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Case Report

# Necrotizing fasciitis wound after debridement could be successfully treated with negative-pressure wound therapy with instillation and dwelling: A case report

Naoya Kobayashi *, Shingo Toyama, Hiroshi Yoshida, Satoru Shiraso, Shinya Kawaguchi

*Department of Surgery, Iwaki City Medical Center, 16 Kusehara, Uchigomimayamachi, Iwaki-shi, Fukushima 973-8555, Japan*

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ABSTRACT

*Background:* Necrotizing fasciitis (NF) is associated with a high mortality rate. Adequate incision and drainage and repeated debridement are necessary for NF management. After drainage, daily local irrigation should be performed.

*Case presentation:* A 72-year-old male patient complained of left lower quadrant pain. Computed tomography revealed a 7 cm mass in the descending colon, with retroperitoneal penetration. Hence, he underwent emergency surgery. The left abdomen was widely incised, and a transverse colostomy was performed for local wound control. Daily debridement of necrotic tissue and wound irrigation were continued. On postoperative day 48, the wound was extensive and complex and obtained a positive bacterial culture. Subsequently, we began a negative-pressure wound therapy with instillation and dwelling (NPWTi-d), which was very effective for extensive and complicated wounds with infection. Thereafter, a split-thickness skin was grafted, and the skin graft survived well. Ultimately, the wound successfully closed.

*Conclusions:* NPWT is contraindicated for infected wounds, and an infection control period is required. However, NPWTi-d enables early initiation of wound care despite the presence of infection. Therefore, NPWTi-d is effective for extensive and complicated wounds with infection after NF debridement.

## Background

Necrotizing fasciitis (NF) is associated with a high mortality rate; thus, early surgical intervention and antimicrobial treatment are important [1]. Considering that NF is life-threatening, rapid diagnosis and immediate treatment are needed [2]. Adequate incision and drainage, as well as repeated debridement of necrotic tissue, is necessary for its successful management [3]. In Fournier syndrome, colostomy is often performed for local wound control. In the present case, good wound closure was achieved by using negative-pressure wound therapy (NPWT) with instillation and dwelling (NPWTi-d).

* Corresponding author at: Iwaki City Medical Center, Department of Surgery, 16 Kusehara, Uchigomimayamachi, Iwaki-shi, Fukushima 973-8555, Japan.

*E-mail address:* naoya_712@icloud.com (N. Kobayashi).

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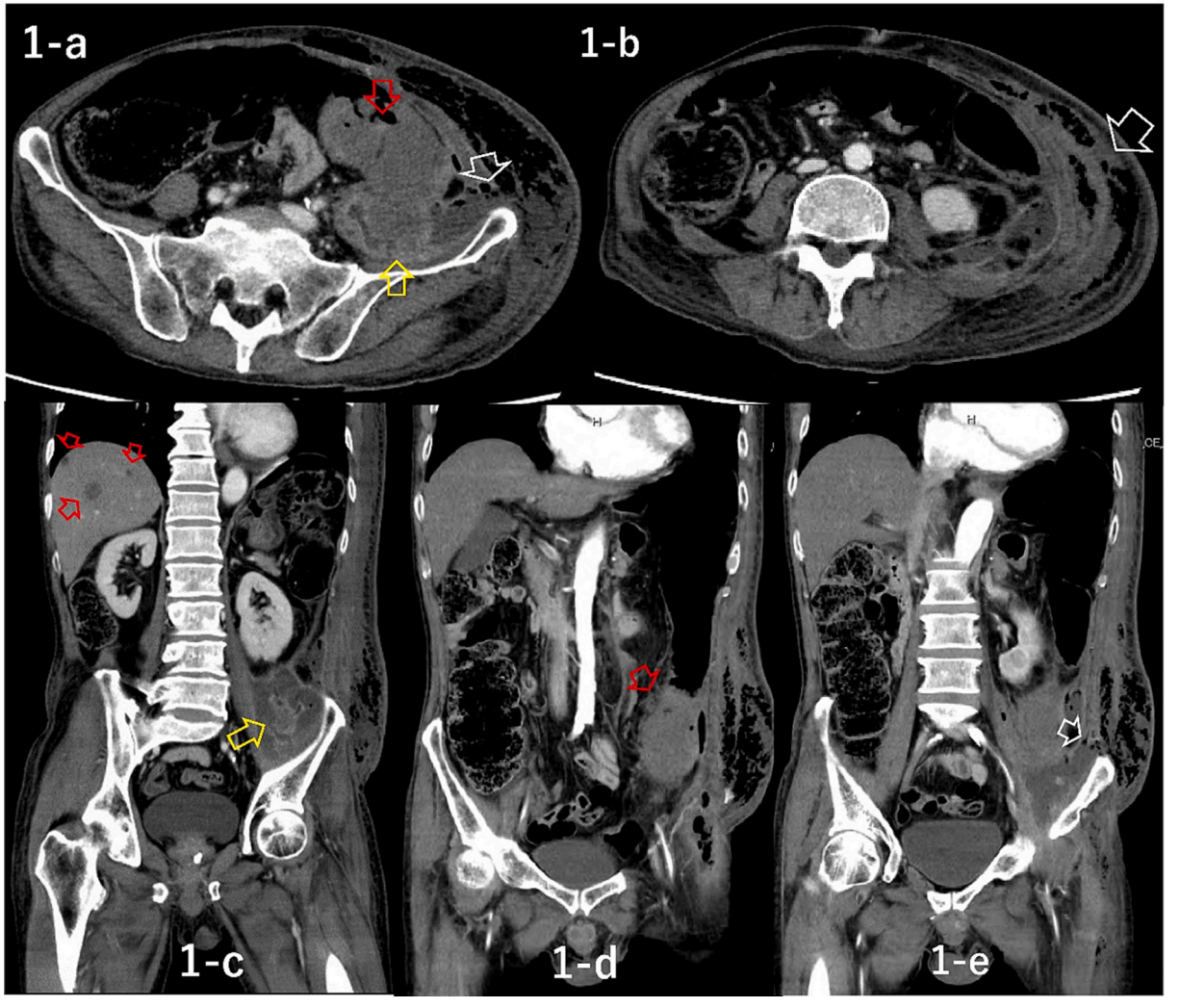


**Fig. 1.** Contrast-enhanced abdominal CT.
1-a: The descending colon (red arrow) cancer penetrated into the retroperitoneum, forming an abscess (yellow arrow), and later penetrated the subcutaneous tissue (white arrow), resulting in the development of extensive emphysema, which could be observed subcutaneously in the left abdomen.
1-b: The subcutaneous fat tissue concentration in the left abdomen and emphysema increased extensively, reaching the lower pole of the kidney (white arrow).
1-c: Retroperitoneal abscess (yellow arrow) formed in the coronal section, and extensive subcutaneous emphysema was detected in the left abdomen. Metastasis foci were also observed in the liver (red arrow).
1-d: Cancer of the descending colon in the coronal section (red arrow).
1-e: The site of subcutaneous rupture of the retroperitoneal abscess in the coronal section (white arrow).

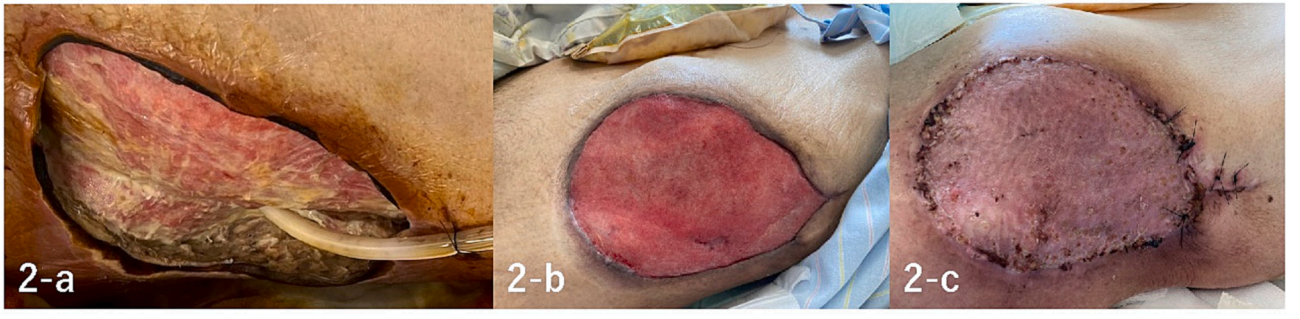


**Fig. 2.** Improving process of an extensive and complex wound after surgical debridement for necrotizing fasciitis.
2-a: Postoperative day 7.
2-b: After negative-pressure wound therapy with instillation and dwelling treatment (postoperative day 65).
2-c: After the use of a split-thickness skin graft (postoperative day 73.)

## Case presentation

A 72-year-old male patient complained of left lower quadrant pain. An elastic hard mass was palpable in the left flank, and the skin around the mass was reddish and swelling. His past history was myocardial infarction. Temperature was 37.2 °C, the blood pressure was 108/62 mmHg, the pulse rate was 148 bpm/min, SpO2 97 %. White blood cell count was 27,600/μl (number of neutrophils 97 %), C-reactive protein was (CRP) 40.1 mg/dl, platelet count was 20.7 × $10^4$/μl, PT 43 %, FDP 25 μg/ml. Through computed tomography, a 7 cm malignant mass in the descending colon was detected, penetrating the retroperitoneum. Additionally, multiple masses suspected of distant metastases were found in the liver (Fig. 1). The retroperitoneal penetration by the descending colon cancer led to subcutaneous rupture. Hence, emergency surgery was performed. A wide incision was made in the left abdomen. There was purulent drainage with a strong odor as soon as the incision. The aponeurosis of the external oblique muscle was necrosis extensively. Fascial necrosis was extensive. Necrotic fascia was debrided as much as possible. By these intraoperative findings, we diagnosed this case as necrotic fasciitis. Then, a transverse colostomy was performed for local wound control. After the debridement, a Duple drain was placed in the retroperitoneal abscess cavity. Isodine gauze was inserted into the wound, and the procedure ended with an open wound. Intraoperative bacterial cultures were positive for *Escherichia coli*, *Streptococcus anginosus*, *Bacteroides fragilis*, *Bacteroides thetaiotaomicron*, and Peptostreptococcus mangus. Antibiotics, tazobactam/piperacillin + meropenem, were administered. Culture results led to the de-escalation of sulbactam/ampicillin on postoperative Day 7. The patient was released from the intensive care unit on postoperative day 14. Daily debridement of necrotic tissue and wound irrigation were continued. However, on postoperative day 48, bacterial wound culture was positive, and the wound was extensive and complicated. Therefore, an NPWTi-d was started. VAC-ULTA® was used for this procedure. NPWTi-d was found to be very effective for this extensive and complicated wound showing infection. On postoperative day 66, a split-thickness skin was grafted. NPWT was then used to fix the skin graft. Subsequently, this skin graft appeared to be surviving well, and the wound successfully closed (Fig. 2).

## Discussion

NF is a serious soft-tissue infection with a mortality rate exceeding 30 % [1]. To improve its prognosis, early surgical debridement should be performed. Repeated necrotic tissue resection and sufficient incision and drainage during the clinical course are also important [1].

Since 2010 in Japan, NPWT has been covered by health insurance for wound closure of extensive tissue defects, and its use has been widely reported. However, NPWT is not indicated for infected wounds; thus, an infection control period is required. Conversely, NPWTi-d enables early initiation of wound care regardless of the presence of infection [4–6]. NPWT is originally intended to increase blood flow in the wound, improve oxygenation, promote granulation, and remove excess exudate. However, it cannot effectively reduce the number of bacteria [7–9]. Singh DP et al. reported that compared with NPWT alone, NPWTi-d reduced the number of bacteria and decreased biofilm formation [10].

NPWTi-d improves wound by controlling the wound environment, enabling wound cleaning through a periodic infusion function, the application of controlled negative pressure, protection of the wound, promotion of granulation formation, removal of exudate and infectious waste products, and provision of a cleaning solution to the entire wound surface, including those wounds that have complex shapes [11,12]. NPWTi-d is a safe and effective treatment for extensive tissue defects accompanied with infection, and it may be used in various fields. In the present case, NPWTi-d was effective for an extensive and complex wound accompanied with infection after NF debridement, and the wound successfully closed using a split-thickness skin graft.

## Conclusions

NPWT is not indicated for infected wounds; hence, an infection control period is required. Conversely, NPWTi-d enables the early initiation of wound care despite the presence of infection. In this case, NPWTi-d was effective for an extensive and complicated wound accompanied with infection after NF debridement.

## Abbreviations

NF necrotizing fasciitis
NPWTi-d negative-pressure wound therapy with instillation and dwelling

## Patient consent

Informed consent was obtained from the patient for the publication of this case report and any accompanying images.

## Source of funding

Not applicable.

## Ethics approval

This case report was conducted in accordance with the Declaration of Helsinki and procedures were performed in accordance with the ethical standards of our institution and our national standards.

## CRediT authorship contribution statement

Manuscript drafted by NK. NK, ST, and SS performed treatment and management of the patient. HY and SK carried out medical patient care and revised the manuscript.

## Guarantor

Naoya Kobayashi has accepted full responsibility for this work and the decision to publish it.

## Declaration of competing interest

The authors declare that they have no competing interests.

## Data availability

Not applicable.

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