

Clinical effect of VSD combined with autologous platelet rich gel on a case of gout chronic wounds

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Abstract: Objective To observe the clinical effect of vacuum sealing drainage (VSD) combined with autologous platelet rich gel (autologous platelet-rich gel) in treating chronic gout wounds. Methods A case of gout with chronic wound on the left dorsum of foot was treated with APG after debridement, dressing change and VSD. Results One patient was treated with VSD combined with autologous platelet-rich gel. The wound healed in 73 days without obvious adverse reactions. Conclusion VSD combined with autologous platelet-rich gel is a safe and effective new treatment for chronic gout.

1. Introduction

Gout stone is a characteristic damage of gout, which is caused by the long-term increase of blood and uric acid, and the formation of sodium urate deposited in various tissues and organs to form stones. Surface stones mainly occur in the joints of extremities and adjacent tissues. If the stones originate in soft tissues, the skin will become thinner and burst. Sodium urate crystals will continue to flow out, and often combined with infection, which makes wound healing difficult, and forms chronic ulcers and refractory ulcers, seriously affecting the daily work and life of patients. Traditional treatment methods generally take antibiotic treatment, symptomatic support treatment while debridement and drainage. Drainage often prolongs the repair time of wound soft tissue defect, brings great pain to patients, increases economic burden, and is not conducive to the control of infection. The combination of VSD and APG in the treatment of diabetic foot and chronic ulcer has achieved good results [1]. We speculate that the combination of VSD and APG will also have a good effect on refractory ulcers caused by tophi, but no similar reports have been reported at home and abroad. In September 2018, our department used a conventional treatment for chronic wounds with left foot gout and no signs of healing. Therefore, we tried to implement a combination of VSD and APG and achieved good results. The report is as follows.

2. Clinical data

A 74-year-old male patient was admitted to the hospital on September 2, 2018 because of "ulceration of the left dorsum of foot and unfavorable pain activity for more than two months". Two months ago, the patient had no obvious inducement of left foot pain, ulceration and effusion of tofu residue. Gout has a history of 10 years. The effect of hypouric acid, anti-infection and dressing change in the hospital was not significant. Specialist examination: 6 cm x 10 cm mass on the left dorsum of foot, local skin flushing, 6 ulcers, tofu dregs, wound assessment (Figure 1): Visual Analogue Scale / Score (VAS) [2]. Wound Bed Score (WBS) [3]. Joint evaluation of wounds, evaluation methods: (1) VAS. Visual pain scale was used to divide the painful barrel into 0-10 points. Before each treatment, patients were asked to mark the pain on the recording ruler according to the degree of pain, and record the corresponding scores. (2) WBS. According to Falanga et al [3]. The reported wound scoring method scored the wound from the aspects of granulation, fibrous tissue, scar, exudate volume and color of the wound, 16 was divided into the best state, and 0 was the worst state. 1. Method of measuring wound: The maximum length and the widest part of the

wound are measured with a ruler, and the length of the longitudinal axis of the patient's body is wide, the width is the vertical direction of the longitudinal axis of the body, and the depth is from the surface of the skin to the bottom of the wound. See Table 2 for details. X-ray left foot report showed a change in left foot gout. Laboratory examination: WBC $14.87 \times 10^9/L$; hypersensitive C-reactive protein 19 mg/L; mm/h, uric acid 616.66 $\mu\text{mol/L}$; albumin 32.40 g/L. The diagnosis was an acute attack of gouty arthritis and ulceration. Firstly, anti-infection, analgesic, uric acid-reducing and traditional dressing methods were applied to wound debridement, disinfection and drainage treatment. The infection was controlled on the 9th day after admission, but there was no sign of healing on the wound surface. VSD combined with APF was used to repair the wound and recover smoothly. , hospitalized for 73 days, cured and discharged.



Fig.1.

Table 1 Wound Score Scale

Scoring items	0 points	1 points	2 points
Skin margin in healing	Nothing	25%-75%	>75%
Black scab	> 25% wound surface	0-25%	nothing
Depth and granulation	Deep or higher than periwound tissue	secondary	flat
Exudation volume	Many	secondary	Small or none
Edema	Serious	secondary	Mild or none
Skin inflammation around wound	Serious	secondary	Mild or none
Periwound callus or fibrous tissue	Many	secondary	A few
Red wound area	Nothing	50%-75%	>75%

Table 2 Wound evaluation in this patient

Wound site	Left dorsum of foot
Wound area	Medial: 3.0 cm * 2.0 cm * 1.0 cm, 2.5 cm * 2.5 cm * 0.5 cm, 1.5 cm * 1.5 cm * 0.5 cm; lateral: 3.0 cm * 3.0 cm * 1.5 cm, 2.0 cm * 2.0 cm * 1.8 cm, 1.0 cm * 1.0 cm * 0.3 cm
Wound color	75% yellow tissue and 25% red tissue
Peripheral skin	Obvious redness, severe swelling, dryness, large amount of dandruff and pigmentation
Seepage condition	Plenty of purulent secretions and urate crystals
Smell	Fishy odor
VAS	10 points
WBS score	5 points

3. Therapeutic method

3.1 VSD negative pressure closed drainage

3.1.1 Material

VSD dressing set (produced by Sacco Medical Technology Co., Ltd.) contains medical sponge dressing, medical operation film, pipeline and sealing sucker.

3.1.2 Mechanism of promoting wound healing

VSD makes the exudates and necrotic tissues of drainage area cleared in time, reduces the number of bacteria in wound, prevents the spread of infection and toxin absorption; closes wound inhibits bacterial reproduction, closes and moist environment, and is conducive to the function of immune microspore; stimulates capillary regeneration under continuous negative pressure. The experimental study found that after applying negative pressure, the blood flow of wound is comparatively high. There was a significant increase before negative pressure to avoid pain caused by frequent dressing changes; more effective protection of tendons and nerves of wounds; effective promotion of granulation tissue growth [4]. The VSD technology turns open wounds into closed wounds. The translucent film can prevent external bacteria from entering the wound surface, ensuring the normal outflow of water vapor in the wound surface and skin, effectively preventing infection and in-hospital cross-infection caused by conventional dressing change and drainage; VSD treatment can also produce compression. Because the dressing collapses under vacuum, the pressure acts evenly on the wound surface, so the pressure can resist excessive exudation of the wound caused by the suction of negative pressure.

3.2 Application of autologous platelet rich gel

3.2.1 Preparation of autologous platelet rich gel

It is prepared by the Department of our hospital.the wound and platelet count need to be evaluated in detail before preparation [5]. First, according to the granulation tissue condition of the wound, it is necessary to calculate the platelet gel on the ulcer surface, to ensure that the gel count per ml is over 500 thousand; secondly, to draw blood according to the platelet count $>100 * 10^9/L$ and collect the blood with the whole closed triple bag, (the blood volume is determined according to the area of the wound, and autologous blood 10ml can prepare LML platelet rich gel).The corresponding ml of autologous blood was collected, and platelet-rich plasma,PRP) was prepared manually by using BSC-1100IIA2-X small cryogenic centrifuge after 2 centrifugation. Finally, PRP and thrombin-calcium mixture (5,000 U of thrombin powder and 5mL of 10% calcium gluconate) are mixed according to the ratio of 10:1 to prepare platelet-richgel,PRG).

3.2.2 Repair mechanism

When platelets in APG bind to calcium, they can release many growth factors and cytokines, such as platelet-derived growth factor, insulin-like growth factor-1, epidermal growth factor, vascular endothelial growth factor, transfer growth factor, fibroblast growth factor, nerve growth factor, interleukin-1, osteocalcin, fibrinogen and so on. Various growth factors and cytokines are fine. Cell proliferation and tissue remodeling play their respective roles in promoting ulcer healing [6]. APG contains a large number of concentrated leukocytes and monocytes, which may have local anti-infective effects. Other cytokines secreted by the APG may also participate in wound healing. APG is gelatinous, which seals the wound and provides a moist healing environment. Conducive to granulation tissue growth and ulcer healing.

3.3 Therapeutic process

3.3.1 Preparation in advance

After hospitalization, patients should strictly control blood pressure, anticoagulation, anti-infection, microcirculation improvement, analgesia, nutrition supplementation and other symptomatic treatment; low purine diet, drinking more water, maintaining daily urine volume of 2000-2500 mL, giving sodium bicarbonate Tablets and febupropathione as appropriate, reducing uric acid, adjusting drug dosage, controlling blood uric acid in the normal range; changing drugs, disinfecting peripheral skin and wounds with iodophor, disinfecting and then using physiological salts Rinse with water. The necrotic tissue in the wound surface should be removed as much as possible, gout stones attached to the tissue should be removed as much as possible with curettes, the wound should be washed repeatedly with normal saline, the wound surface should be coated with

hydrogel wound dressing and drained with silver-containing dressing, and the wound should be cleaned and changed after 6 times of debridement and dressing change until the wound is clean and free of purulent secretions (Figure 2).

3.3.2 Method

No visible wound necrosis tissue and gouty stone, after negative bacterial culture of wound secretion, repeatedly rinse with Iodophor and physiological saline, wipe the water of wound edge skin with gauze, and apply medical surgical film to the skin around the wound to prevent immersion. Cut the VSD dressing to the shape similar to the six wounds, the area is 1-2 cm larger than the wound, cover the wound, bridge the six unrelated wounds with the dressing, ensure that each wound has enough negative pressure, cover the whole wound with biological semi-penetration, cover the edge of the medical surgical film should be about 5 cm beyond the wound edge, make the whole wound closed, 0.9% saline 10-15 drops/minute continuous irrigation. The suction tube connects with the central negative pressure, and adjusts the negative pressure to 150-300 mHg according to the circulation of lower limbs, wound size, age of necrosis degree, etc. The dressing contracts tightly under the negative pressure, touches hard, the shape of the tube is prominent, and there is no sound of leakage. The liquid flow in the drainage tube is effective, and the negative pressure is maintained continuously and smoothly. The drainage bottle should be replaced daily, and the color and drainage volume of the drainage fluid should be closely observed. If a large amount of fresh blood is drained, the small artery or vein is broken. The VSD should be removed immediately, the blood vessel should be ligated and reinstalled. If the collapsed VSD count If there is secretion accumulation under the semi-permeable membrane, it indicates that the seal is invalid, or the negative pressure is not enough, disappears, or the drainage tube is pressurized, or the tee is not opened, it needs to be carefully checked and treated immediately) (4th) It was found that the suction was not good and the foam was uplifted. It was found that the urate crystals blocked the pipeline and replaced the suction cup. After 7 days, the VSD dressing was removed, and the six wounds were cleaned, the blood supply was rich, and the fresh granulation tissue grew well (Figure 3).



Fig.2.



Fig.3.

After 6 fresh granulation tissue wounds were cultured without bacteria, APG was evenly sprayed

on the ulcer surface with three-way tube, and wound care ointment was applied on the wound surface to cover Vaseline gauze and brake for 2 hours. After 21 days of treatment, the medial dorsum of the left foot was healed by changing dressings every three days: 3.0 cm x 2.0 cm x 1.0 cm, 2.5 cm x 2.5 cm x 0.5 cm, 1.5 cm x 1.5 cm x 0.5 cm (Figure 4). The lateral side of the left foot: 3.0cm x 3.0cm x 1.5cm, 2.0cm x 2.0cm x 1.8cm, 1.0cm x 1.0cm x 0.3cm The wound is slower than the previous granulation, the bud is slow, white, and there is urate crystal adhesion. Achieve the desired results (Figure 5).



Fig.4.



Fig.5.

The second VSD was performed on three wounds with poor growth of the first APG granulation tissue on the lateral side of the left foot, followed by the second APG. After 15 days, the wound depth of the three wounds on the medial side of the left dorsum became significantly shallow and granulation tissue grew. The epithelium was formed, then rinsed with saline, the wound was coated with a wound care ointment and covered with Vaseline oil yarn, once every three days, and the wound healed after 14 days of dressing change (Figure 6).



Fig.6.

4. Discuss

With the improvement of living standards in China, the incidence of gout has increased significantly. Surface stones can make the skin thinner and burst. Sodium urate crystals or small stones continue to flow out. It is a common clinical problem that ulcers and sinus wounds are difficult to heal. Surgical treatment is often used. In addition to the risk of operation, there are still some problems, such as the difficulty of clearing uric acid calculi at one time and the difficulty of

healing surgical wounds. We understand the advantages of VSD combined with APG treatment: there is no blood-borne disease and immune rejection; the curative effect is exact, the chronic wound that the patient can not heal for several months, healed in a short period of time; can be repeated; the treatment process is simple OK; effective for elderly patients, in this study, the effect on patients aged 74 years, good to avoid surgery; at the same time safe and effective; no obvious adverse reactions.

VSD combined with APG is a simple, safe and effective method to treat a chronic wound with infection of left foot gout stone. It can control infection quickly, promote ulcer healing, shorten wound healing time, relieve patients' pain and have no adverse reactions. We speculate that APG will also have a good effect on chronic ulcers caused by tophi, and try to treat it; there are no reports at home and abroad, and the number of observations is small. In the future research, it is necessary to further improve the design, conduct prospective, randomized controlled study, increase the number of cases, and explore the clinical effect of VSD combined with APG in the treatment of tophi with refractory ulcer.

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