

Severe Sacral Region Pressure Ulcer Infection Treated in Negative Pressure Wound Therapy with Instillation and Dwelling: A Case Report

Mariko SUGITA^{*1}, Shigeo HIGAMI^{*1}, Toru SAWAMOTO^{*1}, Seiji MORITA^{*2} and Yoshihide NAKAGAWA^{*2}

^{*1}*Tokai university Hachioji Hospital emergency and critical care medicine*

^{*2}*Department of emergency and critical care medicine, Tokai University school of medicine*

(Received January 19, 2022; Accepted February 9, 2022)

We report a case of severe sacral osteomyelitis and sepsis with pressure ulcer infection treated with negative pressure wound therapy with instillation and dwelling (NPWTi-d) V.A.C.ULTA[®] from an early stage.

Case: A 76-year-old man, bedridden because of dementia and an old cerebral infarction, was treated in a nursing facility for a sacral region pressure ulcer. He had a fever for three days and was transferred to the emergency department. The quick SOFA (sequential organ failure assessment) score at the hospital visit was three points. A coccyx and black mud-formed necrotic tissue attached to the sacral region pressure ulcer with a strong putrid odor sloughed off. Sacral region pressure ulcer infection, sepsis, disseminated intravascular coagulation, and purulent sacral osteomyelitis were diagnosed, and urgent debridement was performed. We treated the patient with meropenem, clindamycin, and vancomycin, and we performed irrigation debridement every day and transduced the V.A.C.ULTA[®] care system from AOD9, that led to good granulation at the infection site. The wound area underwent simple closure on AOD35 and the patient was transferred to the medical treatment hospital.

Since dressing change is relatively easy in the emergency department of a secondary medical care institution with little man power, V.A.C.ULTA[®] therapy may be useful in treating severe cases of pressure ulcer infections.

Key words: Pressure ulcer infection, sepsis, Negative Pressure Wound Therapy, V.A.C.ULTA[®], purulent sacrum osteomyelitis

INTRODUCTION

Pressure ulcer infections are common in Japan because of its super-aging population. Pressure ulcer infections often require systemic therapy with antibiotics; however, topical treatment is important because drug-resistant bacteria may resist treatment with antibiotics only [1]. Negative pressure wound therapy (NPWT) has been used for a long time to treat pressure ulcers spreads widely, but is contraindicated for local infection and contaminated wounds [2]. NPWT with instillation and dwelling (NPWTi-d) is well-adapted for treating intractable ulcers and wounds with bacterial infection where NPWT will not work [3]. As these infected ulcers are challenging to treat in emergency practice, patients may have a negative experience. It may be useful to consider the use of NPWTi-d early in acute and intensive care. We report our experience with a sacral region pressure ulcer infection with septic shock with good outcomes using NPWTi-d (V.A.C.ULTA[®] Therapy System, KCI USA, Inc., SanAntonio, TX).

CASE REPORT

We present the case of a 76-year-old man who was bedridden because of dementia and disuse atrophy. A pressure ulcer developed in the sacral region for 6

months and was treated in a nursing home. He developed a fever 2 days before the hospital visit, and sacral region pressure sore infection was diagnosed, and the patient was prescribed levofloxacin. Since the fever continued, the staff requested an ambulance, and the patient was transferred to our hospital.

His medical history included dementia, atrial fibrillation, and an old cerebral infarction, and he required maximum assistance.

At presentation to the hospital, the patient's vital signs included sepsis at GCS2-1-4, respiratory rate 22 breaths/min, heart rate 140 beats/min, blood pressure 128/86 mmHg, temperature 39.1°C, and a quick Sequential Organ Failure Assessment (qSOFA) score of 3. The sacral region pressure ulcer had a putrid odor and resulted in a skin loss of 10 cm in diameter, a pocket of 20 cm in diameter, and the coccyx which fell off attached (Fig. 1). The blood test at the hospital visit showed high leukocyte count, high levels of c-reactive protein (13.552 mg/dL), and procalcitonin (0.49 ng/mL) (Table). A diagnosis of severe soft tissue infection and sepsis was suggested. The patient was urgently admitted to the intensive care unit and treated with antibiotics — meropenem, clindamycin, and vancomycin — for 7 days and meropenem and clindamycin for 10 days followed by ceftriaxone sodium for 10 days. Concentrated red cells were transfused on admission



Fig. 1 Sacral region pressure ulcer with the putrid odor formed skin loss of 10 cm in diameter, a pocket of 20 cm in diameter, and the coccyx which fell off attached.

Table The blood test at the hospital visiting

White blood cell	14,900	/ μ L
Hemoglobin	6.6	g/dL
Platelet	15.2	10^4 / μ L
Firin degradation product	28.2	ug/mL
PT ratio	1.35	
Aspartate aminotransferase	50	U/L
Alanine aminotransferase	38	U/L
Albumin	1.3	g/dL
C-reactive protein	13.552	mg/dL
Procalcitonin	0.49	ng/mL
Acute disseminated intravascular coagulation diagnostic criteria *Japanese Association for Acute Medicine criteria	5	point

and the 5th day of hospitalization because of anemia; albumin preparation was administered for hypoalbuminemia for 3 days from the day of admission, and recombinant human soluble thrombomodulin was administered for treating sepsis and disseminated intravascular coagulation.

Obligate anaerobic asporogenic gram-positive bacilli, *Peptostreptococcus prevotii*, and *Corynebacterium* sp. were detected in both blood and wound area cultures, and obligate anaerobic gram-negative bacilli, coagulase-negative *Staphylococcus*, *Escherichia coli*, pigmented *Prevotella/Porphyromonas*, and *Streptococcus* sp. were detected only in the wounded area culture. We attached the V.A.C.ULTA® system for 14 days from day 9 onwards. The blood flow of the granulation tissue improved on day 14, and the necrotic tissue around the sacrum almost disappeared, and good granulation

tissue formation was observed on the 28th day. The patient was transferred to the chronic stage bed on the 42nd day. The clinical course is shown in Fig. 2 and the course of the wounded area in Fig. 3.

DISCUSSION

Pressure ulcers appear most commonly in older adults, and the most common site reported is the sacral region. It easily occurs in the elderly, for whom reduced activities of daily living lead to a constant, long-lasting pressure in the sacral region and a pathologic bone prominence [4]. In the sacral region, frequent treatment is labor-intensive. NPWT is not indicated for treating an infected wound, and therefore, systemic therapy with antibiotics is required for a long time, promoting infection with drug-resistant bacteria [2]. The exchange of the irrigation and dressing agent

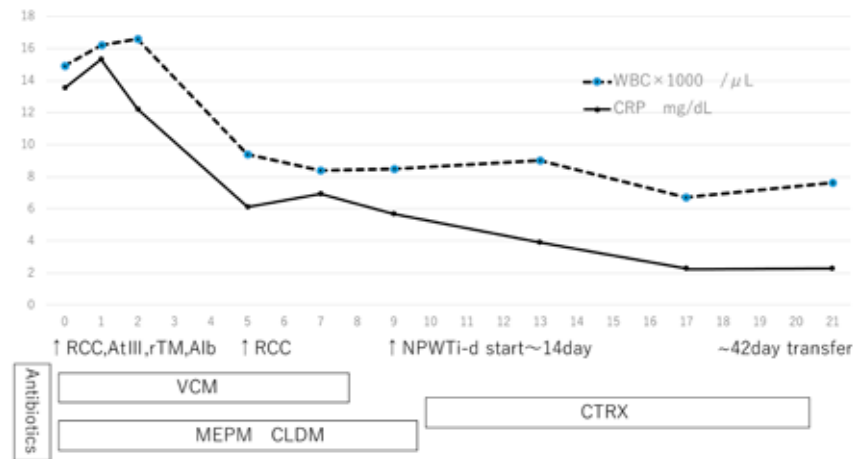


Fig. 2 Antibiotic treatment and DIC treatment were initiated using blood preparation on the first day. V.A.C.ULTA® was attached for 14 days from the 9th hospital day and hospital was changed in the chronic stage on the 42nd hospital day.

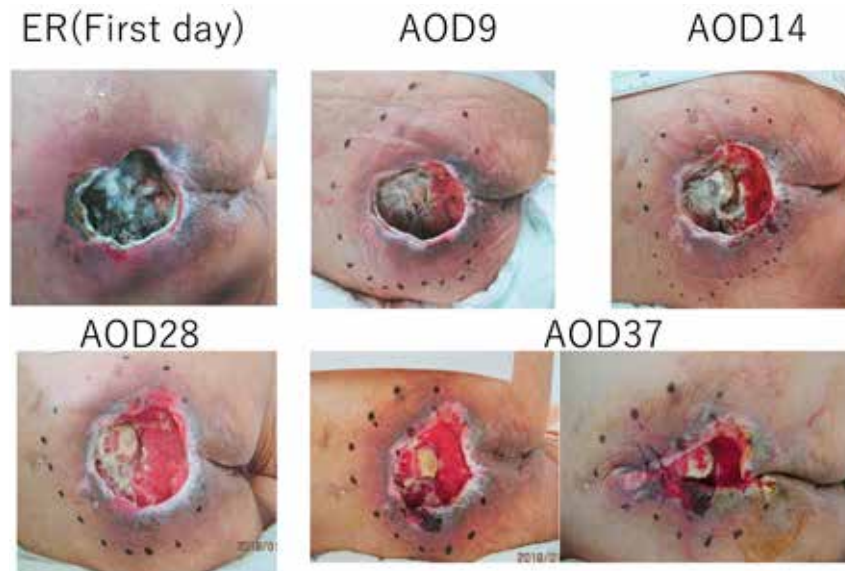


Fig. 3 We attached V.A.C.ULTA® for 14 days from the 9th day. Blood flow of the granulation improved on the 14th day. The necrotic tissue around the sacrum almost disappeared, and a good granulation was observed on the 28th day.

of the back is difficult, and a system that percolates washings in NPWT was created. It was covered by insurance in Japan in 2017, and NPWTi-d has been in use for several years. NPWTi-d promotes wound healing by promoting wound shrinkage, removing excessive decoction, improving edema, physically stimulating the cells and tissue, increasing the wound floor blood flow, and reducing debris. An adaptation case is a refractory wound in which the existing treatment did not succeed or will not succeed [5]. According to the International Consensus Guidelines, this involves wounds that need reoperation, wounds that cannot be closed easily, invasive infections or intractable wounds in which biofilm is present widely, diabetic gangrene with infection, bone exposure or bone infection, ischemia of the wounded area, and necrotizing fasciitis [3, 5].

The pressure ulcer infection is often caused by multiple bacteria, for example, *Enterobacter*, *Staphylococcus*, *Enterococcus*, *Streptococcus*, *Proteus*, and anaerobic bacteria; it is reported that bacteremia is also common [6, 7].

In this case, the major merit of NPWTi-d was that VAC (Vacuum Assisted Closure) therapy was possible from the early stage of local infection. Because the procedure involves a kit and requires few dressing changes, managing the wounded area becomes relatively simple. There is merit in enabling treatment of the pressure ulcer infection with severe infection in medical institutions with little manpower. The demerits of NPWTi-d include difficulty in observing the wound area, aggravated infection when a circuit occludes, and frequent leakage in the circuit if intense body movements occur.

In our case, good outcomes were obtained by introducing NPWTi-d for treating a pressure ulcer with bacterial infection with multiple species involved, sacrum osteomyelitis, and severe sepsis. We conclude that NPWTi-d might improve the outcome if considered early as an adaptation to treat a contaminated wound in acute medicine. Therefore, we reaffirm the importance of topical therapy in emergency medicine and intensive care.

ACKNOWLEDGEMENTS

The authors thank Dr. Kanako Kakuta (Department of Plastic surgery, Tokai University) and Mr. Yosimura M (Certified Nurse in Wound, Ostomy and Continence Nursing).

CONFLICT OF INTEREST

The authors declare no conflicts of interest associated with this manuscript.

REFERENCES

- 1) Whitney J, Phillips L, Aslam R, Barbul A, Gottrup F, Gould L, *et al.* Guidelines for the treatment of pressure ulcers. *Wound Repair Regen* 2006; 14: 663-79.
- 2) Gupta S, Baharestani M, Baranoski S, de Leon J, Engel SJ, Mendez-Eastman S, *et al.* Guidelines for managing pressure ulcers with negative pressure wound therapy. *Advances in Skin & Wound Care*: 2004; 17: 1-16.
- 3) Gupta S, Gabriel A, Lantis J, Téot L. Clinical recommendations and practical guide for negative pressure wound therapy with instillation. *Int Wound J* 2016; 13: 159-74.
- 4) Japanese Society of Pressure Ulcers Surveillance Committee. Pressure ulcers prevalence in each facilities, site/severity (depth) of pressure ulcers (in Japanese). *Jpn J Pressure Ulcers* 2015; 17: 58-68.
- 5) Kim PJ, Attinger CE, Constantine T, Crist BD, Faust E, Hirche CR, *et al.* Negative pressure wound therapy with instillation: International consensus guidelines update. *Int Wound J* 2020; 17: 174-86.
- 6) Yoshikawa TT, Livesley NJ, Chow AW. Infected pressure ulcers in elderly individuals. *Clin Infect Dis* 2020; 35: 1390-6.
- 7) Whitney J, Phillips L, Aslam R, Barbul A, Gottrup F, Gould L, *et al.* Guidelines for the treatment of pressure ulcers. *Wound Repair Regen* 2006; 14: 663-79.