Med & Health Aug 2024; 19(2): 648-655 https://doi.org/10.17576/MH.2024.1902.22

CASE REPORT

Necrotizing Fasciitis of the Eyelid Secondary to *Pseudomonas aeruginosa* Infection

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Received: 31 July 2023 / Accepted: 11 March 2024

ABSTRAK

Seorang lelaki berumur 65 tahun dengan sejarah implan orbit sekunder mata kanan untuk soket 'anophthalmia' dengan sindrom soket pasca-enukleasi dan tiada sejarah masalah kesihatan telah mengalami bengkak pada kelopak mata kiri dan kemerahan selama 5 hari. Masalah tersebut semakin teruk dan turut mengalami kesakitan. Pemeriksaan mata menunjukkan visual akuiti mata kiri ialah 6/12. Kelopak mata bawah kiri turut bengkak, sakit apabila disentuh dan kemerahan, serta keluarnya cecair lendir pada mata kiri. Pada bahagian tengah kelopak atas mata kiri, didapati kulit mengalami hakisan, ulser dan di selubungi tisu nekrosis. Pemeriksaan funduskopi dan pemeriksaan sistemik yang lain adalah normal. Pesakit menjalani prosedur pembedahan untuk mencuci dan mengeluarkan tisu kulit yang rosak serta tompok nekrosis. Kultur nanah menunjukkan 'Pseudomonas aeruginosa'. Antibiotik intravena diberikan mengikut sensitiviti mikroorganisma. Ujian darah menunjukkan 'neutropenia' dan siasatan lanjut tidak menunjukkan sebarang bukti jangkitan kuman, keradangan atau tanda-tanda kanser sel darah. Walau bagaimanapun, pesakit tidak memberi keizinan untuk ujian aspirasi sum-sum tulang dan biopsi 'trephine'. Selepas 10 hari di wad, keadaan pesakit bertambah baik. Semasa rawatan susulan di klinik, keadaan mata menunjukkan resolusi sepenuhnya serta tiada relaps. Rawatan segera serta prosedur pembedahan untuk penyingkiran tisu kulit yang mati dan rosak pada luka dan antibiotik intravena adalah mandatori dalam kes 'necrotising fasciitis' kelopak mata.

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Kata Kunci: Debridemen; kelopak mata; 'necrotising fasciitis'; Pseudomonas aeruginosa

ABSTRACT

A 65-year-old male with a history of right-eye secondary orbital implant for anophthalmia socket with post-enucleation socket syndrome and no comorbidities presented a 5-day history of left eyelid redness and swelling. Progressive exacerbation ensued, accompanied by pain. On examination, the visual acuity of the left eye measured 6/12. Manifestations included a swollen, tender, erythematous lower lid and purulent ocular discharge. Notably, the middle third of the left lower lid displayed erosions and ulcerations with an overlay of necrotic tissue. Systemic and funduscopic examinations yielded unremarkable findings. The intervention involved debridement, wound desloughing and excision of the necrotic patch. Subsequent culture of purulent discharge revealed the presence of *Pseudomonas aeruginosa.* Intravenous antibiotics were administered according to microorganism sensitivity. Hematological investigations unveiled neutropenia, while subsequent comprehensive assessments excluded evidence of infectious, inflammatory, or hematological malignancies. Regrettably, the patient declined both bone marrow aspiration and trephine biopsy. After a 10-day inpatient observation, symptoms demonstrated marked improvement. Subsequent clinical follow-ups indicated complete symptom resolution without relapse. Urgent intervention comprising wound debridement and intravenous antibiotic therapy stands as imperative in necrotising fasciitis of the eyelid.

Keywords: Debridement; eyelid; necrotising fasciitis; *Pseudomonas aeruginosa*

INTRODUCTION

Necrotising fasciitis (NF) is an uncommon and serious infection of the subcutaneous soft tissue and underlying fascia. NF infrequently affects the head, neck and even less frequently, the periorbital region (Bisno & Steven 1996). The infection spreads quickly through tissues, causing septicemia and even fatal. Symptoms and signs can range from nonspecific, such as pain and swelling, to obvious, such as blistering, tissue necrosis, or septicemia (Carter & Banwell 2004). Most adults who develop NF also have at least one other underlying condition that makes them more susceptible to infection, such as diabetes mellitus or malignancy (Green et al. 1996). Distinguishing NF from periorbital cellulitis, despite similar presenting symptoms, is crucial due to the differing treatment strategies. NF demands a more aggressive therapeutic approach involving intravenous antibiotics and surgical debridement. If left unattended, periorbital NF can

precipitate blindness, orbital lesions, meningitis, various neurological complications, and fatal outcomes (Doorenbos-Bot et al. 1990). Thus, we reported a rare case of NF of the eyelid secondary to *Pseudomonas aeruginosa* infection.

CASE REPORT

A 65-year-old male with a history of right-eye secondary orbital implant for anophthalmia socket with post-enucleation socket syndrome and no comorbidities presented with a 5-day history of left eyelid redness and swelling. Progressive exacerbation ensued, accompanied by pain. There was no ocular discharge, itchiness, blurry vision, or diplopia. The patient denied any history of trauma or insect bites. Additionally, there was a clear denial of any utilisation of traditional medications or immunosuppressive agents, including corticosteroids. Furthermore, the patient disclosed an absence of prolonged fever, cough, significant changes in appetite or weight, and denied any issues related to poor hygiene practices.

On examination, the visual acuity of the left eye measured 6/12. Manifestations included a swollen, tender, erythematous lower lid and purulent ocular discharge (Figure 1). Notably, the middle third of the left lower lid displayed erosions and ulcerations with an overlay of necrotic tissue measuring about 1.2 x 0.5 cm. Inferior conjunctival injection was observed (Figure 2). The examination of optic nerve function revealed normalcy, along with unremarkable extraocular muscle mobility. The intraocular pressure was normal in bilateral eyes. Funduscopy showed a normal optic disc and macula. Systemic examinations were unremarkable. The patient was admitted to the ward for further management.

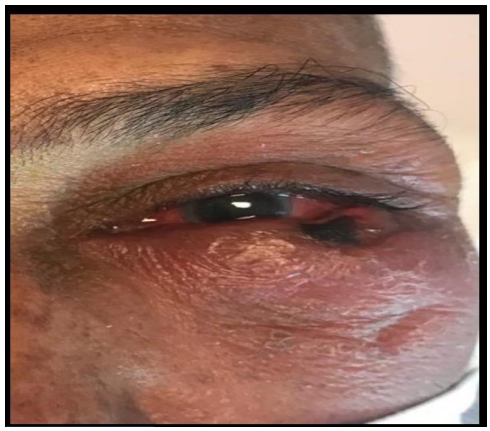

FIGURE 1: The bulbar conjunctiva was injected over the left eye. The lower lid was swollen and erythematous over the periorbital area with a necrotic patch at the lower lid

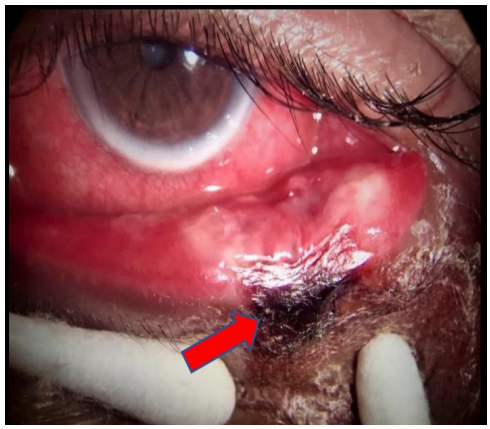

FIGURE 2: There were erosions and an ulcerated middle third of the left lower lid with an overlying necrotic patch (red arrow)

An urgent contrast-enhanced computed tomography of the orbit

revealed inflammatory changes of the left lower lid extending into the anteroinferior part of the orbit and abutting the lower margin of the globe (Figure 3). No obvious abscess formation was seen. There was the presence of a right orbital implant (Figure 4).

A diagnosis of NF of the left eyelid was made. The intervention involved debridement, wound desloughing, and excision of the necrotic patch (Figure 5). Subsequent culture of purulent discharge revealed the presence of *Pseudomonas aeruginosa* and the patient initiated a 3-day course of intravenous Augmentin (amoxicillin and clavulanate) followed by a switch to intravenous Ciprofloxacin for one week, as per the sensitivity results of the identified microorganism. Hematological investigations unveiled neutropenia (total white cell count 1.0 x 10^9/L and neutrophil count of 0.2 x 10^9/L). A full blood picture showed no blast cells. Following thorough evaluations, such as viral screenings and tumor marker analyses, no indications of infectious, inflammatory, or hematological malignancies were detected. Capillary blood sugar and fasting blood glucose levels ell within the established normal range. Regrettably, the patient declined both bone marrow aspiration and trephine

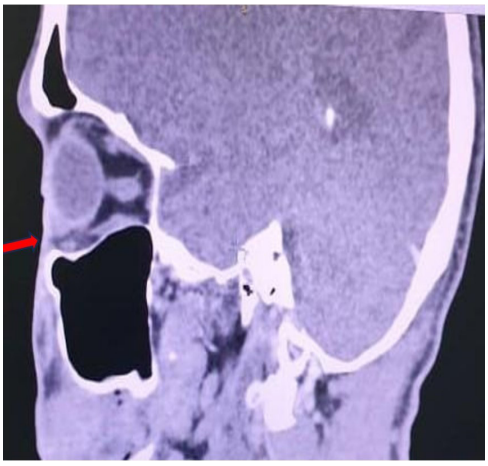

FIGURE 3: The images of computed tomography of the orbit revealed inflammatory changes of the left lower lid extending into the anteroinferior part of the orbit and abutting the lower margin of the globe (red arrow)

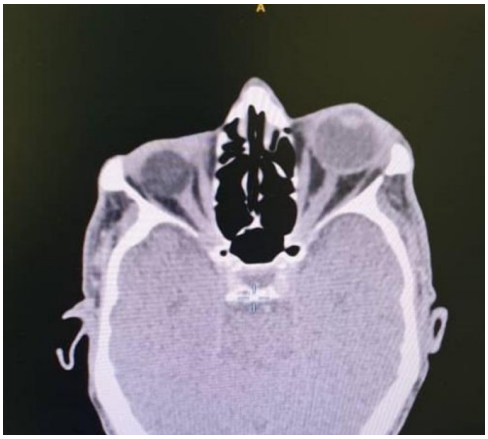

FIGURE 4: No obvious abscess formation was seen. There was the presence of a right orbital implant

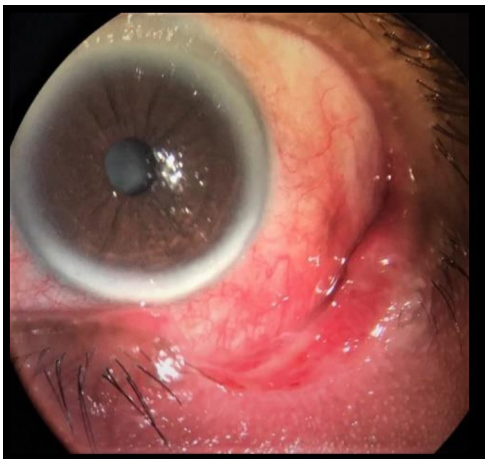

FIGURE 5: Post operative day 3

biopsy. After a 10-day inpatient observation, symptoms demonstrated marked improvement. Subsequent clinical follow-ups indicated complete symptom resolution without relapse and the wound gradually closed by secondary intention without skin grafting (Figure 6 & 7).

DISCUSSION

This report illustrated NF of the eyelid due to *Pseudomonas aeruginosa* infection. NF of the eyelid can be devastating if prompt action is not taken. Diabetes, alcoholism, cancer, human immunodeficiency virus (HIV) infection, chronic renal failure, peripheral vascular disease, immunosuppressive therapy, chronic cardiac and pulmonary disease have all been identified as major risk factors (Carter & Banwell 2004). *Pseudomonas aeruginosa* is a Gram-negative aerobic rod with such low virulence that it is practically incapable of causing serious disease in a healthy patient. It is an opportunistic organism that is commonly found in patients with chronic pulmonary diseases, cystic fibrosis, and severe burns, as well as in those who are immunocompromised (Woog et al. 1986). After Group A Beta Hemolytic Streptococcus, *Pseudomonas aeruginosa* is the most prevalent single bacteria responsible for periorbital NF. Most patients with pseudomonas infection had neutropenia, and the neutrophil count improved concurrently with infection clearance (Dickenson & Yates 2002). On the other hand, in our case, the patient had no previous comorbidity but was noted to have persistent leukopenia upon blood investigation, even though the infection had already resolved. A full blood picture showed no blast cells; however, the patient refused bone marrow aspirate and a trephine biopsy to rule out myelodysplastic syndromes.

Luksich et al. (2002) also highlighted the distinctive behavior of NF within

FIGURE 6: Post operative 6 month

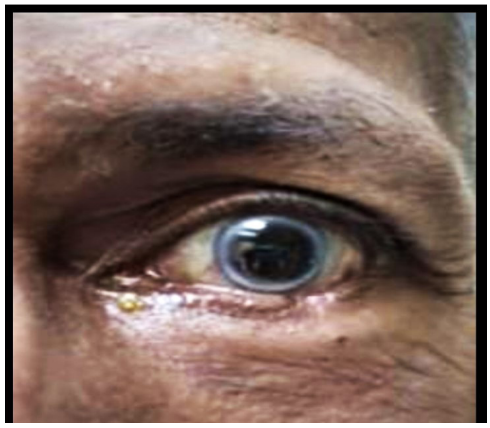

FIGURE 7: Post operative 18 months (the wound gradually closed by secondary intention without skin grafting)

the eyelid, attributed to its unique anatomical characteristics such as abundant blood supply in the orbicularis oculi muscle, thin skin, and the absence of subcutaneous fat between the skin and the muscle layer. Notably, cutaneous infection manifests earlier, leading to rapid thin eyelid necrosis, resulting in a relatively brief interval between symptom onset and treatment initiation. The eyelids exhibit innate resistance to infection owing to the protective role of the vascularised barrier formed by the orbicularis oculi muscle within the subcutaneous layer, shielding the superficial skin from necrosis. Additionally, the rich vascular supply in the marginal strip of the lid, known as the eyelid marginal arterial arcade, often spares this area from involvement. Moreover, lateral and inferior firm dermal attachment at the nasojugal and malar furrows, in conjunction with the orbicularis oculi muscle, collectively establish an 'anatomical barrier,' confining inflammatory dissemination from the orbit. Consequently, patients necessitating exenteration due to deep orbital engagement frequently exhibit relative preservation of the eyelid, thus elucidating this phenomenon (Overholt et al. 1992).

Typically, diagnosing this condition necessitates excluding acute fulminant skin infection, pyoderma gangraenosum, and various infectious etiologies such as orbital cellulitis, staphylogenic Lyell syndrome, endogenous endophthalmitis, cavernous sinus thrombosis, and rhino-orbital mucormycosis (Jensen et al. 2004; Lazzeri et al. 2010). It is crucial to differentiate periorbital NF from orbital and preseptal cellulitis. Initially, distinguishing between NF and preseptal cellulitis is difficult, if not impossible. However, to distinguish this ailment from ordinary non-necrotising preseptal cellulitis, we observed indications of speedy progression, eventual tissue cyanosis (presenting as violet discoloration), and the emergence of serum-filled bullae. The presence of dusky erythema in a cellulitis region can differentiate orbital cellulitis from periorbital NF, where antibiotic treatment alone cannot halt the skin lesion progression toward necrosis. Instead, extensive removal of necrotic tissue and antibiotic therapy are the only effective measures (Lazzeri et al. 2010).

Computed tomography (CT) scans and magnetic resonance imaging (MRI) can also detect the degree of NF and soft tissue edema entering the fascial planes several hours before cutaneous symptoms arise. A CT scan has also been used to guide surgical debridement (Saldana et al. 2010). Early detection and immediate surgical debridement with broad-spectrum intravenous antibiotic treatment remain the most important strategies for minimising NF mortality (Wong et al. 2003). Any delay in diagnosing the condition could spread bacteria throughout the body, causing septicemia, and leading to the failure of multiple organs, ultimately increasing the mortality rates, which could range from 30% to 70%. Additional problems that may arise include the loss of eyesight or facial deformities as well as tissue death, resulting in

scarring and the possible reoccurrence of the infection (Lazzeri et al. 2010; Wong et al. 2003).

The prognosis depends on the infection's severity, the patient's age and health, and the treatment timing. The mortality rate from periorbital NF is expected to be between 10% and 14.42%, considering systemic effects, such as septicemia, shock, and multi-organ failure (Lazzeri et al. 2010). However, early diagnosis, prompt and aggressive treatment with antibiotics, and surgical debridement can significantly improve the chances of recovery. Several cases of periorbital NF have been reported in the literature (Table 1).

CONCLUSION

NF of the eyelid is a rare but extremely serious infection that requires prompt medical attention. A clinical diagnosis of NF of the eyelid can be made if there is a high index of suspicion; urgent intervention comprising wound debridement and intravenous antibiotic

TABLE 1: Summary of reported cases of ocular necrotizing fasciitis

Studies	Area of ocular necrotizing fasciitis	Organism	Treatment	Outcome
Doorenbos-Bot et al. 1990 (n=1)	Eyelid	*Cryptococcus neoformans*	Surgical debridement with systemic antifungal (fluconazole)	Adequate appearance and function after ectropion surgery
Overholt et al. 1992 (n=18)	Eyelid	Group A β-hemolytic Streptococcus	Surgical debridement with systemic antibiotic (penicillin G and nafcillin)	Adequate appearance and function
Dickenson et al. 2002 (n=1)	Eyelid	*Pseudomonas aeruginosa*	Surgical debridement with systemic antibiotic (gentamicin and ceftazidime)	Adequate appearance and function
Luksich et al. 2002 (n=7)	Eyelid	Group A β-hemolytic Streptococcus	Surgical debridement with systemic antibiotic (ceftriaxone and clindamycin)	Adequate appearance and function
Jensen et al. 2004 (n=1)	Periorbital	Group A β-hemolytic Streptococcus	Surgical debridement with systemic antibiotic (penicillin G and clindamycin)	Deceased
Lazzeri et al. 2010 (n=103)	Periorbital	- Group A β-hemolytic Streptococcus - *Pseudomonas aeruginosa* - *Cryptococcus neoformans* - *Staphylococcus aureus* - *Moraxella catarrhalis*	Surgical debridement with systemic antibiotic (meropenem and ciprofloxacin)	The overall mortality rate was 14.42%.

therapy stands as imperative in NF of the eyelid. It has a high morbidity and mortality rate, and patients may require extensive surgical intervention and prolonged hospitalisation. Timely diagnosis and appropriate treatment are critical for a successful outcome.

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