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Extensive Head and Neck Necrotizing Fasciitis Induced by Mandibular Canine Tooth Infection in an Uncontrolled Diabetic patient: a case report

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Case Report

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Abstract

Background

Head and neck necrotizing fasciitis is a rare, progressive soft tissue infection that usually originates from odontogenic sources. Systemic diseases, including immunosuppression and diabetes mellitus, can complicate patient management.

Case presentation

We report a case of necrotizing fasciitis in a 46-year-old Iranian woman with uncontrolled diabetes. The patient was referred to the hospital with tenderness and erythematous swelling in the right buccal, submandibular, submental, and upper neck regions. Computed tomography (CT) revealed necrotic areas and gas accumulation extending to the superficial temporal, deep temporal, and periorbital spaces. The patient was admitted under the care of the infectious disease service. A multidisciplinary management was implemented. Empiric antibiotics were prescribed by the infectious disease service. Surgical debridement of the necrotic areas and extraction of decayed teeth were performed under general anesthesia. Wet-to-dry dressings were applied and changed every three hours. Tracheostomy and jejunostomy were performed by the general surgery service to provide long-term secured airway and nutritional support. Culture results revealed *Klebsiella pneumoniae* infection, and the antibiotic regimen was adjusted to colistin, imipenem and vancomycin.

Conclusion

Early diagnosis and prompt multidisciplinary approach can survive complicated patients with extensive necrotizing fasciitis.

1 Background

Head and neck necrotizing fasciitis is a progressive, fulminant soft tissue infection characterized by rapid spread along fascial planes. It causes severe complications such as extensive tissue necrosis and microvascular thrombosis and may progress to septic shock, with reported mortality rates ranging from 20% to 35% (1, 2). Because the initial clinical features of necrotizing fasciitis often resemble those of other infections, such as cellulitis or dental abscesses, early differentiation can be difficult. Delayed diagnosis, particularly beyond 24 hours, significantly worsens patient outcomes and is associated with disproportionate pain, bullae formation, and systemic toxicity (3). Early diagnosis, prompt surgical debridement, and broad-spectrum antibiotic therapy are critical for improving survival. Therefore, a multidisciplinary management is essential for patient care (4). Several comorbid conditions, including diabetes mellitus, alcohol or drug abuse, have been shown to be associated with necrotizing fasciitis. Among these, diabetes mellitus significantly increases susceptibility, by approximately 20- to 40-fold, through mechanisms such as hyperglycemia-induced neutrophil dysfunction, microangiopathy, and impaired wound healing. These mechanisms contribute to accelerated tissue destruction and reduced

responsiveness to antibiotic therapy (2, 5). In such cases, infection may spread via cervicofacial lymphatic pathways or the bloodstream, presenting with signs such as cervical crepitus, dysphagia, and rapid airway compromise (6, 7). In this report, we report a case of necrotizing fasciitis of odontogenic origin in an uncontrolled diabetic patient, involving the right buccal, submandibular, submental and upper neck areas. Also, we describe the multidisciplinary management approach used to successfully treat this complex condition.

2 Case Presentation

A 46-year-old Iranian woman was referred to the Emergency Department of Imam Hosein Hospital with the chief complaint of toothache accompanied by painful swelling in the right buccal, submandibular, submental, and upper neck regions. The patient had been treated with oral amoxicillin (500 mg every 8 hours) and metronidazole (250 mg every 8 hours) for one week; however, her condition worsened, and cutaneous fistulas developed on the facial and cervical skin. Then, two doses of penicillin G were administered, after which the patient was referred to the hospital for further management. The patient had a known history of diabetes mellitus, and initial laboratory evaluation revealed a markedly elevated blood glucose level of 625 mg/dL. Also, laboratory findings showed elevated C-reactive protein (CRP) and erythrocyte sedimentation rate (ESR), 127.2 mg/L and 90 mm/h respectively, indicating an acute inflammatory and infectious state. Also, she had a history of bipolar and schizophrenic disorders.

Extraoral examination revealed erythematous swelling in the right buccal, submandibular, and upper neck areas. Multiple cutaneous fistulas with purulent discharge were observed in these regions. Crepitus and tenderness were detected on palpation (Fig. 1).

Panoramic radiographic examination demonstrated multiple decayed teeth and periapical lesions on the right side of the maxilla and mandible, which were considered the primary odontogenic sources of infection. Radiolucent areas suggestive of gas accumulation were also evident on the right side (Fig. 2).

Further evaluation with contrast-enhanced facial and neck computed tomography (CT) scans revealed disseminated abscess and gas collections in the right buccal, submandibular, and submental spaces, extending into the upper cervical region, superficial temporal, deep temporal, and periorbital spaces (Fig. 3).

The patient was admitted under the main care of the infectious disease service and was visited daily by oral and maxillofacial surgery, general surgery and internal medicine services. Samples of purulent discharge were obtained and sent for culture and sensitivity testing. Empiric antibiotic therapy with ampicillin-sulbactam (6 g every 6 hours), metronidazole (500 mg every 8 hours), and vancomycin (500 mg every 12 hours) was initiated. Additionally, regular insulin (4 units every 12 hours) and NPH insulin (8 units every 12 hours) were prescribed to control hyperglycemia.

Surgical interventions, including extensive debridement, drainage of necrotic tissues, and extraction of decayed teeth, were planned. The procedure was performed under general anesthesia with nasal

endotracheal intubation. Necrotic tissues were thoroughly removed, and drainage was achieved through surgical access to the buccal, submandibular and lateral pharyngeal spaces. Also, all decayed teeth were extracted (Fig. 4). A large amount of purulent discharge was encountered during extraction of the right lower canine, and specimens were collected for microbiological analysis. Copious irrigation with normal saline solution was performed, and the patient was subsequently transferred to the intensive care unit (ICU). Wet-to-dry dressings were applied to the surgery sites and were changed every three hours. As shown in Figs. 5, the wound healing process in the ICU demonstrated gradual improvement over time.

Abscess culture results identified *Klebsiella pneumoniae* as the causative organism. Therefore, the antibiotic regimen was adjusted to colistin (4.5 mIU every 12 hours), imipenem (500 mg every 12 hours), and vancomycin (500 mg every 12 hours) based on antimicrobial sensitivity testing. After approximately one month, the patient was transferred from ICU to the ward. Figure 6 illustrates the ongoing wound healing process in the ward.

For providing a long-term secured airway, a tracheostomy was performed by the general surgery service. Also, a jejunostomy was performed during the same operative session to provide enteral nutrition. After two months of hospitalization, during which inflammatory markers returned to normal levels, the patient was discharged in stable condition. At the two-month follow-up visit, complete wound healing was observed. Figure 7 illustrates the patient's condition at the two-month follow-up.

3 Discussion

Necrotizing fasciitis in the head and neck areas is a fulminant, progressive, and potentially fatal soft tissue infection. It originates usually from odontogenic lesions, such as infections arising from dental caries or periapical lesions. The infection involves the skin and subcutaneous tissues and may spread extensively into the facial and cervical spaces, necessitating aggressive and prompt multimodal management to ensure patient survival. A multidisciplinary approach is essential for the effective management of these patients (8, 9). Predisposing factors such as systemic diseases, including diabetes mellitus, malnutrition, and alcoholism, have been well documented in the literature (10). In our case, uncontrolled diabetes mellitus significantly complicated the clinical condition and contributed to extensive involvement of multiple facial and cervical spaces, including the buccal, submandibular, submental, and upper neck areas. Therefore, the patient was referred to the hospital with markedly elevated blood glucose levels and increased inflammatory markers (e.g. ESR and CRP).

Early clinical features of necrotizing fasciitis, including swelling, erythema, fever, and tenderness, are nonspecific and may mimic conditions such as cellulitis or dental abscesses, making early diagnosis challenging. However, the presence of gas accumulation within soft tissues, rapid spread of odontogenic infection into facial spaces, and dusky skin discoloration are suggestive features of necrotizing fasciitis. Contrast-enhanced computed tomography plays a critical role in diagnosis, as it can clearly demonstrate gas formation and the extent of tissue involvement (11). Hansen et al. (9) reported that gas accumulation on CT imaging was the most common diagnostic finding (63%), followed by skin bruising

(26%) and severe pain (26%). The Laboratory Risk Indicator for Necrotizing Fasciitis (LRINEC) score is a useful diagnostic tool for identifying patients at risk of necrotizing fasciitis. The scoring system incorporates six parameters: C-reactive protein, total white blood cell count, hemoglobin, sodium, creatinine, and glucose levels. A score of six or higher is associated with an increased risk of necrotizing fasciitis. In our case, LRINEC score was five. Although the original study had shown that 10% of confirmed cases had a score below six (12). Using a combination of these methods along with clinical and paraclinical examinations helps to make an earlier diagnosis. If necrotizing fasciitis left untreated or diagnosed late, it may result in severe complications, including mediastinitis, septic shock, disseminated intravascular coagulopathy, acute renal failure, and brain abscess. These complications significantly increase mortality risk, particularly in immunocompromised patients such as those with diabetes mellitus or malignancies (4).

Mental disorders such as schizophrenic disorders can affect nutrition, health practice and oral hygiene. Patients with schizophrenia reveal significantly higher scores of decayed, missing and filled teeth. Also, these patients do not consume their medications properly (13, 14). In our case, the oral health was poor, and she denied performing dental visits and treatments. Also, she did not use her prescribing medications. Therefore, the diabetes status was uncontrolled, and the dental infections were untreated; and the infection extended progressively into multiple facial spaces.

Management of necrotizing fasciitis requires securing the airway, initiating broad-spectrum antibiotic therapy, performing prompt and repeated surgical debridement, and controlling underlying comorbid conditions such as diabetes mellitus. Cervical inflammation has a potential for airway compromise; therefore, early airway protection through endotracheal intubation or tracheostomy is often necessary (4). In our case, the patient was initially managed with nasal endotracheal intubation during surgery. Then, due to patient discomfort and the anticipated need for prolonged secured airway, a tracheostomy was subsequently performed by the general surgery service. Empiric antibiotic therapy should be initiated promptly and later adjusted based on culture and sensitivity results. In our case, empiric treatment with ampicillin-sulbactam, metronidazole, and vancomycin was administered according to standard treatment protocols (15). Following identification of *Klebsiella pneumoniae* on culture and sensitivity testing, the antibiotic regimen was adjusted to colistin, imipenem, and vancomycin. Glycemic control is an important component of management, as uncontrolled hyperglycemia impairs immune function and wound healing. In our case, blood glucose levels were effectively controlled through collaboration with internal medicine service.

Bandaru et al. (8) reported successful wound closure using split-thickness skin grafting following extensive debridement, as their patient had a larger residual defect measuring 10 * 15 cm. in our case, the wound size was smaller, and satisfactory secondary healing was achieved without the need for skin grafting. Wet-to-dry dressings were used to promote wound healing and facilitate mechanical debridement. Frequent dressing changes contributed to the removal of necrotic tissue and reduction in wound size.

A critical consideration in patients with necrotizing fasciitis is immune system dysfunction following extensive tissue injury and multiple surgical interventions. These patients may reveal a compensatory anti-inflammatory response characterized by lymphopenia, suppression of tumor necrosis factor, and reduced monocyte responsiveness to cytokines, which can impair host defense against secondary infections, even after surviving from necrotizing fasciitis (4).

4 Conclusion

Necrotizing fasciitis is an uncommon but fulminant soft tissue infection associated with a high risk of mortality. Early diagnosis based on thorough clinical evaluation combined with appropriate radiographic and laboratory assessments is essential for improving patient management. Prompt multimodal approach, including aggressive surgical debridement and initiation of appropriate empiric broad-spectrum antibiotic therapy, plays a critical role in patient survival. Specimens should be obtained from purulent discharge and sent for culture and sensitivity testing. Then, antibiotic regimen should be adjusted accordingly. Proper wound care, serial debridement, when necessary, effective control of underlying comorbid conditions, and proper antibiotic regimen can lead to successful recovery and complete wound healing, even in patients with complicated and extensive diseases.

5 Declarations

5.1 Ethics approval and consent to participate

Written informed consent was obtained from the patient for participation in study. A copy of the written consent is available for review by the Editor-in-Chief of this journal.

5.2 Consent for publication

Written informed consent was obtained from the patient for publication of this case report and any accompanying images. A copy of the written consent is available for review by the Editor-in-Chief of this journal.

5.3 Availability of data and materials

Available

5.4 Competing interests

The authors declare that they have no competing interests.

5.5 Funding

None

5.6 Author Contribution

All authors had same contributions.

5.7 Acknowledgements

Not applicable

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Figures



Figure 1

Clinical view of the patient.



Figure 2

Panoramic radiographic examination.

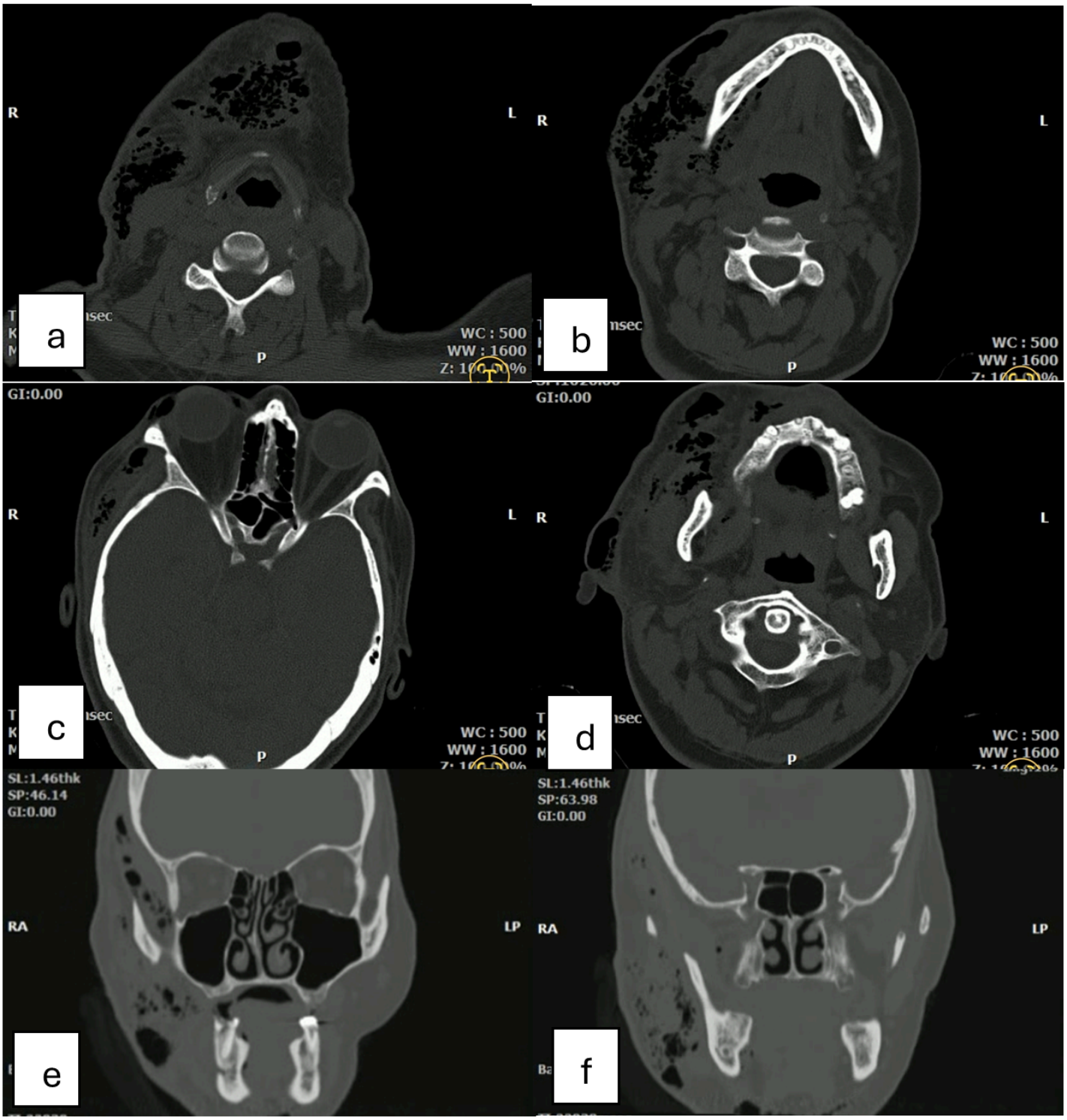


Figure 3

Facial computed tomography scans. A-D) Axial view of submental space, submandibular space, temporal spaces, and buccal space, respectively. E & F) Coronal view of temporal and buccal spaces and submandibular and submental spaces, respectively.

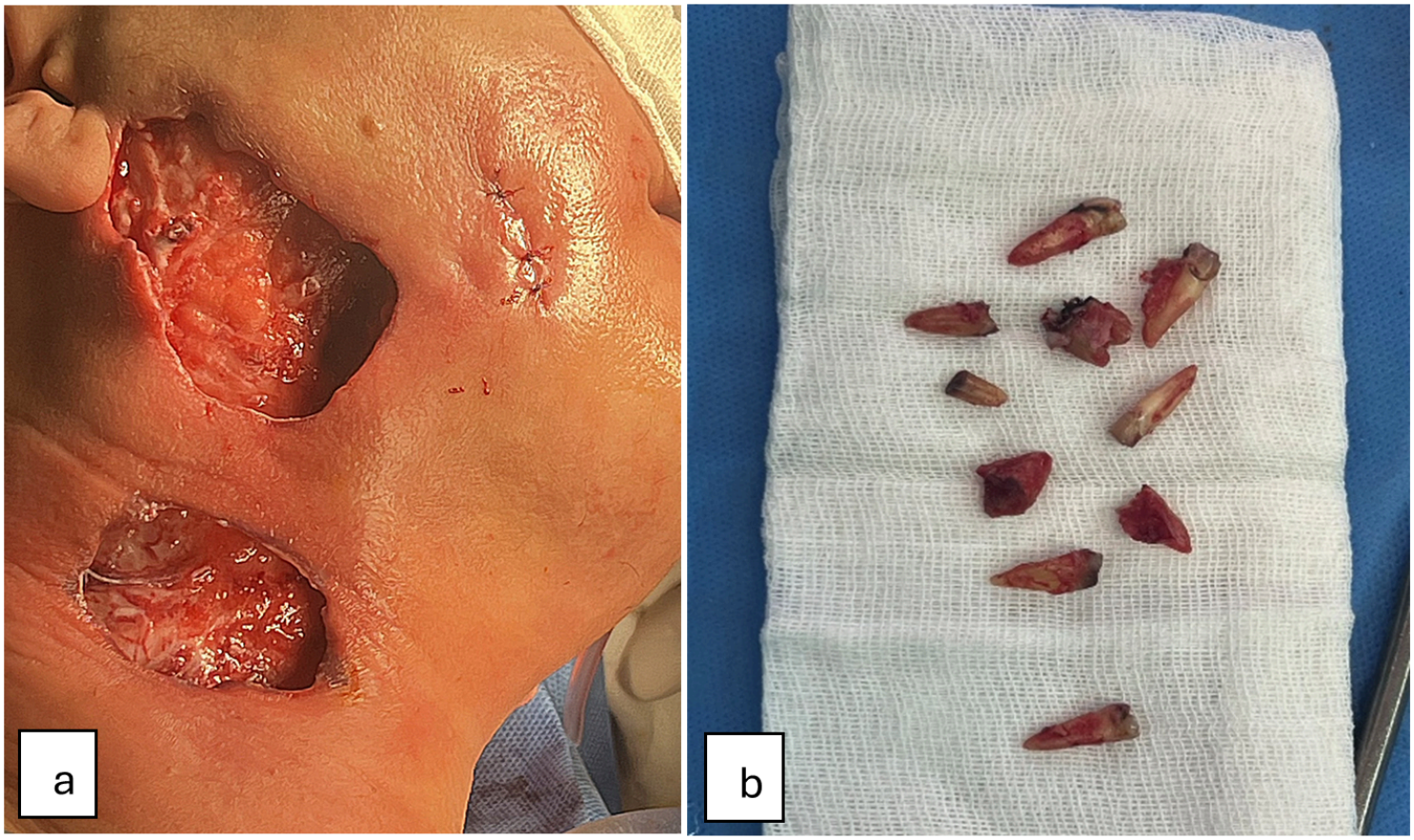


Figure 4

A) Postoperative view, B) Extracted teeth.

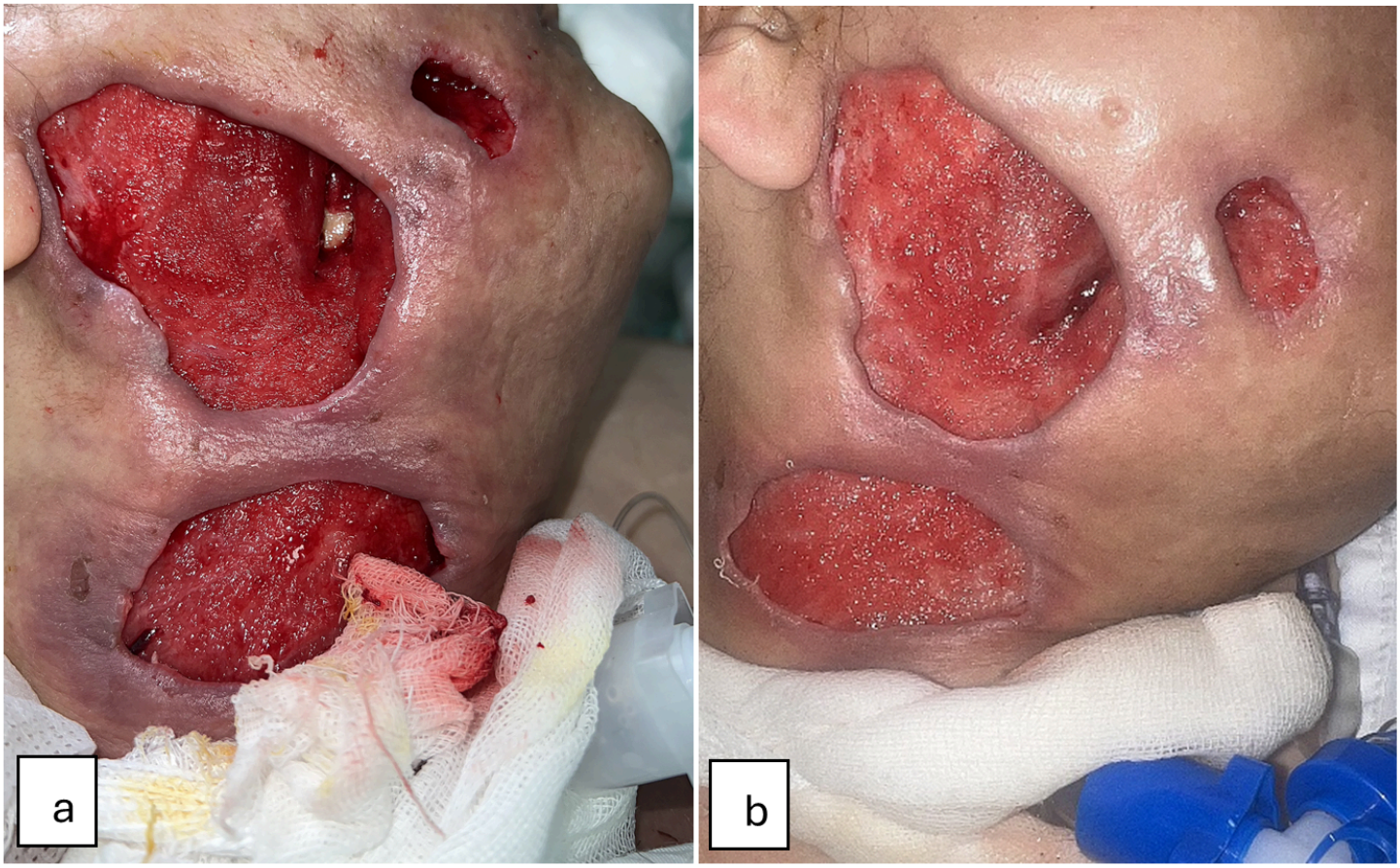


Figure 5

Wound healing in the ICU. A) After one week, B) After two weeks.



Figure 6

Wound healing in the ward.



Figure 7

Two-month follow-up.