular movement can be critical signs of the disease. Intravenous antibiotics have always been the first choice of treatment. Therefore, culture and antibiotic sensitivity test play an important role in successful treatment. Surgical should be considered if it becomes a life-threatening condition.

Keywords: orbital cellulitis; *Serratia marcescens*; evisceration; uncontrolled diabetes

Introduction

Orbital cellulitis is an ophthalmic infection that reaches the soft tissue in the eyeball socket located behind the orbital septum. It is an eye emergency that requires immediate medical attention.^[1] This disease can occur at any age, especially in children and the elderly who are immunocompromised, for example, HIV, diabetes, users of immunosuppressant drugs for a long time, have a higher risk of obtaining it.^[2] The most frequent source of infection is usually from the upper respiratory tract, such as direct extension sinusitis or infections arising from dental or face. The common pathogens are *Staphylococcus* sp, *Streptococcus* sp, and *Bacteroides* in adult infection and *Haemophilus influenzae* in children infection; however, the incident decreased since many children got vaccinated. The selection of antibiotics is usually adjusted to the causative organism. Therefore, it is imperative to do a bacterial culture. Orbital cellulitis usually improves within 2 x 24 hours after intravenous antibiotics admission; however, complications or other diagnoses should be considered if there is no clinical improvement.^[3] *Serratia marcescens* (*S. marcescens*) is a rare pathogen that causes primary ocular infection. The infection is usually exogenous, preceding by trauma or surgery or frequently related to nosocomial exposure. The case report brought by Shirisha Pasula et al.^[4] also presented this uncommon organism can be correlated with intravenous drug users leading to endophthalmitis with acute vision loss due to disseminated *S. marcescens* infection.

Case presentation

A 49-year-old man came to the eye clinic complained of swollen and painful left eye for two weeks ago. One week later, this condition got worse accompanied by fever and vision loss. His vision decreased rapidly in two weeks as the swollen eyelid got bigger and he could not open his eye. Yellowish secretion sometimes coming out from the eye. He only consumed analgesic and did not get any specific medication for his eye. There was no problem in his right eye. One month ago, he was admitted to the hospital and diagnosed with sinusitis. He refused sinusitis surgery at that time and did not have any complaints about his eye. He had a history of uncontrolled diabetes and never had any trauma or surgery.



Figure 1. Left eye proptosis with crustae on the enrolment.

During examination we found left eye axial proptosis; stuck upper and lower eyelids caused by dried pus and blood (Figure 1). Debridement had been done, ulcers were found at the superior and inferior eyelid from which we could see muscle and soft tissue, necrotic tissue and pus covering the sclera and conjunctiva. Hazy cornea caused difficulty in evaluating the iris, pupil, and lens (Figure 2). The visual acuity was no light perception, the intraocular pressure was soft by palpation and the ocular movement was restricted in all directions (fixed eye). He was lethargic with temperature of 39.5°C.

The patient was planned for hospitalization and underwent a CT-scan examination, complete blood count, fasting blood glucose, HbA1c, thyroid function test, pus culture, antibiotic sensitivity test, and further consultation to otorhinolaryngology, endocrinology, and odontology department. The ocular ultrasonography and blood culture were not arranged due to his unsupported left eye condition and limited resources. He got an intravenous antibiotic, cephobactam and metronidazole; ketoconazole as anti-fungal; ketorolac as anti-inflammatory; paracetamol as antipyretic; and wound debridement with nebacetin powder and gentamicin irrigation every day.

The laboratory investigation revealed leukocytosis ($14.98 \times 10^3/\mu\text{L}$), fasting blood sugar was 496 mg/dL with HbA1C of 15.5 %, and the thyroid function test was



Figure 2. The ulcers at the upper and lower eyelid are accompanied by necrotic tissue at the eyeball.

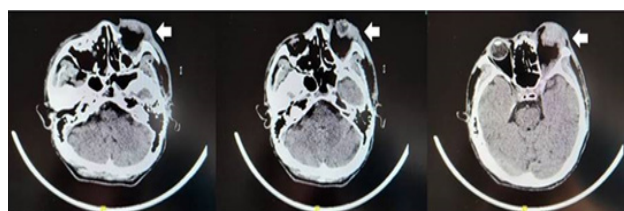


Figure 3. CT of left orbital cellulitis showing soft tissue mass from lower to upper eyelid with proptosis.

within normal limit. Pus culture revealed *S. marcescens* as a single organism and cephobactam was sensitive to it. CT-Scan examination showed soft tissue mass from lower to upper left eyelid, left sphenoidal and maxillary sinusitis (Figure 3). To exclude the other diagnoses, we performed a histopathology examination and the result was non-specific chronic inflammation without any sign of malignancy (Figure 4).

Three days after intravenous antibiotics treatment, the production of pus in his left eye was quite a lot and his condition was not getting better either. We decided to do evisceration accompanied by debridement and eyeball exploration to reduce the local infection and to prevent systemic spreading of the infection (Figure 5).

Five days after evisceration, the swollen eyelid started to decrease, the ulcer got healed with new tissue, the pus was reduced, and his condition improved better than before. After receiving an intravenous antibiotic for eight days, he became outpatient then switched to ciprofloxacin orally (Figure 6).

Discussion and conclusions

Orbital cellulitis is a bacterial infection that occurs posteriorly to the orbital septum. The symptoms are proptosis, palpebral oedema and erythema, pain, inhibition of extra ocular movements, and optic neuropathy may occur in severe cases. Systemic symptoms

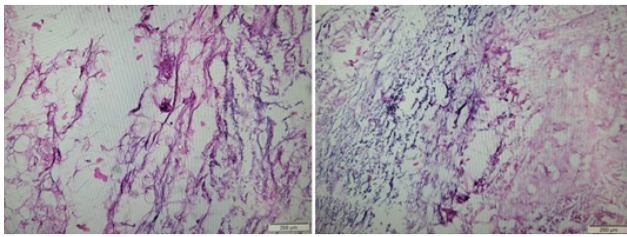


Figure 4. Endoscopic biopsy specimen. Microphotograph shows the H&E-stained section showing lymphocytes inflammatory cell, plasma cells, and histiocytes at fat tissue stromal and loose fibrous connective tissue without any sign of malignancy.

can also include fever, lethargy, and leucocytosis.^[5] If the infection reaches the brain as a complication, it could decrease consciousness.^[6] In this case, the patient's symptoms and clinical manifestations were mainly representatives of orbital cellulitis, but it would like to be confirmed to exclude other differential diagnoses by further examination. Computerized tomography imaging showed left sphenoidal and maxillary sinusitis and enlarged upper and lower eyelids mass. However, it still raises suspicion whether a malignant process with secondary infection or not.^[7] Therefore, it is confirmed again by histopathological examination, which reveals that the result of biopsy tissue is only a non-specific inflammatory process and there are no signs of malignancy. Graves' ophthalmopathy and inflammatory orbital pseudotumor can be ruled out with unsupported clinical features.

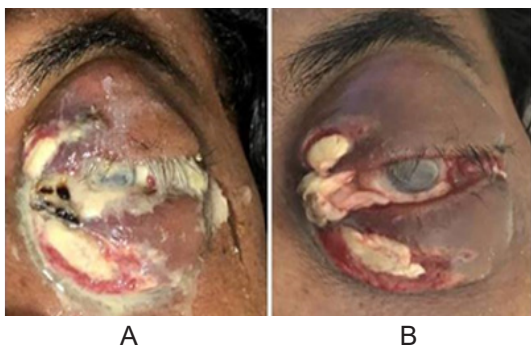


Figure 5. Three days after intravenous antibiotic; (A) Excessive pus production; (B) After debridement, without clinical improvement.

S. marcescens, the organism found in patient pus cultures, is a true opportunistic pathogen that rarely causes primary invasive infections and is more common in healthcare-associated infections than in community-acquired infections. These rod gram-negative bacteria that do not form endospores have low virulence, however, become dangerous if they access a suitable host. These organisms are rarely become the primary cause of orbital cellulitis.^{[4],[8]} Gram-positive bacteria such as *Staphylococcus* sp and *Streptococcus* sp are the most common organisms that cause orbital cellulitis, especially in the presence of acute or chronic sinusitis. Gram-negative and anaerobic bacteria can also be

involved.^{[9],[10]} Immunocompromised patients should also be suspected of having a fungal infection.^[11] The spread of infection can be in four ways: the infection through structures around the eye, such as the ethmoid and frontal sinuses, dacryocystitis, dental infections, ear infections, and cranial infections is the most common incident. The second is through intraorbital infection, endophthalmitis, and dacryoadenitis. The third is endogenous via the bloodstream, and the last is exogenous via trauma, foreign bodies, or postoperatively.^[12]

S. marcescens infection in this patient is in accordance with the theory above because the patient has the immunocompromised condition, which is uncontrolled type 2 diabetes mellitus, as evidenced by high levels in fasting blood sugar and HbA1C. The initial infection source was suspected to be obtained when he was inpatient. Even though not using invasive treatment during hospitalization, these pathogens can be found in medical environmental sources, such as air conditioning units, bed-pan macerators, urine-collecting basins, tap water, and liquid soap dispensers accompanied by poor patient hygiene and subsequent contact with eyes.^{[8],[11]}

Antibiotics are still the primary choice in treating orbital cellulitis, usually given intravenously and as quickly as possible to prevent complications. The initial choice is to use a broad-spectrum antibiotic and then adjust the culture results if there is no improvement. If within 48-72 hours after administration of antibiotics there is no clinical improvement or even worsens, a subperiosteal abscess should be suspected and a repeat CT scan may be performed.^{[13],[14]} If accompanied by a septic condition, hemodynamically unstable, and multiple cranial nerve palsy should be wary of cavernous sinus thrombosis, which is very life-threatening. Other complications include intraocular infection, optic neuropathy, retinal vascular occlusion, meningitis, intracranial abscess, blindness, and even death.^{[3],[6],[15]}

In this case, at the first coming the patient was in the late-stage with blind left eye accompanied by infection spreading to the eyeball. Aggressive antimicrobial became the first choice to prevent the life-threatening infection



Figure 6. Progression after evisceration. Five days after surgery; (A) Showing sclera and conjunctiva; (B) Showing eyelid improvement; (C) Two weeks after surgery.

by systemic spreading. Wound debridement was also performed daily to help reducing bacterial colonization. However, after 72 hours, there was no improvement for which evisceration was performed without implant placement to reduce local infection. Evisceration was done based on the consideration that it can be performed under local anesthesia with a relatively faster and simpler technique related to the patient's condition and to reduce the infection spreading to the central nervous system by the optic nerve.^[16]

Orbital cellulitis is a complex disease that can be fatal to vision and life. Although the diagnosis can be made clinically, supporting examinations such as bacterial culture, antibiotic sensitivity test and computerized tomography also play a critical role in the successful treatment and detection of complications. We should try to save the patient's vision as much as possible, but if the vision is too late to be saved, we do not hesitate to perform surgery to save the patient's life. In this case, intravenous antibiotic did not give any significant clinical changes. Better outcomes, both local and systemic condition, were reached after we did evisceration.

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