International Journal of Clinical Images and Medical Reviews

ISSN 2771-6309

Case Report

Negative Pressure Wound Therapy for Necrotizing Fasciitis of the Head and Neck: A Case Report

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Abstract

Necrotizing fasciitis is a deep soft-tissue infection that rapidly progresses along the fascia. It causes ischemia and necrosis in the invaded tissues, leading to extensive damage to the surrounding skin, subcutaneous tissue, and muscles. The standard treatments are injection of broad-spectrum antibiotics and incisional drainage with radical debridement of necrotic tissue. Thereafter, repeated irrigations and dressing applications are required to remove exudates and prevent further progression. Negative pressure wound therapy could efficiently remove pus or necrotic exudates by applying continuous negative pressure to the wound area. It has been widely used in diverse surgical fields such as general surgery, plastic surgery, and thoracic surgery. The use of negative pressure wound therapy decreases the fatigue of medical staff and the pain of the patient. We report a case of successful wound healing with negative pressure wound therapy in a patient with cervical necrotizing fasciitis, together with a review of the literature.

Key words: Necrotizing Fasciitis, Negative Pressure Wound Therapy

INTRODUCTION

Necrotizing fasciitis (NF) is an acute severe infection of the superficial fascia that rapidly progresses, causing fascial necrosis with serious damage to the surrounding skin, subcutaneous tissue, muscle, and soft tissue. It can be caused by polymicrobial bacteria including mixed aerobic and anaerobic species. The incidence rate of NF is approximately 3.5–4 cases per 100,000 people. Among them, cervical NF accounts for only approximately 5%. Owing to the rarity of cervical NF and the rapid progression of infection, causing respiratory obstruction, mediastinitis, and systemic sepsis, the reported mortality rate is very high (up to 64%). The treatment of NF involves the use of broad-spectrum antibiotics with repetitive pus drainage and dressing applications. In addition, the necrotic tissue needs to be aggressively removed. However, the need for repetitive dressings is very troublesome for both patients and medical staff.

Negative pressure wound therapy (NPWT) could efficiently remove necrotic pus and tissue by applying continuous negative pressure to the involved wound. This method has been widely applied in general surgery, plastic surgery, and thoracic surgery. However, in surgeries for head and neck lesions, few cases have been reported.

Here, we report the case of a patient with cervical NF successfully treated with NPWT, together with a review of the literature.

CASE REPORT

A 49-year-old man visited the emergency department with the complaint of sore throat with neck swelling that had persisted for 2 weeks. He had underlying diseases including hypertension, diabetes, and alcoholic liver disease. He was a chronic alcoholic (one or two bottles of soju) and a heavy smoker (1 pack per day for 20 years).

Physical examination revealed swelling, tenderness, febrile sensation, and crepitation in the neck. During the endoscopic examination, pus with necrotic tissue was identified near the right epiglottis, accompanied by severely foul odor from the mouth (Fig. 1A, 1B). Laboratory examination revealed elevated white blood cell count (13,260 × 103/μL) and C-reactive protein level (259 mm). Initial neck computed tomography (CT) showed soft-tissue swelling, multifocal gas accumulation, and multifocal abscess formation in the masticator, parapharyngeal, parotid, submandibular, sublingual, and pharyngeal mucosa in the anterior cervical neck (Fig. 1C). Deep neck infection with possible NF was diagnosed. The patient was treated with broad-spectrum antibiotics after surgical drainage with necrotic tissue debridement. After skin incision, subcutaneous necrotic tissue with foul odor and purulent pus was drained and removed. After further debridement, the wound was irrigated with betadine solution and closed after drain-tube insertion (Fig. 2A). The wound was treated with betadine irrigation three times daily. On the second postoperative day, CT showed decreased cervical abscess; however, increased mediastinitis was observed. Severe change in the color of the neck skin was identified (Fig. 2B). Additional surgery was performed in cooperation with a thoracic surgeon. The residual abscess, necrotic tissue, and discolored neck skin were removed, and NPWT was applied to the neck (Fig. 2C, 2D). The

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Received: June 21, 2022 **Published:** July 05, 2022

Citation: Jin Lee, MD, Dong Hwan Oh, MD, Young Ju Jin, MD, PhD*. Negative Pressure Wound Therapy for Necrotizing Fasciitis of the Head and Neck: A Case Report. Int Clin Img and Med Rew. 2022; 2(4): 1081.

DOI: 10.55920/IJCIMR.2022.02.001081

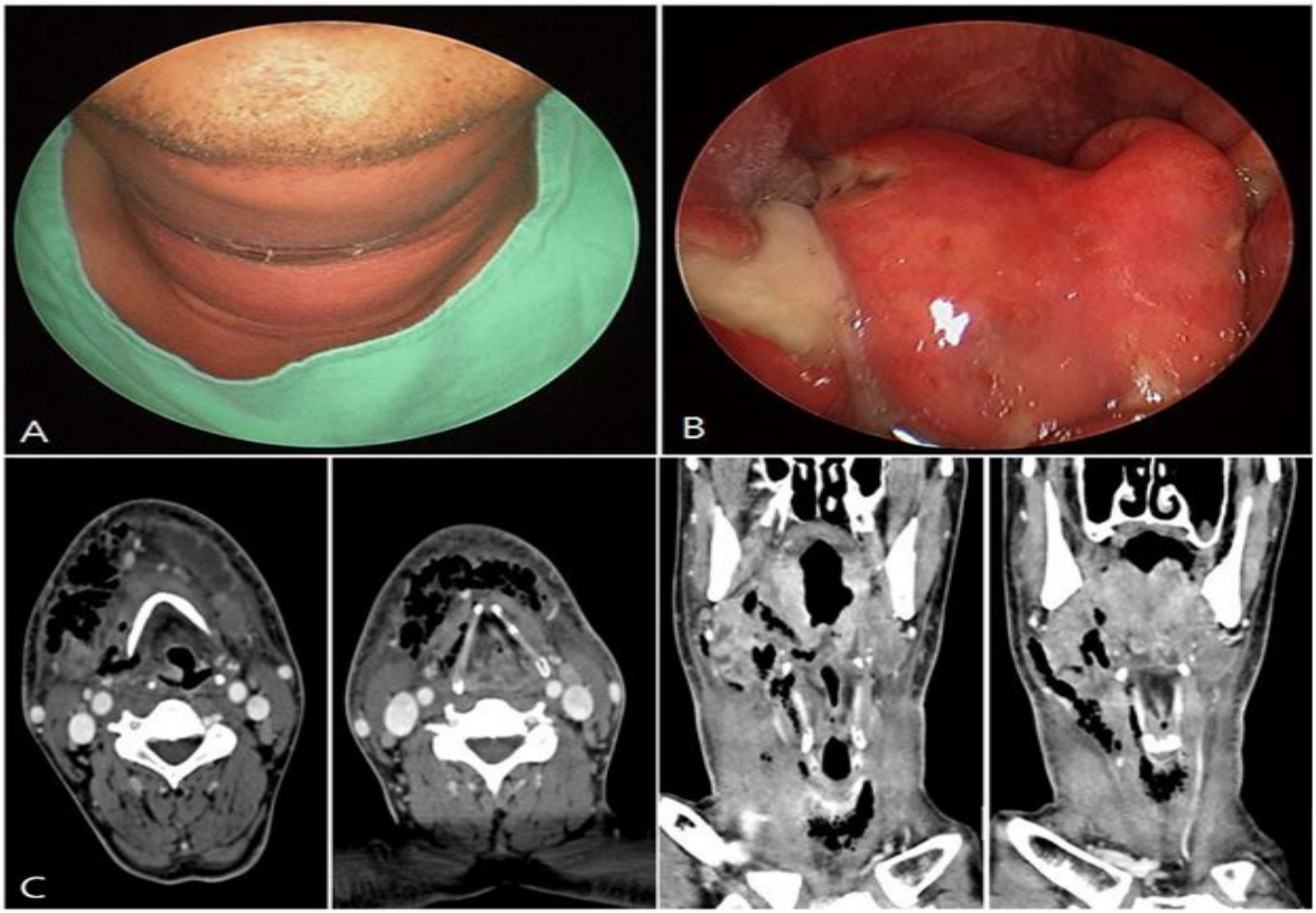

Figure 1: *(A) Swelling and erythema in the anterior neck and mandible. (B) Abscess in the right epiglottis, accompanied by severe odor from the mouth. (C) Axial (enhanced) and coronal computed tomography images of the neck showing soft-tissue swelling, multifocal gas accumulation, and multifocal abscess formation in the masticator, parapharyngeal, parotid, submandibular, sublingual, and pharyngeal mucosa in the anterior cervical neck.*

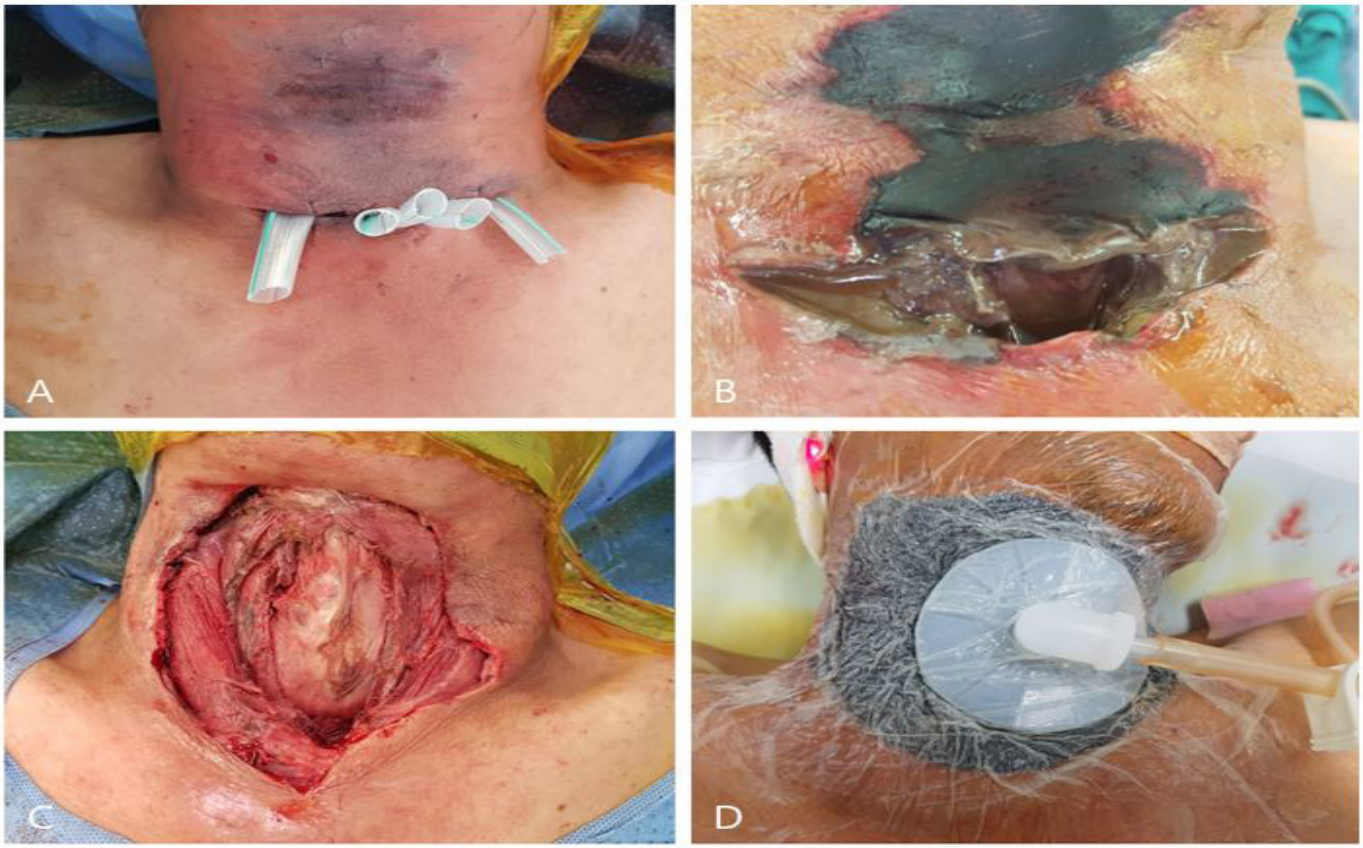

Figure 2: *(A) Drain tube inserted after debridement and betadine irrigation. (B) Skin necrosis observed 2 days postoperatively. (C) Aggressive surgical debridement. (D) Negative pressure wound therapy.*

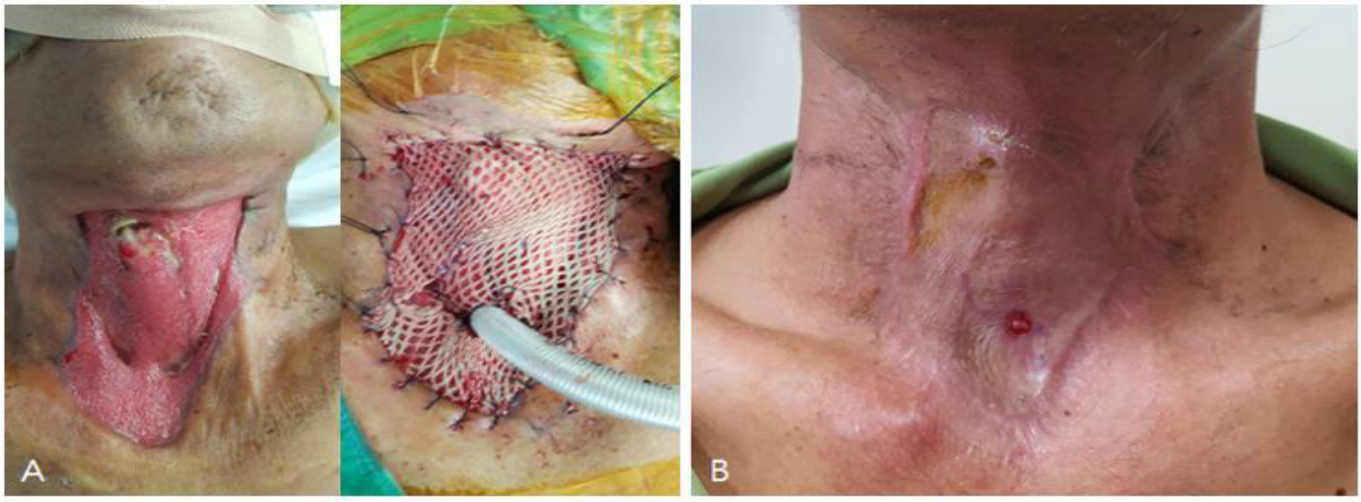

Figure 3: *(A) Split-thickness skin graft placed 33 days after negative pressure wound therapy. (B) Photograph showing the recovery of the patient without any abnormal findings other than mild skin contractions.*

Table 1: *Characteristics of Reported Cases of Necrotizing Fasciitis of the Head and Neck Treated with Negative Pressure Wound Therapy*

Authors	Sex/age (years)	Underlying disease	Microbiology	NPWT duration	Pressure	Change time	Skin graft
Lee et al.[2] 2012	M/46	Alcoholism, social isolation	MRSA	25 days	100 mmHg	3 days	STSG
Frankel et al.[12] 2015	M/53	Diabetes, depression	MRSA	12 days	(-)	7 days	STSG
Chen et al.[13] 2019	M/52	Diabetes	(-)	19 days	(-)	7 days	(-)
	F/72	(-)	(-)	15 days	(-)	7 days	(-)
	M/76	Diabetes	S. intermedius	30 days	(-)	13 days	(-)
	M/65	Hypertension	S. aureus	19 days	(-)	7 days	(-)
	M/41	Diabetes	(-)	15 days	(-)	7 days	(-)
	M/61	Diabetes, hypertension	(-)	14 days	(-)	7 days	(-)
	M/27	(-)	(-)	9 days	(-)	5 days	(-)
Kim et al.[8] 2020	F/66	Diabetes, smoking, alcoholism, HCC	S. intermedius, P. aeruginosa, A. baumannii, MRSE, C. striatum	24 days	(-)	5–6 days	STSG
	F/77	Diabetes, hypertension, angina pectoris, adrenal insufficiency, hypercholesterolemia	MRSE, S. capitis, C. striatum, E. faecium, C. dubliniensis	26 days	(-)	4–5 days	(-)
Campana et al.[7] 2020	M/47	(-)	MSSA	35 days	70–100 mmHg	4 days	(-)
This case	M/51	Diabetes, hypertension, alcoholism, smoking, social isolation	MRSA	33 days	100 mmHg	3 days	STSG

NPWT, negative pressure wound therapy; MRSA, methicillin-resistant Staphylococcus aureus, STSG, split-thickness skin graft; S. intermedius, Streptococcus intermedius; S. aureus, Staphylococcus aureus; HCC, hepatocellular carcinoma; P. aeruginosa, Pseudomonas aeruginosa; A. baumannii, Acinetobacter baumannii; MRSE, methicillin-resistant Staphylococcus epidermis; C. striatum, Corynebacterium striatum; S. capitis, Staphylococcus capitis, E. faecium, Enterococcus faecium; C. dubliniensis, Candida dubliniensis; MSSA, methicillin-sensitive Staphylococcus aureus.

pressure was maintained at 100 mmHg, and the wound was opened every 72 h for irrigation and to change the sponge. The NPWT was removed 14 days after the surgery. At 33 days after NPWT treatment, the neck soft tissue showed improvement, and a split-thickness skin graft was used to cover the neck muscle and thyroid cartilage (Fig. 3A). The patient was discharged 83 days after admission without complications, and recovered without any further events (Fig. 3B).

DISCUSSION

NF is a progressive severe bacterial infection that rapidly progresses along the fascia, and causes various local and systemic complications such as tissue necrosis, mediastinitis, multiple organ failures, disseminated intravascular coagulation, sepsis, and death. This condition was first described by Wilson in 1952.

Painful neck swelling is the most common symptom, which may also be present in other neck pathologies such as inflammation or abscesses. Moreover, patients can have accompanying cervical stiffness, hyperemic neck skin, dysphagia, and sore throat. Our patient presented to the emergency department with sore throat and neck swelling that started 2 weeks prior, and also had diabetes, liver disease, chronic alcoholism, and long-term malnutrition. In previous studies, the reported risk factors for NF were diabetes, alcoholism, older age, cirrhosis, chronic renal failure, peritonsillar abscess, malnutrition, and malignant tumors. The most common pathogens of NF are divided into three groups: mixed aerobic–anaerobic species, group A Streptococcus, and Clostridium perfringens. In our case, methicillin-resistant Staphylococcus aureus was identified and vancomycin was intravenously administered.

Findings that confirm the diagnosis of NF include the following: the muscle layer and subcutaneous fat layer are easily peeled without resistance; the muscle layer is preserved and necrosis of the fascia is pronounced; and the subcutaneous fat layer is necrotized, with severe odor and grayish brown abscess. Radiologic modalities such as CT may be useful for early diagnosis. Air is observed in soft tissues on plain radiography and along the fascia on CT.

Treatment involves the use of appropriate antibiotics for cultured bacteria and surgical debridement of necrotic tissue. In addition, hyperbaric oxygen therapy and intravenous immunoglobulin therapy have also been applied.

NPWT was developed in the 1990s and has been used for simple wound treatment in the past; however, its use has only recently been expanded to chronic or acute traumatic wounds, burns, ulcers caused by diabetes, or pressure sores. In the field of head and neck surgery, cases using NPWT have been reported (Table 1). Compared with previously reported patients, our patient needed to be admitted for a long time because of repeated surgeries for the treatment of mediastinitis and skin dehiscence. The benefits of NPWT include effective removal of exudates and necrosis, thus increasing the blood flow in the wound and promoting the growth of healthy tissue. In particular, the NPWT was replaced every 72 h after the application in our case, decreasing the number of dressings used, the patient's pain, and the staff's effort. The mortality rate of NF is reported to be 27%–40%, and prognosis is closely related to the timing of treatment. Therefore, fast and appropriate treatment plays a crucial role in the prognosis of NF.

We report a case of NF that was successfully healed with NPWT.

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