

Management of Unilateral Buccal Necrotizing Fasciitis Superimposed with Submandibular Abscess At Colli Dextra in a Type 2 Diabetes Mellitus patient : A Case Report

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Abstract:

Background: Necrotizing fasciitis (NF) is a relatively rare infectious disease of soft tissues that is characterized by necrosis of subcutaneous tissue and fascia and can even extend to involve the skin and muscles, with the main spread through odontogenic infections. One of the main comorbidities of necrotizing fasciitis is diabetes mellitus. Proper case management is needed because NF can result in severe morbidity and mortality if not treated at an early stage. **Study Objective:** This case report aims to report the management of patients with buccal necrotizing fasciitis complicated by submandibular abscesses with comorbid type 2 diabetes mellitus.

Case Presentation: A 60-year-old woman came to RSHS complaining of swelling on her right cheek 20 days before hospital admission, which further extended to the jaw and neck area. Swelling on the patient's face did not improve after antibiotic treatment, and continued to enlarge to a size of 10x8x7 cm and 8x6x5 cm. The patient has a history of type 2 diabetes mellitus and controlled hypertension. The patient is diagnosed as necrotizing fasciitis and submandibular abscess. Patients are given antibiotic treatment and performed pus-tapping, necrotomy debridement, and tooth extraction.

Conclusion : Necrotizing fasciitis involving the facial (especially buccal) area is rare, with the main cause being odontogenic, peritonsillar, or sinogenic. The main management includes debridement, reconstructive measures, and administration of antibiotics. Extensive tissue involvement, and poly-comorbid conditions can worsen the prognosis of necrotizing fasciitis.

Keywords : Abscess, Buccal, Colli dextra, Necrotizing fasciitis, Submandibular

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Introduction

Necrotizing fasciitis (NF) is defined as a disease that severely infects soft tissue, this is because NF is able to cause an extensive necrosis of subcutaneous tissue and fascia,

even penetrating into muscle tissue. In the course of the disease, infection due to NF will infect poorly vascularized area of the skin. The infection process caused by NF

can spread rapidly. Bacteremia and sepsis are some threatening complications that can developed from NF.[1]

In NF, infection quickly passes through the muscular fascia after a few days infecting the overlying skin, which initially appears unaffected, will turn erythematous, purplish red to grayish blue. The skin texture will become softer, indurated, swollen, shiny and warm in temperature. At this stage, the skin is very tender to palpation. Sometimes, the clinical appearance and the subjective pain experienced by the patient do not match each other.[2] Skin breakdown will begin in three to five days, with ulcers and gangrene. Pain decreases in the affected area due to thrombosis of small blood vessels and superficial nerve damage in the subcutaneous tissue. Advanced stages of infection are characterized by systemic symptoms such as fever, tachycardia and sepsis.[2,3]

If not treated aggressively, NF can result in death. The mortality rate from NF is as high as 34%.¹ Based on epidemiologic data, the incidence of NF is 0.4 per 100,000 people per year in the United States.[4,5] In some countries in the world, the incidence is generally 1 per 100,000 people. Most NF is closely associated with other systemic diseases such as diabetes mellitus (DM), peripheral arterial disease, gouty arthritis, myelodysplastic syndrome, hepatic cirrhosis, and several other immunosuppressive diseases.[6]

The majority of NF cases are acute conditions that usually develop within a few days. Bacterial infections that enter through a damaged fissure cause NF in about 80% of cases. Most infections occur at a single site caused by gram-positive cocci bacteria, mainly *Staphylococcus aureus* and *Streptococcus* strains. If gram-negative and anaerobic bacteria combine, polymicrobial infection may also occur.[7]

Based on culture results, NF is classified into three categories; the first category consists of multiple bacteria infections;

Type two is caused by group A streptococcus infection alone or can be concurrent with *Staphylococcus* infection, type three is caused by vibrio bacterial infection.[7]

Early diagnosis of NF is difficult; hence the diagnosis is often missed. Higher clinical suspicion is needed when a patient presents with painful erythema swelling accompanied by tachycardia. These symptoms are the beginning of NF infection. If not immediately intervened, it can spread to deeper parts signed with tense edema with unbearable pain, skin discoloration, necrosis.[8]

Complications that can arise from NF are septic shock, multiorgan failure, amputation or anatomical defects, severe scars, even death. The prognosis of this disease is serious.[9] NF is considered as a life-threatening infection in the range of 20-80%. Poor prognosis is associated with streptococcal strains, old age, uncontrolled diabetes, immunosuppressed cases, and delayed surgery. Even those who survive the disease have a long recovery time with significant functional deficits.[10,11]

Diabetes Mellitus (DM) is reported to be a common disease in patients with NF, accounting for 44.5-72.3% in various series, confirming a close relationship between NF and DM. Diabetic patients exhibit impaired skin wound healing and increased susceptibility to infection, thus influencing the course of soft tissue infection. The occurrence of NF in the maxillofacial region is very rare and is generally only seen in about 2.5%-5% of all cases.[12] It is commonly associated with systemic diseases such as DM.¹³ NF in the maxillofacial region is caused by an odontogenic infectious process and can also be caused by tonsillopharyngitis, or salivary gland infection.[11,14]

CASE

A 60-year-old woman, referred from RSKGM, came to RSHS with complaints of swelling of the right cheek which was

felt for 20 days before admission (SMRS). The patient was treated by a local general practitioner (GP) and then given antibiotics. Approximately 17 days SMRS, the patient still complained of swelling of the right cheek which already extended to the lower jaw. Because of these complaints, the patient returned to the same local GP. The patient was referred to a regional dentist but no action was taken. Approximately seven days SMRS, the patient complained of increased swelling that extended to the right neck, accompanied by pain when swallowing and decreased general condition. The patient went to St. Joseph's Hospital and was hospitalized for three days before being discharged home. Approximately four days SMRS, the patient went to the emergency room of the RSKGM and was given drugs by injection but there was still no improvement. The patient returned to RSKGM and then referred to RSHS for further treatment. History of drug and food allergy was denied. Patient has a history of systemic diseases such as type two diabetes mellitus

and controlled hypertension. Patient had a history of cataract surgery in 2021. Patient has a history of medication consisting glimepiride ruti and metformin. History of toothache, altered voice, hot potato voice, hoarseness, and neck stiffness were denied.

Physical examination of this patient was performed with several findings: compos mentis consciousness, blood pressure 170/100 mmHg, pulse 92x per minute, temperature 37 degrees Celsius, respiratory rate 24x per minute, with oxygen saturation 97% free air. Findings on general status of the patient: at the head, face was asymmetrical with swelling of the buccal area dextra which extended to the submandibular area dextra. Localized status findings: asymmetrical face, with swelling of the dextra buccal region which extends to the dextra submandibular with a size of 10x8x7 cm; 8x6x5 cm febrile, accompanied by hyperemia, fluctuation, and pain on palpation. There was also generalized hyperemia of the gingiva (Figure 1).



Figure 1: The patient's condition before treatment

The patient was diagnosed with necrotizing fasciitis buccal region with submandibular abscess dextra et colli dextra. The patient was treated with IVFD RL, ceftriaxone injection IV 1gr/12 hours, metronidazole 500 mg/8 hours IV, omeprazole IV 40 mg,

and ketorolac IV 30 mg. The patient was planned for buccal regio to submandibular-colli dextra pus tapping, extraction of teeth 26, 47, 48, necrotomy debridement, antibiotic resistance culture, and the patient was hospitalized.

After hospitalization, the patient was treated with pus tapping (Figure 2). Debridement was then performed in the operating room (Figure 3). Gradually, the patient was followed up regularly on the

first postoperative day (Figure 4), second postoperative day (Figure 5), third postoperative day (Figure 6), 9th, 16th, 28th, and 43rd days (Figures 7;8;9;10).



Figure 2: The Tapping Pus



Figure 3: Debridement



Figure 4: The first postoperative day



Figure 5: The second postoperative day



Figure 6: The third postoperative day



Figure 7: The ninth postoperative day



Figure 8: The sixteenth postoperative day



Figure 9: Day 28 postoperatively



Figure 10: Day 43 postoperatively

Discussion

Necrotizing fasciitis is an infection that is generally rare especially in the maxillofacial region. This case is often manifested as an infection due to complications from the patient's pre-existing immunocompromised disease. In this case report, it was a 60-year-old woman with comorbidities of controlled diabetes mellitus.[15]

In soft tissue, infection can easily and quickly affect the superficial fascia, connective tissue, and surrounding skin and muscle. The infection can cause a necrosis. In this case, necrotizing fasciitis affecting the buccal region is a rare case with an incidence less than 5%. This finding is in accordance with research conducted by Wang who reported that out of 115 patients, only about 4 patients reported infection in the head and neck area. Generally, necrotizing fasciitis affects parts of the body such as the extremities, abdomen, and peritoneum. [16]

Necrotizing fasciitis that occurs in the head and neck region is generally caused by orofacial infections such as teeth, throat, tonsils, acne, furuncles, or salivary infections. 14 Patients receiving long-term diabetes treatment are included in the group that has predisposing factors for the onset of this disease. Commonly accepted predisposing factors include alcoholism, tobacco smoking, immunosuppression, malnutrition, age, malignancy, and liver cirrhosis.[17]

NF cases have symptoms similar to cellulitis or abscess in the early stages. Early diagnosis fails in 85% to 100% of cases and is considered the single factor leading to therapeutic failure. At baseline, 41% of patients have vesicles or bullae, while signs such as skin crepitation, necrosis, and anesthesia are rare (0-5%). With time, more patients experienced the conditions of vesicles (77% had vesicles by day 4), skin crepitation, necrosis, and anesthesia (9-36%). Although these signs

are common and specific, they are only seen in 10 to 40 percent of patients.[18]

The gold standard supporting examination of NF is surgical exfoliation to find "dishwater" or foul-smelling fluid, tissue necrosis or lack of bleeding, and loss of normal resistance of the fascia during dissection. Intraoperative biopsy with Gram staining may be used in some cases but is not required as a finding of definitive exploratory surgery.[19,20]

A case study conducted by Lancerotto (2012) found that on the first day of diagnosis of NF, the patient had erythema, tenderness, warm skin, and swelling. In addition, like the main manifestations mentioned earlier, the patient also experienced additional symptoms such as fascia inside and outside the muscles. Soft tissue thickening also occurs, which is common, but can also occur after trauma. Despite this, MRI cannot determine the morbidity and mortality of NF patients. Gas is also often found in subcutaneous tissue, suggesting aerobic isolates such as Enterobacteriaceae. X-rays or CT scans can clearly show various forms of inflammation, abscesses, and fascial thickening. CT scans are better for diagnosis than x-rays. [21,22]

In the patient in this case report, there was no improvement after antibiotic treatment and the NF continued to enlarge to a size of 10x8x7 cm and 8x6x5 cm which extended to the jaw and neck area. This can be attributed to the presence of DM in the patient. Type two diabetes mellitus is a chronic metabolic disorder characterized by hyperglycemia associated with metabolic abnormalities, carbohydrates, fats and proteins caused by decreased insulin secretion or insulin sensitivity and possibly both. Complications resulting from this disease include microvascular, macrovascular and neuropathic complications. [23,24]

It is known that diabetic patients have neuropathy and microvascular disease,

which inhibit wound healing. Therefore, when a patient has DM and necrotizing fasciitis, the wound progresses faster and causes the patient to experience rapid deterioration. Infection by bacteria that enter the body should be fought and killed by the body's immune system, but in patients with DM, blood sugar levels that reach more than 200 mg/dl cause the strength of white blood cells to decrease [25]. As a result, germs become difficult to destroy and continue to multiply.

The diagnosis of NF should be made immediately. However, this is not always easy as the signs of NF are indistinguishable from cellulitis and nonnecrotizing abscesses. As NF is closely associated with disease severity, higher amputation rates and higher mortality rates, any delay can be fatal.

In this patient, after diagnosis, surgery was performed immediately after stabilization of the condition. Several measures were taken such as debridement, reconstruction measures, and antibiotic administration.

Aggressive surgical treatment, debridement, necrotomy and the use of broad-spectrum antibiotics are essential in managing necrotizing fasciitis. The polymicrobial nature suggests that a multidisciplinary approach, involving microbiology and infection in addition to surgery, is essential. This condition can lead to sepsis, respiratory and renal insufficiency if not treated properly, which can ultimately lead to fetal death. Most literature suggests that antibiotic therapy should be started immediately, including antibiotics against gram-positive, gram-negative and anaerobic bacteria, until antibiogram results are obtained. Once the antibiogram results are obtained, it will then be decided when specific therapy should be initiated.[26]

Initial pharmacotherapy may include identification of empiric broad-spectrum antibiotics by soft tissue gram staining, culture and sensitivity results. In recent

versions of vancomycin or linezolid are suggested to be used along with piperasillin-tazobactam, carbapenems, or ceftriaxone-metronidazole. For the treatment of Group A streptococcus haemolyticus and *S. aureus* infections, penicillin and clindamycin should be combined. As soon as the microbiology of the sample is determined, therapy can be tailored for the specific organism. On the other hand, a local antibiogram can be used to determine local resistance patterns.[27]

This patient was given 1 gram of ceftriaxone and metronidazole injection. Ceftriaxon is a group three cephalosporin. This antibiotic has a broad antibacterial spectrum, active against gram-positive and gram-negative bacteria and anaerobic bacteria. The mechanism of action of this drug is to stop the formation of mucopeptides necessary for the formation of the bacterial cell wall, which is also known as the third stage transpeptidase reaction in the series of cell wall formation reactions. Metronidazole is an antibiotic with bactericidal and bacteria-killing properties that has good clinical results in the treatment of anaerobic bacteria. Metronidazole stops the synthesis of bacterial DNA and damages the DNA through oxidation, which causes the DNA chain to break and kills the bacteria. Metronidazole is an appropriate drug for anaerobic bacterial infections because it is cheap and does not cause side effects.[28]

When NF is suspected to be the diagnosis, surgery is the gold standard. The affected tissue should be debrided immediately and investigated through surgical procedures. Discoloration, edema or ecchymosis, and signs of necrosis may be the initial tissue findings. During surgical exploration, culture and gram specimens should be obtained. It can be re-evaluated within 24 hours after debridement to ensure that all necrotic tissue has been removed and only healthy tissue remains. In severe cases involving the extremities, amputation may be required to control the infection.[29]

A better understanding of the symptoms and signs of NF is warranted. Extensive tissue involvement, and poly-comorbid conditions may worsen the prognosis of necrotizing and should prompt intervention as early as possible to prevent morbidity and mortality.

Conclusion

Necrotizing fasciitis involving the facial area is a rare case, with the main causes being odontogenic, peritonsillar, or synugenic. Primary management includes debridement, reconstructive measures, and antibiotics. Extensive tissue involvement and poly-comorbid conditions may worsen the prognosis of necrotizing fasciitis.

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