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Case Report

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Case report: Treatment of large-area leg venous ulceration in a 94 year-old woman with polymorbidity

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Abstract

Background: Venous Leg Ulcer (VLU) is an open skin injury of the lower limbs caused by persistent or Chronic Venous Insufficiency (CVI) and venous hypertension. It is a common type of chronic lower limb wound and accounts for 70%~80% of all chronic lower limb ulcers.

Case report: Herein, we describe a case of utilizing the best medical and surgical therapies including advanced wound care products to treat CVI. A 94-year-old female patient was admitted due to bilateral edema of lower limbs, paroxysmal dyspnea at night and shortness of breath for one week and shortness of breath for one day. After admission, appropriate infection control, volume expansion, diuresis and anti-heart failure treatment were given to correct electrolyte imbalance and stabilize the internal environment. On the second day of admission, her right lower limb exhibited purplish-black discoloration with exudate, and by the third day, skin breakdown with significant exudate was observed, with the wound gradually expanding. The patient has an old appearance, a thin constitution, and severe edema in both lower limbs. The skin of the right lower limb was purple-black, accompanied by a large amount of exudation, local necrotic tissue, weakened pulse of the dorsalis pedis artery, and dry and cold skin temperature.

Conclusion: After systematic treatment, the patient's right lower limb ulcer gradually healed, infection was controlled, and heart failure stabilized. The patient was discharged after improvement of her multiple morbidities.

Keywords: Extremely old age; Polymorbidity; Leg ulcers; Povidone-iodine; Betadine

Introduction

Venous Leg Ulcer (VLU) is an open skin injury of the lower limbs caused by persistent or chronic venous insufficiency (CVI) and venous hypertension [1-3]. It is a common type of chronic lower limb wound and accounts for 70%~80% of all chronic lower limb ulcers [4-6]. It is common in the lower 1/3 of the inner and outer legs and is also called "ecthyma". The main risk factors for venous lower limb ulcers include age, obesity, lower limb trauma, pregnancy, deep vein thrombosis and phlebitis. Treatment includes drug, pressure therapy, surgery (such as vein stripping), biological dressing, intravenous active drug therapy.

Povidone-iodine is a complex of iodine and Polyvinylpyrrolidone (PVP). PVP has film-forming, adhesion, detoxification, chronic release, strong water solubility, and excellent microbial degradation properties. Iodine is a highly active halogen element with good microbicidal effect [7]. Povidone-iodine is a broad-spectrum antimicrobial drug, which is effective against Gram-positive bacteria, fungi, yeasts and protozoa. External application of recombinant human epidermal growth factor (hEGF) can promote skin wound tissue repair, induce the reversal of differentiated and mature epidermal cells into epidermal stem cells, and accelerate the formation of wound granulation tissue and the proliferation of epithelial cells [2].

Case report

The patient, a 94-year-old female, was admitted to the cardiac intensive care unit on July 22, 2024 due to edema in both lower limbs for one week and severe shortness of breath for one day. She had a history of coronary atherosclerotic heart disease, hypertension, and chronic heart failure. The patient was previously diagnosed with coronary atherosclerotic heart disease, chronic heart failure and hypertension. She took aspirin (100 mg/day) regularly for long-term antiplatelet therapy, atorvastatin (20 mg/day) to control blood lipids, and benazepril (10 mg/day) to relieve heart failure and controls blood pressure, metoprolol extended-release tablets (47.5 mg/day) to reduce heart rate and improve myocardial oxygen consumption, and furosemide (40 mg/time, once daily) to control fluid retention. The patient's condition is stable, but follow-up visits are irregular. The physical examination on admission showed that the wound is located on the dorsal side of the right calf, close to the medial malleolus area. The patient's lower limbs were severely edematous, the skin of the calf of the right lower limb was purplish black, and the pulse of the right dorsalis pedis artery weakened but did not disappear. Neurological examination showed that the muscle strength of the limbs was grade 5, and the muscle tone and tendon reflexes were normal. Laboratory tests revealed acute systemic infection (CRP 105.32 mg/L, PCT 97.4 ng/mL), accompanied by hypoalbuminemia (ALB 26.54 g/L). Based on the above manifestations, the initial diagnosis was soft tissue infection of the right lower limb combined with sepsis.

The diagnosis was confirmed to be venous ulcer combined with soft tissue infection, sepsis, acute exacerbation of chronic heart failure, atherosclerosis of the lower limbs and Hypoalbuminemia. On admission, CRP (105.32 mg/L) and PCT (97.4 ng/mL) were significantly elevated, accompanied by coagulation disorders and Systemic Inflammatory Response Syndrome (SIRS), which met the diagnostic criteria for sepsis. She had a history of chronic heart failure, and his NYHA cardiac function classification was Class III on admission. Her NT-proBNP level was elevated at 1304 pg/mL, accompanied by severe edema of both lower limbs and shortness of breath, indicating an acute exacerbation of chronic heart failure. Ultrasound examination of the lower limbs showed arteriosclerosis with plaque formation, and the pulse of the dorsalis pedis artery of the right lower limb was weakened, supporting the diagnosis of atherosclerosis of the lower limbs.

Results

Laboratory and imaging examination showed that the patient's inflammatory indicators were significantly elevated: high-sensitivity C-Reactive Protein (CRP) 105.32 mg/L, Serum Amyloid (SAA) 184.51 mg/L, and Lactic Acid (LAC) 6.56 mmol/L, interleukin-6 (IL-6) 14350 pg/mL, Procalcitonin (PCT) 97.4 ng/mL. Plasma protein analysis showed hypoalbuminemia, with an albumin (ALB) level of 26.54 g/L; coagulation function testing showed that the activated Partial Thromboplastin Time (APTT) was prolonged to 54.7 s, and D-dimer increased to 9.64 μg/mL. (FEU), suggesting coagulation disorders and possible Disseminated Intravascular Coagulation (DIC) tendency. Total Bilirubin (TBIL) was 38.4 μmol/L, urine microalbumin (UAlb-N) was 344.35 mg/L, and plasma protamine paracoagulation test (3P) was positive.

Ultrasound examination showed large amount effusions in the bilateral pleural cavities, and subcutaneous edema in the right calf and dorsum of the foot. Vascular ultrasound examination showed atherosclerosis and plaque formation in both lower limbs without blockage of venous return nor obvious thrombosis. Cardiac ultrasound examination showed that the left ventricle was slightly enlarged, both chambers were significantly enlarged, and the Left Ventricular Ejection Fraction (LVEF) was 42%, indicating decreased cardiac function and a small amount of effusion in the pericardial cavity. These examination results indicate significant inflammatory reaction, abnormal coagulation and cardiac dysfunction.

Treatment process

The patient's condition was recorded as follows:

(1) On the day of admission: the patient showed significant shortness of breath (breathing 35 times/min) and unstable vital signs (body temperature 37.8°C, pulse 132 times/min, blood pressure 105/53 mmHg). The skin of the calf of the right lower limb was purple-black with slight exudation. Laboratory tests showed that CRP was significantly elevated (105.32 mg/L), PCT (97.4 ng/mL) and IL-6 (14350 pg/mL). Venous ultrasound showed that the venous return of the lower limbs was smooth and in the detumescence stage. According to the "2023 Expert Consensus on Wound Management of Venous Lower Extremity Ulcers", a non-elastic bandage was used for compression dressing. There was soft tissue infection and erysipelas in the right lower limb, and anti-infective treatment was given. Parenteral nutrition support and correcting coagulation abnormalities was applied.

(2) Day 2 to day 3: the skin of the right calf ruptured, forming an ulcer with an area of about 12 cm × 8 cm. The wound base was 100% red and covered with yellow secretions. The

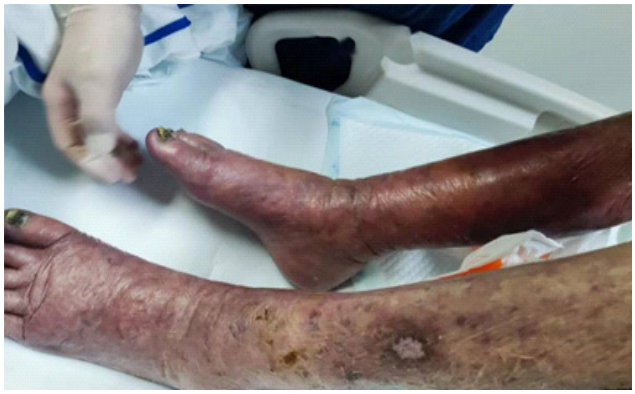

Figure 1: Day 0 Edema of the right lower limb, purple-black skin color. Upon presentation the wounds were heavily covered with slough (Figure 1, day 0).

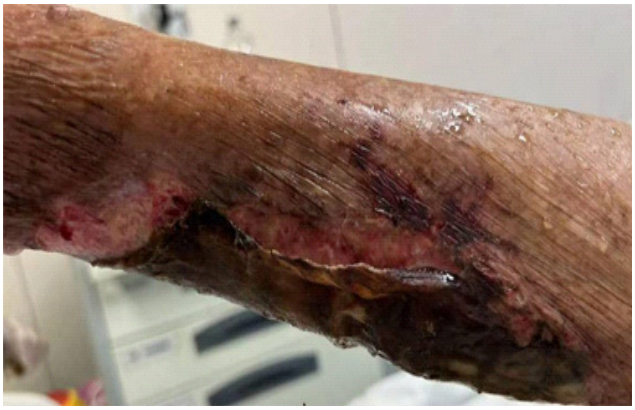

Figure 2: Treatment large-area skin ulcers with Eutoplasmic gauze.

Figure 3: Continuous external application of Yunnan Baiyao.

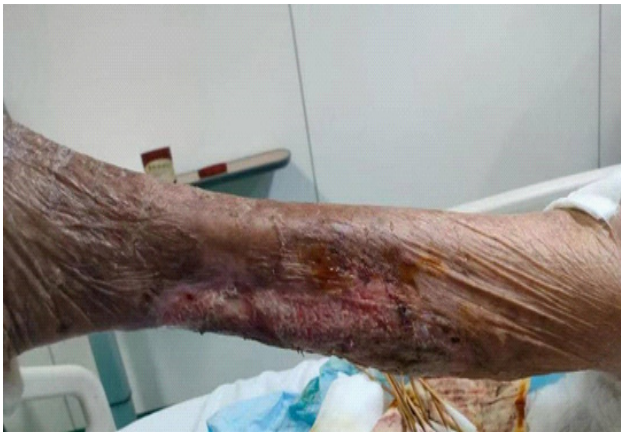

Figure 4: Start using povidone cream after debridement.

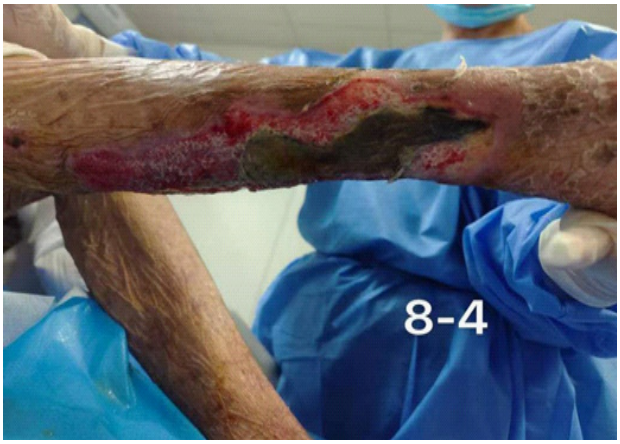

Figure 5: 3 days on povidone cream after debridement.

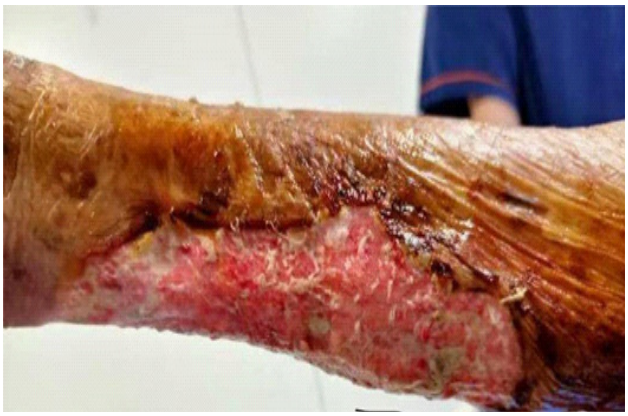

Figure 6: One week on povidone cream.

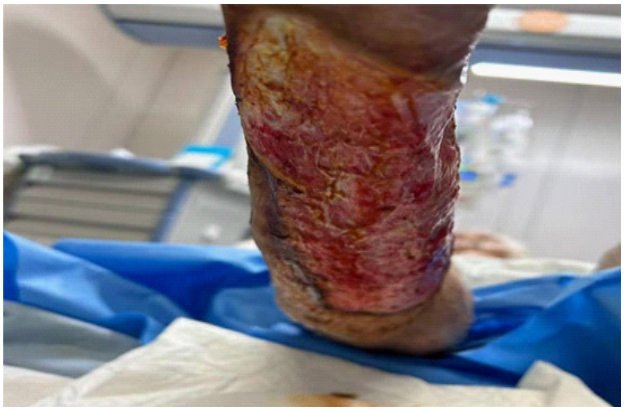

Figure 7: Day 1 of hEGF growth factors spraying + external application of povidone.

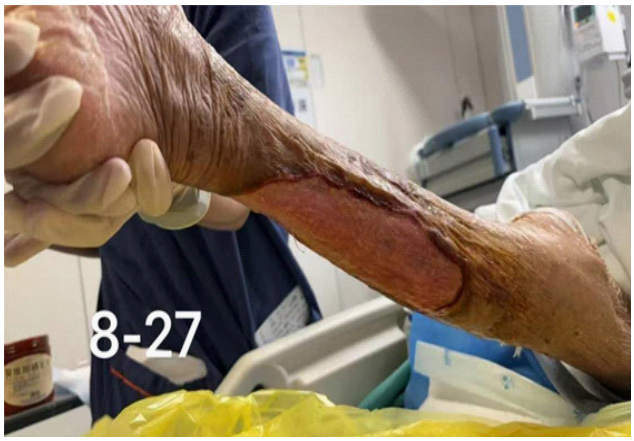

Figure 8: 10 days after external application of growth factor + povidone.

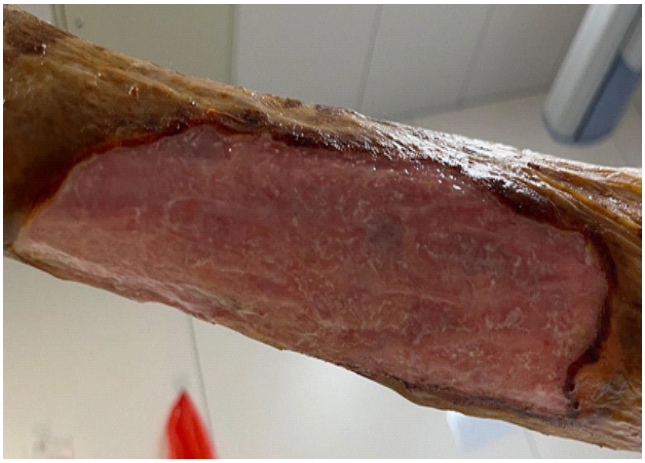

Figure 9: Skin of right lower limb before discharge.

patient also had abnormal coagulation function (D-dimer 9.64 μg/mL), suggesting a tendency for DIC. The skin temperature increased, the pulse of the right dorsalis pedis artery was weak and the skin temperature was dry and cold. The affected limb was elevated, debrided, disinfected, and the wound protected. The wound was covered with gauze and cotton pads to absorb the exudate, while reducing local pressure and controlling the spread of infection. Orthopedic consultation concluded that the scope of infection and necrosis of the right lower limb had further expanded, and there was a risk of septic shock and amputation.

(3) One week: After anti-infection and supportive treatment, the patient's infection indicators declined (CRP 44.30 mg/L, PCT 0.204 ng/mL), the ulcer area expanded to 30 cm × 15 cm. The epidermis was ruptured with black necrotic tissue. The base of the wound was red and white mixed, and the exudate increased, indicating aggravation of local infection. The endocrinology department recommended using iodophor for disinfection after debridement, topical application of Yunnan Baiyao, and dressing with gauze and cotton pads.

(4) 2 week: The patient's wound base was still dominated by yellow necrotic tissue (100% yellow), accompanied by a large amount of purulent secretions, and the skin temperature was slightly higher. Povidone-iodine antibacterial ointment was applied after daily mechanical debridement. At the same time, albumin was supplemented, and tramadol analgesia and lidocaine wet compress before dressing change were used to relieve the patient's pain and discomfort caused by dressing change.

(5) One month after admission: The base of the wound gradually turned red, the exudate decreased, the area shrank, and the surrounding tissue was slightly red and swollen, which was significantly improved than before. The patient's condition further improved, the wound shrank to 20 cm × 10 cm, the surrounding redness and swelling subsided, and the exudate was significantly reduced. The albumin level increased from 26.54 g/L to 31.88 g/L, close to the normal range. The base was 75% red and 25% yellow. The surrounding skin was pigmented, and the wound edge was dry. Continue to change the dressing every day, combine with spraying growth factors after debridement, and combine with povidone-iodine antibacterial ointment to promote wound healing.

(6) 37 days after admission: The patient's wound was dry and rosy, with intact surrounding skin, obvious pigmentation, and good infection control.

Medication: (1) Yunnan Baiyao: It is mainly applied to wounds by improving microcirculation and hemostasis[8-10]. (2) Povidone-iodine: It has broad-spectrum antibacterial activity and is a clinically recommended anti-infectious dressing for chronic ulcers. Combined with debridement and daily dressing changes, it can effectively promote infection control and improve wound healing [9].

Discussion

The patient is 94 years old, accompanied by low immune function and multiple comorbidity, including chronic heart failure, coronary atherosclerosis, sepsis, etc., further aggravates the difficulty of ulcer healing [11]. The ulcer area was large (maximum 30 cm × 15 cm) with severe soft tissue infection and local exudation was obvious. The infection control treatment plan refers to the "2023 Expert Consensus on Wound Management of Venous Lower limb Ulcers". The combined application of povidone-iodine cream and mechanical debridement can help effectively remove necrotic tissue and inhibit the spread of infection.

Edema of the lower limbs is common in patients with heart failure. This case was admitted to the hospital with severe edema in both lower limbs, and routine diuretic treatment was given. Elderly people have less muscle tissue in their lower limbs, and unreasonable debridement methods will cause damage to healthy tissues. For this reason, we choose mechanical debridement combined with autolytic debridement to quickly remove necrotic tissue and remove biofilm to reduce pain. We chose povidone-iodine cream as a wound dressing. Iodine has a broad-spectrum antibacterial effect, while polyvinylpyrrolidone has film-forming, adhesive, stable and chronic release properties. Granulation tissue gradually formed in the patient's wound through persistent debridement and use of povidone-iodine.

Conclusion

The skin ulcer of the patient's right lower limb has healed, no infection of the right lower limb has occurred, systemic infection has been controlled, and cardiac function has improved.

Declarations of competing interest: None

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