



Preseptal Cellulitis & Orbital Cellulitis

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Abstract

Preseptal Cellulitis & Orbital Cellulitis. Periorbital cellulitis is purulent infectious inflammation of the tissue around the eyes (ocular adnexa and orbital tissue). Orbital infections are usually classified as preseptal cellulitis and orbital cellulitis. Preseptal cellulitis and orbital cellulitis often originated from direct sinusitis spread and usually require same antibiotic. Often the clinical manifestations of these two types of infection are similar because they occur on an ongoing basis. This serial cases report 6 cases of periorbital cellulitis were treated at Palembang RSMH from July 2016 to October 2019, with 3 cases being preseptal cellulitis and 3 cases being orbital cellulitis. All six cases had symptoms of swelling in the eyelid, erythema, pain, decreased vision, limited mobility of the eyeball, and the presence of secretions or pus. Therapies for all patients are warm compresses, antibiotics, and symptomatic drugs. Some patients also get additional steroids. Clinical improvement occurred in 5 out of 6 patients after therapy, with 1 patient died of sepsis.

Key Words: Preseptal Cellulitis, Orbital Cellulitis, Orbital Infection.

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Introduction

Periorbital cellulitis is a group of conditions that range from minor (minor) infections without sequelae after therapy to severe (major) infections that can lead to blindness, permanent neurological disability, multiple organ failure, and death. In general, periorbital cellulitis is defined as a purulent infectious inflammation of the tissues around the eye (ocular adnexa and orbital tissue). The Chandler criteria established in 1970 have become the standard for describing the clinical range of orbital and periorbital infections. The orbital septum is a membrane that extends from the orbital rim to the palpebral tarsus and is considered an anatomical marker of orbital cellulitis. This orbital infection is usually classified as cellulitis preseptal (site of infection involving the area in front of the orbital septum) and orbital cellulitis (site of infection involving the area behind the orbital septum).¹⁻⁵

Preseptal cellulitis and orbital cellulitis often result from direct contact spread of sinusitis and usually

require the same antibiotic therapy. Often the clinical manifestations of these two types of infection are similar because they occur continuously. However, the ophthalmologist must be able to distinguish between the two because the management and prognosis are different. Preseptal cellulitis is usually mild and does not cause severe complications, whereas orbital cellulitis can cause vision loss and even death. Orbital cellulitis has a higher morbidity rate that requires aggressive therapy and may require surgery, whereas preseptal cellulitis is usually treated with medication.^{1,3,6}

Case Report

Case 1: Right Preseptal Cellulitis

An 18-year-old man was consulted from the ENT department with suspicion of right ocular preseptal cellulitis.

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The patient complained of swelling in the lower eyelid of the right eye since 2 weeks which started with a lump on the right cheek the size of a corn kernel. Swelling is not painful. Since the last 1 week the swelling has gotten bigger and covers the right eye, the eyelids are red, watery, and accompanied by fever.

Patients often experience runny nose, sneezing, and nasal congestion. History of toothache or cavities was denied. Previous history of the same illness was denied. History of previous eye trauma was denied. He denied history of diabetes and high blood pressure. Family history of the same disease was denied.

Vital signs and general status were within normal limits. From the ophthalmological status of the right eye, the pressure p=n+0, eyeball movement normal in all directions, superior and inferior palpebral edema, visible abscess in the right maxillary to inferior palpebra Ø 5x4 cm, hyperemia, there is crustae, pus, and tenderness (figure 1A). Left oculi within normal limits. Laboratory results showed leukocytosis 17,400/mm³. The results of the CT scan of the orbit revealed an abscess in the right maxillary region.

The patient was diagnosed with right preseptal cellulitis. The patient received ceftriaxone injection therapy 1 g/12 hours, metronidazole drip 500 mg/8 hours, methyl prednisolone injection 125 mg/6 hours, chloramphenicol EO/8 hours OD, and warm compresses. The patient improved after 2 weeks of therapy (figure 1B).

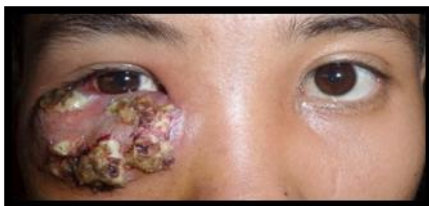


Figure 1A. Case 1, Before therapy



Figure 1B. Case 1, After Therapy

Case 2: Bilateral Preseptal Cellulitis

A 79-year-old man came to the emergency department of RSMH Palembang with complaints of swelling in both eyelids since 4 days. The patient

complained of swelling in the left eyelid since 4 days before being admitted to the hospital after the head fell critically, then the left eye was red, painful, and secreted. Since 1 day before being admitted to the hospital, the right eye also experienced complaints such as the left eye.

He denied a history of frequent colds. History of toothache or cavities was denied. Previous history of the same illness was denied. The patient has a history of high blood pressure but is not regularly monitored. History of diabetes was denied. Family history of the same disease was denied.

Vital signs and general status were within normal limits. From the ophthalmologic status of the right eye, the visual acuity was 6/15, pressure p=n+0, eye movement in all directions (-2), superior and inferior palpebral edema, erythema, crusts, purulent secretions, tenderness, and tenderness of touch. Conjunctival mix injection, with cloudy lens and shadow's test (+). On the left eye, visual acuity was 6/15, pressure p=n+0, eye movement in all directions (-2), superior and inferior palpebral edema, erythema, crusts, purulent discharge, tenderness, and warm palpation. Chemotic conjunctiva, with cloudy lens and shadow's test (+) (figure 2A). Laboratory results within normal limits. The radiological results showed soft tissue swelling in the right-left orbital region and/or cellulitis.

The patient was diagnosed with bilateral preseptal cellulitis and bilateral ocular immature senile cataract. The patient received ceftriaxone injection therapy 1 g/12 hours, metronidazole drip 500 mg/8 hours, injection of methyl prednisolone 125 mg/6 hours, chloramphenicol EO/8 hours OD, mefenamic acid 500 mg/8 hours orally and warm compresses. The patient improved after 1 week of therapy (figure 2B).



Figure 2A. Case 2, Before Therapy



Figure 2B. Case 2, After Therapy

Case 3: Right Orbital Cellulitis

A 62-year-old woman came to the emergency department of RSMH Palembang with complaints of swelling in her right eye since 1 week. The patient complained of swelling in the right eye since 1 week before admission to the hospital accompanied by redness, and pain when moving the eyeball. The patient also complained of eye discharge and blurred vision.

History of previous eye trauma was denied. Previous history of the same illness was denied. The patient has a history of cataracts for 2 years. There are sores on the buttocks that don't heal. The patient also has a history of diabetes and high blood pressure but has never been under control. Family history of the same disease was denied. The patient's blood pressure was 151/78, other vital signs and general status were within normal limits. From the ophthalmologic status of the right eye, there was visual acuity no light perception, pressure 40.2 mmHg, eye movement in all directions (-3), superior and inferior palpebral edema, erythema, discharge, pus, tenderness, and warm touch. Chemotic conjunctiva, with cloudy lens and shadow's test (+). The anterior chamber is shallow, the iris has posterior synechiae, the pupil is irregular, central, and there is no light reflex. On the left eye, the visual acuity was 2/60, the pressure was 15.5 mmHg, the eyeball movement in all directions was normal, the lens was cloudy and the shadow's test (+) (figure 3A). Laboratory results showed that the patient was anemic (Hb 8.5 g/dL), leukocytosis 23,800/mm³, hypokalemia (K⁺ 2.2 mEq/L), random blood sugar 288 mg/dL, reactive HbsAg.

The patient was diagnosed with right orbital cellulitis, suspected right eye absolute glaucoma, and bilateral immature cataracts. The patient was admitted to the internal medicine department with a diagnosis of type II diabetes mellitus, hypertension, decubitus ulcer, sepsis, anemia, hypokalemia, and hepatitis B. The patient received ceftriaxone injection therapy 1 g/12 hours, metronidazole drip 500 mg/8 hours, brinzolamide 1% ED. 1 drop/8 hour OD, thymol 0.5% ED 1 drop/8 hour OD, chloramphenicol EO/8 hour OD, dexamethasone, neomycin sulfate, polymyxin B sulfate EO/8 hour OD, paracetamol 500 mg/8 hour orally, acetazolamide 250 mg/8 hours orally, KSR 1 tab/24 hours orally, and warm compresses. The patient's general condition worsened and the patient died within 1 week of treatment (figure 3B).



Figure 3A. Case 3, Before Therapy



Figure 3B. Case 3, After Therapy

Case 4: Right Preseptal Cellulitis

A 3-year-old girl weighing 12 kg came to the emergency department of RSMH Palembang with complaints of swelling in the right lower eyelid since 7 days. The patient complained of swelling in the lower right eye since 7 days before admission to the hospital. The swelling that initially looked like a pimple has been getting bigger and more painful since 5 days, then the lower eyelid has been [6559](#) bleeding for the last 2 days. The patient also complained of fever and discharge of pus.

Previous history of cough, runny nose, and toothache or cavities was denied. Previous history of the same illness was denied. History of previous eye trauma was denied. Family history of the same disease was denied.

Vital signs and general status were within normal limits. From the ophthalmologic status of the right eye, the eyelids showed inferior edema, erythema, blood, pus, and tenderness (figure 4A). Left oculi within normal limits. Laboratory results showed leukocytosis 11.960/mm³. The results of the CT scan of the orbit showed an abscess of the right lacrimal gland, right periorbital to m. Right inferior lid extends to m. Right masseter and extraconal in right infraorbita. Right maxillary region, but no paranasal sinusitis was seen.

The patient was diagnosed with right preseptal cellulitis. The patient received injection therapy of ceftriaxone 300 mg/12 hours, injection of methyl prednisolone 60 mg/12 hours, ibuprofen syrup 80 mg/8 hours orally, and warm compresses. The patient improved after 1 week of therapy (figure 4B).



Figure 4A. Case 4, Before Therapy



Figure 4B. Case 4, After Therapy

Case 5: Left Orbital Cellulitis

A 26-year-old woman came to the emergency department of RSMH Palembang with complaints of swelling in her left eyelid for 10 days. The patient complained of left eyelid pain, redness, and swelling since 10 days before hospitalized. Initially for 2 days the patient felt like a twinkle in his left eye, then the complaints got worse in the last 3 days. The patient also complained of fever. There is pus and complaints of watery eyes, but no blood. Previous history of cough, runny nose, and toothache or cavities was denied. Previous history of the same illness was denied. History of previous eye trauma was denied. He denied history of diabetes and high blood pressure. Family history of the same disease was denied. The patient has a history of chemotherapy due to lymph node cancer, and is usually a control to the medical oncology hematology clinic (HOM) RSMH.

Vital signs within normal limits. From the generalist status obtained ascites. From the ophthalmologic status, the left eye vision was 6/30, the pressure was 25.8 mmHg, the eyeball moved in all directions (-2), the eyelids were edematous superiorly, there was erythema, pus in the medial canthus, and tenderness. Conjunctival mix injection, FT (+) cornea at 12 o'clock superior 5 mm (figure 5A). Okuli dexa within normal limits. Laboratory results showed anemia (Hb 8.2 g/dL), leukopenia 3.600/mm³, and hyponatremia (Na²⁺ 122 mEq/L). The results of the CT scan of the orbit revealed a defect in the medial left palpebra with signs of abscess in the posterior part and left maxillary sinusitis.

The patient was diagnosed with left orbital cellulitis, left maxillary sinusitis, thymic large B cell lymphoma mediastinum stage IV liver metastases,

anemia, leukopenia, and hyponatremia. The patient received ceftriaxone injection therapy 1 g/12 hours, metronidazole drip 500 mg/8 hours, thymol 0.5% ED 1 drop/12 hours OS, paracetamol 500 mg/8 hours orally, and warm compresses. The patient improved after 2 weeks of therapy (figure 5B).

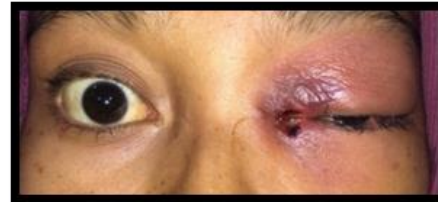


Figure 5A. Case 5, Before Therapy

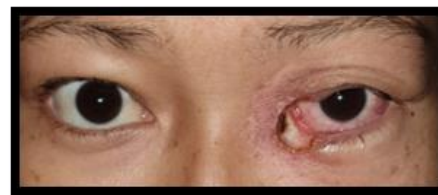


Figure 5B. Case 5, After Therapy

Case 6: Right Orbital Cellulitis

A 51-year-old man came to the emergency department of RSMH Palembang with complaints of swelling in the right eyelid since 1 week. The patient complained of right eyelid pain, redness, and swelling since 1 week before admission to the hospital. Initially, 3 weeks before admission to the hospital, the patient felt itchy right eye after dusting with dust, rubbed it and washed it with betel water, then red and painful eyes appeared. There is pus and complaints of watery eyes, but no fever.

The patient's right eye has been blind since birth, but the cause is unknown. Previous history of cough, runny nose, and toothache or cavities was denied. Previous history of the same illness was denied. History of previous eye trauma was denied. He denied history of diabetes and high blood pressure. Family history of the same disease was denied.

Vital signs and general status were within normal limits. From the ophthalmologic status of the right eye, there was visual acuity no light perception, palpebral edema and tenderness. Chemotic conjunctiva, cloudy cornea and details are difficult to evaluate. On the left eye, the visual acuity was 6/15 PH (6/7.5), cloudy cornea with shadow's test (+) (figure 6A & 6B). Laboratory results showed



leukocytosis 25,500/mm³. CT scan results of right orbital pseudotumor oculi.

The patient was diagnosed with right orbital cellulitis. The patient received ceftriaxone injection therapy 1 g/12 hours, metronidazole drip 500 mg/8 hours, methyl prednisolone injection 125 mg/6 hours, levofloxacin ED 1 drop/hour OD, chloramphenicol 1 drop/8 hours OD, and mefenamic acid 500 mg/hour. 8 hours orally. The patient improved after 1 week of therapy (figure 6B).



Figure 6A. Case 6, Before Therapy



Figure 6B. Case 6, Before Therapy



Figure 6C. Case 6, After Therapy

From July 2016 to October 2019 it was reported that 6 cases of periorbital cellulitis were treated at RSMH Palembang, with 3 cases being preseptal cellulitis and 3 cases being orbital cellulitis. A total of 3 cases of preseptal cellulitis and 2 cases of orbital cellulitis were reported to have clinical improvement and continued outpatient treatment until they recovered, while 1 case of orbital cellulitis was reported to have died due to complications of sepsis.

Table 1. Comparison of preseptal cellulitis and orbital cellulitis

Clinical Feature	Preseptal Cellulitis	Orbital Cellulitis
Palpebra edema with/ without erythema	Yes	Yes
Painfull	Can be found	Yes, it can cause deep eye pain.
Pain when moving the eyes	No	Yes
Proptosis	No	There's usually, but it's not very visible.
Ophthalmoplegia +/- diplopia	No	Can be found
Visual disorders	No	Can be found*
Chemosis	Rarely found	Can be found
Fever	Can be found	Can be found
Leukocytosis	Can be found	Usually found

* Afferent pupil defect may imply impending vision loss

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Discussion

Preseptal cellulitis according to the AAO definition is a common infection of the skin and soft tissues anterior to the orbital septum characterized by acute palpebral erythema and edema. This infection does not involve the eyeball. Another name for preseptal cellulitis used by some clinicians is periorbital cellulitis.^{1,2,7,8}

Orbital cellulitis according to the AAO definition is a common infection of the skin and soft tissues posterior to the orbital septum characterized by acute palpebral erythema and edema. This infection involves the orbital contents (the muscle and fat that lies within the orbit), but does not involve the eyeball. Orbital cellulitis is also known as postseptal cellulitis.^{1,3,6,9}

In many cases, it is difficult to differentiate clinically between preseptal cellulitis and orbital cellulitis. The majority of our cases had the classic signs of preseptal/orbital cellulitis namely edema of the eyelids, erythema, pain, decreased vision, limited eye movement, and the presence of secretions or pus. All complaints were unilateral except in one patient with a traumatic background, the complaints were bilateral. All patients with orbital cellulitis had fever and malaise.^{2,7,8}

The use of radiological modalities in the form of orbital and sinus CT scans can distinguish the two conditions, and can help assess the origin of the infection. A total of 3 cases were classified as preseptal cellulitis because the inflammation only



occurred in the anterior part of the orbital septum while 3 cases were classified as orbital cellulitis because the inflammation occurred to the posterior part of the orbital septum and even caused complications of sepsis.^{2,3,6-9}

Table 2. Summary of Cases

Parameters	N	Parameters	N
Gender:		Age:	
Male	3 (50%)	Child	1 (16,67%)
Female	3 (50%)	Adult	5 (83,33%)
History:		Antibiotic:	
Sinusitis	1 (16,67%)	Ceftriaxone	1 (16,67%)
Immunocompromise	2 (33,33%)	Ceftriaxone+Metronidazole	5 (83,33%)
Trauma	1 (16,67%)		
Without complication	2 (33,33%)		
Cellulitis:		Corticosteroi:	
Preseptal	3(50%)	Yes	4 (66,67%)
Orbital	3(50%)	No	2 (33,33%)
Surgery:		Hasil:	
Without surgery	5 (83,33%)	Preseptal Cellulitis	3 (50%)
With surgery	1 (16,67%)	Healed/improved	-
		Not healed/Passed away	
		<i>Orbital Celullitis</i>	
		Healed/improved	2(33,33%)
		Not healed/Passed away	1 (16,67%)

Changes in the anatomy of the orbit and paranasal sinuses may contribute to the development of orbital cellulitis. Normally, the maxillary, anterior ethmoidal, and frontal sinus fluids drain into the middle meatus; middle ethmoid sinus fluid drains into the ethmoid bulla and posterior ethmoid sinus fluid drains into the superior meatus; and sphenoid sinus fluid drains into the sphenothmoidal cavity. Obstruction of this drainage pathway by a number of causes including a tumor (as experienced by case number 1) causes clouding of the obstructed sinus and ultimately leads to overgrowth of microorganisms and infection.¹⁰ Posttraumatic orbital cellulitis may occur as a result of injury to the orbital septum. Signs of orbital infection usually appear 48–72 hours after injury, but may be delayed, especially in the case of foreign bodies. Early in the injury, orbital infection may not be suspected because the entrance wound is relatively small with minimal inflammation of the surrounding area, or is covered by bleeding or extensive edema on initial examination. Nevertheless, suspicion. Orbital infection should not be ruled out if the mechanism of injury makes it possible for a foreign body to enter the orbit. Infection can also come from the normal flora of the skin that enters the wound or infectious material that enters the orbit through a foreign object. The

most common cause of infection in posttraumatic orbital cellulitis is *Staphylococcus aureus*. In our case report, patient case number 2 developed infection after 4 days (> 72 hours) of previous trauma to the head and face.^{3,4} Sinusitis is the most common cause of orbital infection and is found in 70–90% of cases of orbital cellulitis. Often two or more sinuses are involved, with the majority being the ethmoid and maxillary sinuses.⁴ In our case report we found only 1 case (13.33%) with sinusitis. CT scan of the orbits and sinuses concluded that the results were in line with the theory, namely maxillary sinus involvement (case number 5). Various mechanisms have been proposed to explain the increased propensity for infection in diabetics. Some infections are more common in people with diabetes, others only occur in people with diabetes. Orbital cellulitis can originate from an external focus of infection such as a skin wound, sinusitis extension, dental infection, or endogenous spread of infection from any part of the body. We report case number 3 with right orbital cellulitis with suspected source of infection with diabetes and chronic decubitus ulcer.¹¹ Hematologic malignancies such as lymphoma, leukemia, and multiple myeloma directly alter the function of the immune system because they



involve the bone marrow and various cells that are primarily responsible for innate and acquired immunity. Treatment of cancer, especially lymphoma and leukemia, is known to be a source of altered immune function and cause infection. Classic cell-targeting cytotoxic chemotherapy highly active cells (cancer cells) destroy most of the immune system cells in the bone marrow. There have been many reports of an increased risk of sinus and orbital infection associated with such therapy. Orbital cellulitis is recognized as a potential complication of the use of targeted monoclonal antibodies and other biologic drugs for the treatment of autoimmune diseases. One patient in our report (case number 5) is on chemotherapy.^{12,13}

The principle of therapy of preseptal cellulitis and orbital cellulitis is the administration of antibiotics. Broad-spectrum antibiotics can be given first, until the culture results come out.¹⁴ The majority of patients (83.33%) in this case series received third-generation cephalosporin antibiotic therapy (ceftriaxone) which can treat both gram-positive and negative bacteria (especially useful in treating nosocomial infections from hospital and can penetrate the central nervous system for suspected MRSA) and metronidazole for anaerobic bacteria. In most of the patients in this case series there was improvement, so all intravenous antibiotics were given 2–3 days and then followed by oral antibiotics.^{2,3,6-9}

The use of corticosteroids in patients with preseptal cellulitis and orbital cellulitis is controversial. Not all guidelines include the use of corticosteroids in the management of preseptal cellulitis or orbital cellulitis. Research by Davis et al. (2015) concluded that corticosteroids can reduce edema and cell migration, preventing an increase in orbital pressure and compression of surrounding structures. Corticosteroids also inhibit the proliferation of fibroblasts thereby preventing the formation of scar tissue. The use of corticosteroids has also been shown to shorten parenteral antibiotic therapy and length of hospital stay. The majority of our cases (66.67%) used corticosteroids in combination for antibiotics.¹⁴⁻¹⁷

No patient required immediate more invasive action in the form of surgery because almost all cases improved with antibiotics, both from symptoms and physical examination (vision and eye movement). A total of 1 case we got with the underlying sinusitis and the patient was planned for further therapy to overcome the sinusitis.^{3,6,9}

Conclusion

This case report reports 6 cases consisting of 3 cases of preseptal cellulitis and 3 cases of orbital cellulitis with different ages. The six cases had symptoms of eyelid edema, erythema, pain, decreased vision, limited eye movement, and the presence of secretions or pus. A CT scan can be performed to confirm the diagnosis.

Therapy for all patients is warm compresses, antibiotics, and symptomatic drugs. Some patients also receive additional steroids. The antibiotics used were broad-spectrum cephalosporin third generation (ceftriaxone) which can treat gram-positive and negative bacteria and metronidazole to treat anaerobic bacteria. There was clinical improvement in 5 of 6 patients after this treatment, with 1 patient dying from complications of sepsis.

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