

Treatment of Deep Burn Wounds of the Buttocks and perineum using Vacuum Sealing Drainage Combined with a Homemade Anal Canal

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Vacuum sealing drainage; Burn; Anal canal

1. Abstract

The aim of this study was to investigate the therapeutic effects of vacuum sealing drainage technology combined with homemade anal canal treating the deep burn wounds of the buttocks and perineum. From March 2014 to September 2019, after debridement of buttocks and perineal granulation wounds in 10 cases with large-area deep burns, autologous postage stamp skin was grafted, homemade silicone tube was inserted and fixed in the anus, continuous catheterization was performed, and the wounds were treated with vacuum sealing drainage technique for 5-7 days. In 9 cases, most of the skin survived, and the wound was healed after changing the dressing. Treating deep burn wounds on the buttocks and perineum with VSD technique and anal insertion of homemade canal significantly improved the skin grafting survival effect, reduced the number of operations and complication, and shortened the treatment time.

2. Introduction

In patients with large area deep burns, the wounds on limbs and trunk can be easily healed by surgical excision, escharectomy and skin grafting, and the wounds on perineum and buttock are generally treated by final operation [1]. Due to the special location, it is not easy to bandage and fix after skin grafting, and there are often contaminated wounds with urine and feces, which brings

many difficulties to the treatment [2, 3]. After decrustation, the wound required multiple skin grafts to heal. From March 2014 to September 2019, we admitted and successfully treated 10 patients of large-area deep burns with buttocks and perineal granulation wounds by vacuum sealing drainage (VSD) technology combined with a homemade anal canal.

3. Materials and Methods

From March 2014 to September 2019, 10 patients (6 males, 4 females) in total with perineal and buttocks deep burns were included in this study. Inclusion criteria were the presence of 50%–90% total burn area and is in deep partial thickness burns or the third degree burns (the diagnostic criteria for the burn area are based on the Chinese rule of nines, and the depth diagnostic criteria are based on the rule of three degrees and four levels). The age of patients was between 19 and 45 years, with a mean age of 29.6 years. Of these, 2 cases were chemical burns, 5 were molten steel burns, and 3 were scalded by boiled water. All patients had severe burns of both lower extremities with their scalp was complete, and the admission time for all patients was 1 hour to 1 day after the injury. All patients were routinely treated with fluid replacement to prevent shock after admission, as well as anti-infective and nutritional support treatment. Patients with inhalation injury or burns over 70% were treated with preventive tracheotomy. After the shock

stage, the escharectomy and skin grafting on the limbs and trunk were performed several times. The scalp was often used as a donor site to provide the skin graft. The wounds of limbs and trunk on the first stage healed gradually. The wounds of the buttocks and perineum were protected in the early stage, and the escharecto-

my was used in the later dressing change. After repeated dressing changes, the necrotic tissue of the wounds of buttocks and perineum completely fell off, and the granulation grew well, and thus, the skin grafting was prepared (Figure S1).



Figure S1: Skin Grafting

Mannitol 250 ml was orally administered for catharsis 1 night before surgery, and the patient was given enema and catheterization in the morning of the operation, and placed in the prone position after the general anesthesia was stable. Subsequently, thoroughly clean the wound surface in strict according to the principle of debridement, repeatedly wash the wound surface with hydrogen peroxide, dilute iodophor and a large amount of normal saline, and perform routine iodophor disinfection. Firstly, 1000 ml of normal saline containing 1/1000000 epinephrine was injected under the scalp, and about 3% of the thin skin graft was excised with a roller-type peeling knife and then the donor site was bandaged. The removed skin graft was cut into a size of 0.5 cm×0.5 cm and evenly attached to the buttock and perineum wounds. Secondly, a silicone tube with a 24 Fr was taken from the thoracic closed drainage tube (Henan Ruike Medical Instrument Co., Ltd.), cut it into the 30-cm long segment, smooth both ends, and used as an anal tube. One end was lubricated with paraffin oil, and inserted 7–10 cm into the patient's anus. then, the silicone tube was firmly fixed to the anus by stitching twice with the 1st thread. Thirdly, multiple VSD dressings (Wuhan Vsd Medical Science & Technology Co., Ltd.) are designed according to the shape and size of the wound. The drainage tubes were combined in series to reduce the number of outlet tubes for convenient sealing, and the direction of

the drainage tube was faced to the head side. The designed VSD dressing is covered on the wound surface and fixed with skin stapler. All VSD drains were combined into one outlet (Figure S2) and the surrounding skin was cleaned. Take the semipermeable film, remove the backing paper on the adhesive surface, keep the film flat, paste the semipermeable film layer by layer from the skin healed to the skin graft using the "Stacking Technique". Pay attention not to press the VSD dressing when sticking the film, so as not to squeeze the liquid in the dressing to the skin around the wound surface and affect the adhesion. When properly pasted, remove the supporting film on the back. Notably, the perineal anal canal and catheter around the paste should be appropriate, and paste multiple layers to facilitate the fixation of the exposed pipeline. The coverage edge of semipermeable film around the wound shall be more than 2 cm from the skin healed to ensure the sealing effect. If normal skin is lacking around the wound, the silver alginate dressing (Kanglebao Co., Ltd.) can be attached to the wound surface, and the wound surface will be sealed by adhering VSD film on the outside. Whether the seal is reliable can be seen from the sunken VSD dressing due to the suction of the negative pressure.

After the operation, the patient was placed in the floating bed or turn over nursing bed, the continuous central negative pressure was immediately connected, the negative pressure was adjusted to

30~ 40kPa, and the drainage volume was observed and recorded. The intravenous infusion of sensitive antibiotics was selected according to the drug sensitivity test. The patient was administered a fluid diet or nasal feeding, using 15 g of senna soaked in water was convenient to make the stool pasty. On day 2 after operation, the patient was given enema with 300 ml warm normal saline twice

a day from the anal canal. If the VSD drainage tube was blocked after the operation, the sterile syringe could be used to retrogradely inject normal saline from the orifice for irrigation. The VSD dressing and the anal canal was removed at 5-7 days after operation and the wound was treated with dressing change.

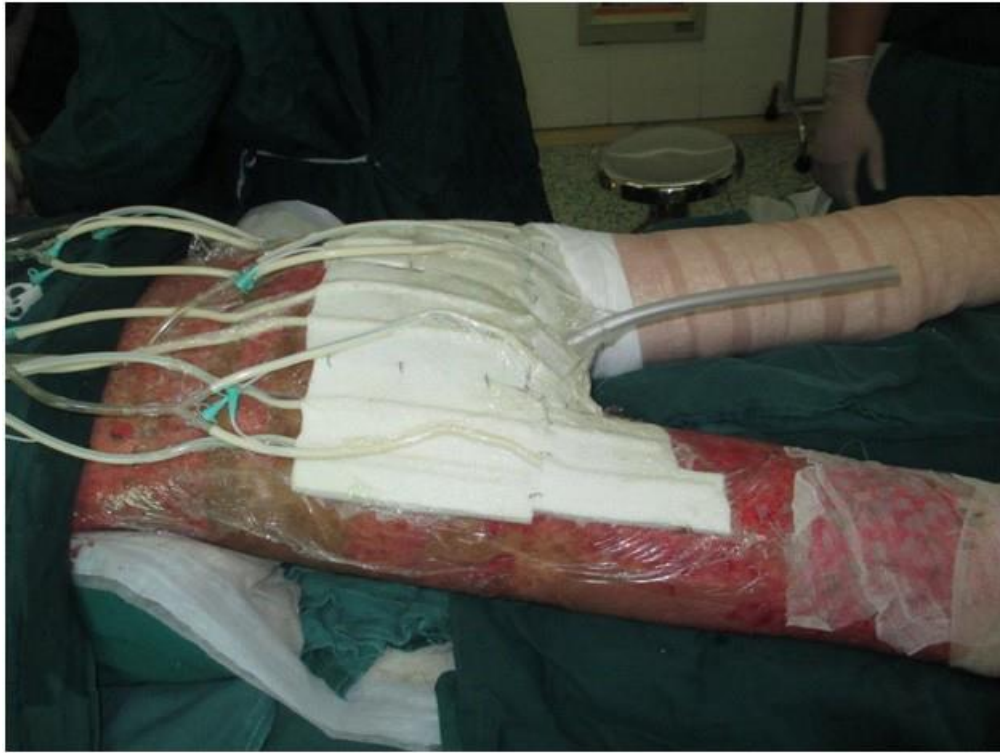


Figure S2: VSD drains

4. Results

A total of 10 patients received skin grafting on buttock and perineum wound to cover VSD dressing and insert anal canal: the VSD dressing was opened 5 days after operation in 1 case, 6 days after operation in 7 cases and 7 days after operation in 2 cases. Six cases of the skin grafts survived more than 80% while three cases sur-

vived more than 70%, and the residual scattered wounds healed spontaneously after dressing change. In one case, more than 50% survived skin grafts were observed, and 1 week after wound dressing change, further reoperation and VSD dressing were conducted for wound healing (Figure S3). In this group, the shortest hospitalization time was 15 days and the longest was 35 days, with an average healing time of 21 days.



Figure S3: VSD dressing were conducted for wound healing

5. Discussion

Because the deep burn wound of buttock and perineum is susceptible to infection caused by fecal and urinary contamination, it often requires multiple operations, skin grafting and compression dressing, to make the skin graft survive and the wound heal [4, 5]. At the same time, it is not easy to fix the skin graft after grafting on the wound surface, often making the survival rate of the skin graft low. In the present clinical study, a self-made anal canal was inserted into the anus, while catheterization was retained, and VSD was placed after skin grafting of the wound. The results showed that the overall efficacy of VSD technique in the treatment of patients with skin transplantation was satisfactory, with few intraoperative and postoperative complications, high survival rate of wound skin grafting, and corresponding reduction in hospitalization time. These findings are consistent with the findings of other authors assessing the benefit of VSD in large area cutaneous defects treatment[6].

VSD technique is a novel therapy to promote wound healing and has been widely used in trauma, general surgery, and burn departments in recent years[7-10]. VSD is a closed system that can fully extract the exudate, necrotic tissue and toxin generated by the wound surface through the negative pressure formed, so that the free skin graft is closely attached to the granulation tissue of the wound surface[11, 12]. Simultaneously, the pressure generated by VSD coverage on the wound surface is uniform and consistent, avoiding the effect of uneven stress on skin survival[13]. The application of algal silver dressing to cover the edge of wound surface before VSD dressing can make the wound edge well sealed. It may be that this material is a absorbent dressing, which is easy to keep dry and firmly adhere to the wound surface after water absorption.

The buttock wound is adjacent to the anus and is easily contaminated with feces during defecation, so patients cannot defecate with the anus during treatment. Considering the many complications of long-term total parenteral nutrition (TPN)[14, 15], we chose a silicone tube with a 24 Fr caliber, which was processed to make an anal canal. One end was lubricated with paraffin oil and inserted into the patient's anus and fixed to the anus by suturing to prevent slippage of the anal canal. The perianal space was subsequently closed to reduce fecal flow to the wound. After operation, a liquid diet was orally administered to reduce stool formation[16]. Simultaneous oral administration of small doses of laxatives facilitates fecal excretion to minimizes contamination. Lavation is conducted regularly to prevent fecal residue. If *pseudomonas aeruginosa* infection occurs after surgery, 5% Sulfamethoxazole solution is utilized for washing the wound daily through the VSD drainage tube[17, 18]. If the other bacterial infections are considered, the wound can also be rinsed repeatedly with 0.25% diluted iodophor saline. Several aspects should be paid attention to in the use of VSD in the treatment of deep burn wounds of the buttock and perineum:

- (1) Although VSD technique can timely remove exudate and necrotic tissue in the drainage area, it cannot replace debridement. Therefore, thorough preoperative debridement is necessary [19].
- (2) VSD technique should be avoided in patients with coagulopathy, and anticoagulants should be avoided during treatment.

6. Declaration of Interest Statement

For all the authors none are declared.

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