

Unilateral Periorbital Necrotizing Fasciitis – A Case Report

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Abstract:

Introduction: Periorbital necrotizing fasciitis is rare due to the excellent blood supply to the area, but nevertheless can sometimes lead to death. Knowledge of the symptoms of the disease enables rapid diagnosis, which reduces the possibility of serious complications of the disease and its mortality. To date, few publications describing the disease entity have been presented.

Patient description: A 70-year-old male patient was admitted to the hospital with necrotizing fasciitis of the left upper eyelid region, diagnosed on the basis of fulminant development of necrosis and a positive bacteriological test for *S. pyogenes*.

Results: Contrast-enhanced computed tomography showed the presence of a pathological inflammatory infiltrate within the eyelid of the left eye and subcutaneous tissue at the preseptal level of the orbit and left cheek. Blood tests showed leukocytosis (total white blood cell count of $17.33 \times 10^9/L$ with 87.1% neutrophils) and elevated C reactive protein parameters (240.64 mg/L). Empirical intravenous antibiotic therapy was administered: 1 g of amoxicillin with 200 mg of clavulanic acid every 8 hours, 500 mg of metronidazole every 8 hours, and ciprofloxacin into the left and right conjunctival sacs 3 mg/ml every 6 hours. Surgical debridement of upper eyelid necrosis was performed on the second day of hospitalization.

Conclusions: The peculiar anatomical structure of the periocular region promotes the dynamic development of necrotizing fasciitis. The close proximity of the central nervous system and the eyeball threatens irreversible consequences, including loss of vision or death. Early appropriate targeted treatment can effectively stop the development of the disease and prevent severe complications.

Key words:

necrotizing fasciitis, group A *Streptococcus*, infectious diseases.

Necrotizing fasciitis (NF) is the most common necrotizing soft tissue infection (NSTI) [1]. NF is a bacterial infection with a high mortality rate; that leads to the rapid destruction of the muscle fascia and subcutaneous adipose tissue [1–10]. The incidence of NF is estimated at 0.3 to 15 cases per 100,000,000 population [1]. Immunocompromised patients and those with chronic diseases, such as diabetes mellitus, malignant neoplasm, vascular disease, obesity, and a history of trauma, are more predisposed to develop NF [2]. Typically, infection develops in the trunk, lower extremities, perineum and scrotum. NF in the head and neck region and especially the face is extremely rare [3]. The mortality rate for upper facial infections is as high as 12.5% of cases [4].

Case report

A 70-year-old patient was admitted to the Department of Maxillofacial Surgery of Andrzej Mielecki Hospital in Katowice due to a suspected orbital abscess with diffuse necrosis of upper eyelid tissues. He had a history of increasing swelling and pain in the left temporal and left orbital regions for 2 days, along with loss of visual acuity of the left eye. In addition, the patient reported the occurrence of hoarseness, coughing and an elevated body temperature of up to 39°C. He denied any trauma to the head area.

He was being treated for hypertension and type II diabetes on a chronic basis, had a body mass index (BMI) of 29.76 and had undergone an operation 5 years ago for frontal sinus polyps. He reported no allergies. Initially he was treated with chloramphenicol ointment to the left eye by a general practitioner. Due to a drastic deterioration of his local condition, he was admitted to the emergency room after two days.

On admission, visual acuity test of the left eye was limited, because of complete closure of the left eyelid due to diffuse stromal necrosis of the upper eyelid. Local redness, warming and swelling of the temporal area, upper and lower eyelids were seen (Fig. 1).

Body temperature was 38°C. The patient's Glasgow Coma Score was 15.



Fig. 1. Clinical appearance of the patient on admission.

Contrast-enhanced computed tomography (CT) showed the presence of a pathological infiltrate, firstly inflammatory, within the eyelid of the left eye and subcutaneous tissue at the preseptal level of the orbit and left cheek with an approximate size of 25 x 68 x 88 mm, without orbital involvement (Fig. 2). In addition, normal frontal sinuses pneumatization and lack of pneumatization of some of the rhethus cells were observed, as well as enlarged, multiple cervical lymph nodes at levels I–V on the left

side with dimensions of up to 15 mm. Structures of the pharynx and larynx were symmetrical, without foci of pathological enhancement.



Fig. 2. Sagittal section of a CT scan of a patient on admission.

Endoscopic examination visualized swelling of the lower pharynx on the left side, swelling of the left tincture, and generalized redness of the mucosa – changes of an inflammatory reaction.

Blood tests showed leukocytosis – total white blood cell count (WBC) $17.33 \times 10^9 / L$ with 87.1% neutrophils – and elevated C-reactive protein (CRP) (240.64 mg/ L).

After analysis of the clinical condition, the patient was diagnosed with unilateral periorbital necrotizing fasciitis. A swab was taken for a bacteriological examination. Empirical intravenous an-

tibiotic therapy was administered: 1 g of amoxicillin with 200 mg of clavulanic acid every 8 hours, 500 mg of metronidazole every 8 hours, and ciprofloxacin into the left and right conjunctival sacs 3 mg/ ml every 6 hours. Within 24 hours, there was a reduction in the swelling of the left upper eyelid. The patient was qualified for surgical removal of necrosis, which was performed on the second day of hospitalization, the material was sent for histopathological examination (examination result: necrotic masses with abundant purulent inflammatory infiltrates (Fig. 3).

The wound culture grew *Streptococcus pyogenes*; hence antibiotic therapy was not changed. Daily wound toilet was performed with saline and sterile active silver compresses (Fig. 4).

On the fourth day, spontaneous dilation of the eyelid stroma was seen, and a decrease in CRP (6.90 mg/ L) was noted (Fig. 5). A total of 10 days of intravenous antibiotic therapy were administered.

One week after discharge, the upper eyelid wound was in a state of healing by granulation. Finally, two weeks after discharge, healing of the upper eyelid wound with normal eyelid function and no eyelid regurgitation, as well as normal visual acuity, was achieved (Fig. 6 and 7).



Fig. 4. Daily wound care using sterile active silver compresses.



Fig. 3. Status after surgical debridement of left upper eyelid necrosis (second day).



Fig. 5. Fifth day of hospitalization



Fig. 6. and 7. Patient's clinical appearance 2 weeks after discharge.

Discussion

According to scientific studies, about 10% of NF affects the head and neck region [5]. As reported by Tambe et al, there have been less than 60 well-documented case reports of periorbital NF in the last 50 years [5]. The small number of publications on the disease and the lack of clearly developed algorithms for diagnosis are the main diagnostic challenges. Periorbital NF is a rare but life-threatening soft tissue infection with a fulminant course. Periorbital NF has a mortality rate of 8–15% [6]. Existing publications report the onset of NF between the ages of 1 and 95 years, but no gender predilection has been demonstrated [2]. One of the risk factors for the development of the disease is diabetes [1–10], which was present in the history of our patient.

Making a correct diagnosis in the early stages of NF is very difficult, due to the small number of skin lesions. The use of antibiotic therapy before admission to the hospital modifies the clinical picture, further increasing the diagnostic difficulty, which occurred in the case of the described patient. The Laboratory Risk Index for the Diagnosis of Necrotizing Fasciitis (LRINEC index), which includes parameters such as WBC, CRP, hemoglobin level (HGB), serum sodium level (Na), serum creatinine level (CREA) and blood glucose level (GLU), proves helpful [5]. Wong and colleagues have attempted to design a risk calculator for NF in which points are assigned to various laboratory test results, but this system has not been rigorously validated [2].

NF, like cellulitis, is characterized by erythema, swelling and warming of the skin. In both diseases an increase of body temperature may occur. The main differentiating factor is the patient's general clinical condition – his hemodynamic stability, which is usually preserved in cellulitis. In addition, in NF, there may be extreme tenderness or pain that is disproportionate to the degree of injury visualized. However, patients with diabetic neuropathy may not experience the same level of pain. On the other hand, deep tissue infection may suggest elevated creatine kinase or aspartate aminotransferase levels in laboratory tests [1], which were not performed in the presented patient.

Necrosis in NF develops as a result of pathogen invasion and infiltration of polymorphonuclear leukocytes, leading to vascular thrombosis and ischemia, followed by subcutaneous gangrene of the adipose tissue and dermis. Due to the thin skin and relative

lack of subcutaneous tissue in the periorbital region, necrosis occurs more rapidly in the area than in other parts of the body, and gangrene develops even after 24 hours [7]. Elner et al. emphasize that the rich blood supply to the orbit acts as a barrier, preventing the spread of infection into the orbit [6].

In 1977, Giuliano et al. proposed a division of NF based on the microbial causative agent (NF I, II, III, IV) [2]. Subtypes I and II are the majority of cases involving ocular adnexa. In a review of the literature, Amrith et al. found that group A beta-hemolytic *Streptococcus* was the most commonly cultured microorganism [2]. In the described case, one pathogen was isolated: *Streptococcus pyogenes*.

The primary treatment for NF is surgical debridement of the wound as soon as possible [1–10]. Some researchers have noted that NF can be effectively treated with intravenous antibiotic therapy alone (Hooi et al.) [4]. Rhujuta et al. attribute the good clinical and cosmetic results without surgical debridement to the short time between the onset of the first symptoms and the initiation of aggressive intravenous antibiotic therapy. They emphasize that CT and magnetic resonance imaging (MRI) can be helpful in early diagnosis by identifying fascial plane infiltration and/ or subcutaneous emphysema [8].

In the head and neck region, especially the periorbital region, sometimes it is necessary to use skin grafts to reconstruct the eyelids, thus restoring full visual function [4, 5]. In the presented patient, no grafts were necessary.

There have been studies that show hyperbaric therapy as a beneficial addition to the patient's treatment [9]. The intravenous administration of immunoglobulin G (IVIG) in the treatment of NF remains controversial [9]. IVIG is thought to provide therapeutic benefit by neutralizing streptococcal toxins, and may be beneficial in cases of severe infection or streptococcal toxic shock syndrome. However, therapeutic benefit has not been demonstrated in large randomized trials [1].

Periorbital NF can be divided into preseptal and postseptal inflammation. The extent of the inflammatory process is determined by CT, in which the septal breach can be observed. In case of postseptal NF, there is a risk of spreading the infection through the pathway of the optic nerve canal, including even brain structures. In this case, enucleation should be considered [6]. Untreated NF can lead to significant loss of visual function. Blindness occurs in more than 13% of patients and is mainly due to corneal perforation or closure of the central retinal artery [7].

Conclusions

The peculiar anatomical structure of the periocular region promotes the dynamic development of NF. The close proximity of the central nervous system (CNS) and the eyeball threatens irreversible consequences, including loss of vision or death. Early appropriate targeted treatment can effectively stop the development of the disease and prevent severe complications.

Disclosure

The authors declare no conflict of interest

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