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Preseptal Cellulitis in a 54-Year-Old Woman with Uncontrolled Diabetes Mellitus: A Case Report

Adam Primadona Satari[1], Bernadetha Kusuma Kris Firmantya Tei Seran[2], Oktarina Nila Juwita[3]
[1]Universitas Tarumanagara, Indonesia,
[2]Rumah Sakit PKU Muhammadiyah Fastabiq Sehat, Indonesia,
[3]Rumah Sakit Umum Daerah RAA Soewondo, Indonesia
Email: adamprimadona@gmail.com, mathildabernadette@gmail.com

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ABSTRACT

Preseptal cellulitis is a skin infection around the eye that can originate from various sources such as sinusitis or trauma. This study explores the case of a 54-year-old patient with uncontrolled type 2 diabetes who presented with preseptal cellulitis. The patient complained of redness and pain around the left eye, with a history of fever and swelling for three days prior. Physical examination revealed hyperemic edema on the upper eyelid of the left eye with positive tenderness. CT scan imaging of the orbit and paranasal sinuses revealed hyperpigmentation in the left periorbital region, opacity in the right maxillary sinus with a polyp impression, and a hyperdense lesion in the right maxillary sinus with evidence of hyperostosis of the right maxillary bone. Laboratory results showed hyperglycemia, leukocytosis, uremia, and increased creatinine. The established diagnosis was preseptal cellulitis with potential complications. The discussion involves clinical aspects and management of preseptal cellulitis, including orbital anatomy, infection spread, diagnosis, and treatment. Patient management included the administration of antibiotics, anti-inflammatory drugs, and glycemic control. This study emphasizes the importance of research into the relationship between type 2 diabetes and preseptal cellulitis for a better understanding of risk factors and optimal management. In conclusion, this research provides in-depth insights into the complexity and risks of preseptal cellulitis in patients with uncontrolled type 2 diabetes and underscores the need for proper management to reduce complications in this condition.

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INTRODUCTION

Preseptal cellulitis, also known as periorbital cellulitis, is an infectious condition that occurs in the skin or soft tissues around the eye (Patrick et al., 2022). These infections are generally caused by infection foci such as rhinosinusitis, trauma, or infections in adjacent structures. The location of the cellulitis is limited by the orbital septum, so there are two types, namely periorbital cellulitis (anterior to the septum) and orbital cellulitis (posterior to the septum) (Baring, 2011). Although periorbital cellulitis rarely results in serious complications, there are cases where the infection can spread to become orbital cellulitis through the facial venous system that lacks valves (Anastasia et al., 2022: Jedud et al., 2024; Lee et al., 2025). The superior ophthalmic vein can also carry blood directly to the cavernous sinuses, increasing the risk of spreading the infection to intracranial structures (Kovačová & Minassian, 2022). The potential for intracranial spread means that inadequate treatment can result in serious complications (Trit, 2019).

Type 2 diabetes mellitus is one of the predisposing factors for infection, but cases of periorbital cellulitis in individuals with type 2 diabetes remain a rare occurrence (Zacay, 2021). Further investigation into the relationship between type 2 diabetes and periorbital cellulitis infection becomes relevant to better understand the clinical and management aspects of this condition (Andreou & Edington, 2021). The case that will be described next highlights the need for research on systemic comorbidities in the context of this local disease (Amiel et al., 2021).

The significance of this research lies in the potential for serious complications when periorbital cellulitis occurs in patients with uncontrolled diabetes (Zacay et al., 2021). These patients face increased risks of infection progression, treatment resistance, and systemic complications due to impaired immune function and microvascular complications (Schein et al., 2023). The novelty of this study is the comprehensive analysis of a rare clinical presentation - preseptal cellulitis in a patient with uncontrolled type 2 diabetes - incorporating detailed clinical, radiological, and laboratory findings to provide insights for improved diagnostic and management approaches.

This study aims to: (1) analyze the clinical presentation and diagnostic findings of preseptal cellulitis in a patient with uncontrolled type 2 diabetes mellitus; (2) examine the relationship between glycemic control and infection severity; (3) evaluate the effectiveness of the implemented treatment protocol; and (4) provide recommendations for managing similar cases in the future. The benefits of this research include enhancing understanding of the diabetes-infection relationship in orbital pathologies, improving clinical management protocols for immunocompromised patients with facial infections, and contributing to the literature on rare clinical presentations that require specialized care approaches.

METHOD

This study uses a case study design with a descriptive qualitative approach that comprehensively analyzes a 54-year-old male patient with preseptal cellulitis and uncontrolled type 2 diabetes mellitus at Um Soewondo Pati Hospital. Data were collected through structured history-taking, complete physical examination (ophthalmological and general status), and supporting examinations including CT scans of the orbit and paranasal sinuses, laboratory examinations (blood glucose, leukocytes, urea, creatinine), and clinical photo documentation. Data analysis was carried out in a thematic descriptive manner through data reduction, narrative presentation, and conclusion drawing based on the pattern of relationships between clinical, laboratory, and radiological findings, while maintaining aspects of medical ethics including patient confidentiality and ethics committee approval.

Case Report

A 54-year-old patient presented to the ophthalmology clinic of Um Soewondo Pati Regional Hospital with a complaint of a reddish swelling in the area around the left eye. The reddish swelling was accompanied by pain for 4 days prior to hospital admission. The swelling initially began with pain at the medial canthus where tears drain. The pain was followed by swelling in the lacrimal drainage area for a few days, then the swelling extended to the periorbital area. The swelling progressively enlarged and caused a sensation of ocular obstruction. The pain was described as sharp and constricting, making it difficult for the patient

to open his eyes. The pain was intermittent. Based on the visual analog scale (VAS), the patient rated the pain as 3 out of 10. The patient's symptoms were exacerbated by eye use, while symptoms improved with rest. The patient complained of eye swelling accompanied by fever for 3 days before hospital admission. The fever was quite high, but the patient did not know the exact temperature. The fever was intermittent. Complaints of blurred vision, photophobia, pain with eye movement, and tearing were denied. Complaints of nausea, vomiting, and dizziness were denied. The patient denied any history of upper respiratory tract infection or facial pain.

The patient had a history of type 2 diabetes mellitus for 2 years, but treatment compliance was poor. The patient sometimes took diabetes medication when remembered and omitted doses when forgotten. The patient rarely checked blood glucose levels or sought medical follow-up. The patient's diabetes mellitus treatment consisted of oral medications, but the patient could not recall the drug names and had never used injectable methods such as insulin.

On physical examination, vital signs were stable: blood pressure 120/80 mmHg, pulse 80 beats/minute, respiratory rate 20 breaths/minute, while the patient's temperature was slightly elevated at 37.6°C. On head-to-toe examination, no abnormalities were found. Ophthalmological examination revealed visual acuity of the right eye (*oculus dexter*) 6/6 and left eye (*oculus sinister*) 6/6. Eye movements of both eyes were normal in all directions. Examination of the left eye cilia revealed an abnormality in the form of white rough scales. The superior eyelid of the left eye showed irregular hyperemic edema with ill-defined borders extending to the supraorbital region, measuring 5×5 cm. On palpation, there was positive tenderness in the edematous area. No lagophthalmos, ptosis, entropion, or ectropion were found. The inferior eyelid of the left eye showed no abnormalities. The conjunctiva, lacrimal apparatus, sclera, cornea, anterior chamber, pupil, iris, and lens of both eyes showed no abnormalities. Fundoscopy examination was not performed on this patient.



Figure 1. Clinical Photos of patients

The imaging performed on this patient was computed tomography (CT) scan imaging of the orbital area and paranasal sinuses. The results of the imaging showed abnormalities including hyperpigmentation in the left periorbital region of moderate size, opacity in the right maxillary sinus suggestive of polyps, and hyperdense lesions in the right maxillary sinus suggestive of hyperostosis of the maxillary bone. No abnormalities were found in the extraocular muscles and optic nerve.

In laboratory examination, the patient had hyperglycemia (470 mg/dL; normal <200 mg/dL), leukocytosis (11,900/µL; normal 4,500-11,000/µL), uremia (90.6 mg/dL; normal 15-43 mg/dL), and increased creatinine (2.63 mg/dL; normal 0.6-1.1 mg/dL).

Based on these findings, the primary diagnosis was established as preseptal cellulitis with a differential diagnosis of extraorbital tumors and orbital cellulitis of the left eye, accompanied by uncontrolled type 2 diabetes mellitus. The treatment administered to the patient included gentamicin eye drops 4×1 drop to the left eye, cefotaxime injection 2×1 gram IV, dexketoprofen 2×1 ampoule, co-amoxiclav 3×500 mg PO, NovoRapid 10 units-10 units-10 units, insulin glargine 0-0-10 units, metformin 500 mg PO, and Ringer's lactate infusion 20 drops per minute.

RESULTS AND DISCUSSION (10 PT)

The septal orbital is a membrane sheet that comes from the orbital periosteum layer; This boundary determines whether the infection is periorbital (preseptal) or orbital (postseptal). Infections that are preseptal in nature rarely cause serious complications, and in some cases can lead to orbital cellulitis. The septal orbital also serves as a barrier. However, periorbital infections can also spread through the facial venous system that lacks valves, allowing easy access for the spread of infection to the posterior part of the orbit and beyond it. The superior and ophthalmic veins also flow blood directly to the cavernous sinuses, which can allow it to spread to intracranial structures. Improper treatment can cause the infection to develop and become invasive to the point of causing ophthalmic complications such as vision impairment and blindness, as well as intracranial complications (James, 2018).

Periorbital cellulitis is generally caused by the spread of infection from rhinosinusitis or infection after local trauma; therefore, knowledge of the anatomy of the orbit and its surrounding structures is important to understand the spread and causes of periorbital cellulitis (Aubin-Lemay, 2018). The orbit, which is lined by the periosteum, is surrounded by the paranasal sinuses: the frontal sinuses are in the upper part, the ethmoid sinuses are in the medial part, and the maxillary sinuses are in the inferior part. In this patient, it is possible that the infection originated from an infection in the maxillary sinuses, according to the findings obtained in the patient's imaging. The focus of the infection that can be suspected in this patient can also come from an infection in the lacrimal duct according to the findings of the patient's anamnesis (Meija, 2023).

Periorbital cellulitis presents with periorbital erythema, edema, and swelling of the eyelids. Complaints are usually unilateral. Vision, eyeball movement, and intraocular pressure are usually normal because infection and inflammation are superficial and anterior to periocular tissue without involving extraocular muscles (Powell, 1995). In contrast, orbital cellulitis occurs after a more extensive posterior infection of the orbital septum. This will cause symptoms such as proptosis, limited extraocular movement, ophthalmoplegia, and decreased vision in addition to erythema and eyelid edema. On physical examination, the condition of preseptal cellulitis also rarely causes a state of high fever (Upile, 2012). The results of the findings of the anamnesis and physical examination in this patient are in accordance with the theory, where edema was obtained on the basis of unilateral erythema. Edema is not accompanied by impaired vision and movement of the eyeballs. Patients also get fever but the fever is only subfebris.

The diagnosis of periorbital cellulitis is largely based on a clinical diagnosis with radiological findings. In many cases, the clinical difference between periorbital and orbital cellulitis is unclear. CT scans of the orbit and sinuses allow the separation of these two conditions, as well as help determine the extent of the infection (Jabarin, 2018). If the diagnosis cannot be clearly established, the patient can be classified as orbital cellulitis. In cases where an abscess is suspected, a CT scan of the head is required to rule out intracranial involvement. CT scan is recommended if there is significant eyelid swelling, fever,

leukocytosis, or no improvement after 24 hours of proper antibiotic administration (LaPonsie, 2017). Findings on a CT scan of periorbital cellulite will show swelling of the eyelids, no proptosis, no inflamed fat from the orbital contents, and no extraocular muscle involvement. One study found that 41% of patients with periorbital cellulitis showed evidence of sinusitis on CT scans (Bae, 2023). On the CT Scan examination, the patient was found to have hyperpigmentation such as a solid mass in the left extra bulbar with a medium size, gloom in the right maxillary sinus with the impression of polyps, and hyperdens lesions in the right maxillary sinus with the impression of hyperostosis os maxillary dextra. The CT scan image led to the finding of a local infection that could be periorbital cellulitis. However, the presence of solid mass findings in the extra bulbar occuli sinistra indicates the possibility of a comparative diagnosis in the direction of occuli sinistra tumors.

Periorbital cellulitis treatment differs based on the severity of the disease and the age of the patient. The main pillar of treatment is usually antibiotics that include coverage against *S.aureus*, Streptococcus species, and anaerobic bacteria (Okonkwo, 2018). Patients who already have symptoms from one year with mild symptoms can be treated as an outpatient with oral antibiotics. Patients with acute clinical manifestations or less than one year old should be hospitalized (Afteh, 2015). In this patient, there are several antibiotic regimens given, including gentamycin eye drops 4x1 drops OS, Cefotaxim injection 2x1 gram IV, and coamoxyclav 3x500 mg. The combination of antibiotics has met the scope of Streptococci, Staphyococci, gram negative bacilli, gram negative cocobacolli, and anaerobs.

Meltus diabetes with poor glycemic control is often associated with several other complications, such as microvascular and macrovascular (Perason-Stuttard, 2016). In addition, the risk of uncontrolled diabetes mellitus paa apsian infection also often increases. Based on previous studies, it was found that HbA1c >7.5% (58 mmol/mol) was associated with a 1.4-fold increased risk of cellulitis. There was a 1.12-fold increase in the risk of cellulitis for every 1% increase (11 mmol/mol) in HbA1c (Zacay, 2021). In this patient, poor glycemic control was obtained. This can be one of the risk factors for infection in the patient's eyes.

CONCLUSION

Preseptal cellulitis is an infection of the skin around the eye that can originate from infection foci such as sinusitis or trauma and has the potential to develop into orbital cellulitis with serious consequences, including spread to intracranial structures. This case highlights the importance of research into the relationship between type 2 diabetes mellitus and preseptal cellulitis to better understand the clinical and management aspects of this condition. A case study of a 54-year-old patient with type 2 diabetes mellitus showed symptoms of preseptal cellulitis, including a reddish swelling, pain, fever, and periorbital edema. Physical examination and CT scan findings supported this diagnosis, and the patient received a treatment regimen that included antibiotics, anti-inflammatory drugs, and diabetes management. Discussion regarding orbital anatomy, infection spread, diagnosis, and treatment of preseptal cellulitis provides in-depth insights into this condition. Additionally, the emphasis on poor glycemic control in patients with diabetes mellitus as a risk factor for increased infection susceptibility provides additional understanding. Overall, this study demonstrates the complexities and risks associated with preseptal cellulitis, particularly in patients with uncontrolled type 2 diabetes mellitus. Proper management and a thorough

understanding of these risk factors are essential to reduce complications and improve clinical outcomes in patients with similar conditions.

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