

Analysis of the Clinical Effect of Vacuum Sealing Drainage on Patients with Limb Trauma

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Objective: To analyze the clinical effect of vacuum sealing drainage (VSD) on patients with limb trauma. **Methods:** 136 patients with limb trauma received by our hospital from October 2018 to October 2019 were selected as the study objects. According to the random number method, they were divided into two groups, 68 cases in each group. The control group was treated with conventional dressing change. The study group was treated with VSD to observe the wound healing effect, wound area and complications before and after treatment for 7 days. **Result:** After 7 days of treatment, the area of wound in the study group was significantly smaller than that in the control group, and the effect of wound treatment in the study group was significantly higher than that in the control group ($P < 0.05$); the incidence of complications in the study group was significantly lower than that in the control group ($P < 0.05$). **Conclusion:** VSD can effectively repair the wounds of patients with limb trauma, significantly improve the clinical treatment effect, and effectively prevent the occurrence of treatment complications, which is worth promoting.

Key words: Vacuum sealing drainage; Limb trauma; Skin repair; Complications; Wound healing

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The skin and soft tissue of patients with limb trauma usually have severe contusion and large area skin defect, even accompanied with fracture, bone exposure and other bone damage, which is difficult to treat¹. At present, in the treatment of limb trauma patients, the wound healing is usually promoted by dressing dressing, daily cleaning of the wound, necrotic tissue and other ways, followed by skin flap transplantation to repair the skin, but the treatment cycle of this way is long, it is difficult to effectively control the wound infection of patients, and it is very easy to lead to tendon necrosis, infection and other serious adverse situations^{2,3}, affecting the limb function of patients.

In addition, the wound surface of patients with limb trauma will bring severe pain to the patients, which is very easy to cause serious stress reaction in the body, improve the speed of tissue metabolism, delay wound healing, and affect the clinical treatment effect⁴. In recent years, with the progress of medical technology, VSD, as a new technology for the treatment of complex wounds, has been widely used in patients with limb trauma through all-round continuous negative pressure drainage to promote granulation growth and improve wound healing effect⁵. In order to explore the practical effect of VSD in the treatment of limb trauma

patients, the speed of wound healing and the value of complications intervention, this study was carried out in our hospital⁶.

MATERIALS AND METHODS

General information

From October 2018 to October 2019, 136 patients with limb trauma in our hospital were randomly divided into control group (68 cases, 42 males and 26 females, aged 18-74 years, with an average of (52.18 ± 7.43) years old. The time from injury to admission was 31 MIN-6 days, with an average of (24.16 ± 4.89) h, the area of skin lesions was 4cmx7cm-16cmx22cm, with an average area of (62.18 ± 12.63) cm², upper limb trauma 48 cases and lower extremity trauma 20 cases, 31 cases were complicated with limb fracture. The types of injuries were traffic accident in 33 cases, heavy injury in 10 cases, mechanical strangulation in 16 cases, and other 9 cases. In the study group, 68 cases, male 40 cases, female 28 cases, age 18-76 years, mean (53.24 ± 8.16) years old, injury to hospital 29-7 days, mean (23.69 ± 5.17) h, skin area 4cmx8cm ~ 18cmx25cm, mean area (63.04 ± 13.27) cm², including upper limb trauma in 44 cases, There were 24 cases of lower extremity trauma and 34 cases of limb fracture; types of injury: 32 cases of traffic accident, 13 cases of heavy injury, 17 cases of mechanical injury and 6 cases of other injuries; the data of the two groups were comparable ($P > 0.05$).

Inclusion exclusion criteria

Inclusion criteria: (1) All patients were 18-80 years old; (2) All patients were hospitalized in emergency department and diagnosed as limb trauma through special examination; (3) All wounds could not heal themselves or be sutured directly; (4) The study was approved by the ethics committee of the hospital and informed consent of the patients.

Exclusion criteria: (1) Patients with clear vascular occlusion or serious malignant tumor; (2) Patients with severe organ damage such as heart and liver; (3) Patients with severe diabetes, hypertension and other basic diseases; (4) Patients with obvious infection on the wound surface before

admission; (5) Patients with severe mental cognitive disorder and low compliance¹⁶.

Method

After admission, all patients were given routine treatment such as blood transfusion and fluid replacement to maintain life improvement and stability. The control group was treated with routine dressing change, first with vaseline gauze and sterile gauze, then with routine tetanus and anti-infection treatment, and regular dressing change. After the granulation tissue growth of the wound, the flap transplantation was carried out at the selected time, and the wound was completely closed after the operation.

In the study group, VSD treatment was carried out. The specific operation measures were as follows: ①After regular treatment, the medical staff cut the VSD dressing reasonably according to the size of the patient's wound. It is necessary to ensure that all ports and holes of the VSD dressing are located in the VSD material, then clean the hair within 2-5cm around the patient's wound, and completely remove the necrotic tissue and pollutants on the wound surface, so as to ensure the cleanness of the wound. Patients with limb fracture should be treated with internal or external fixation. ②After the wound is cleaned, the cut VSD dressing shall be tightly covered on the wound surface of the patient, and slight force shall be applied to eliminate the occurrence of gaps. It is necessary to ensure that the VSD dressing is fully combined with the drainage wound surface. ③Cut and drain the normal tissue 1-3cm from the edge of the wound, and carry out the complete deiodination drainage. Then paste the semi permeable membrane 3-5cm from the outer edge of VSD to ensure the dry wound and surrounding healthy tissue. Connect the special VSD negative pressure instrument (ydx-100 electric suction device). The area of VSD dressing around each drainage tube shall be less than 20cm², and at least one drainage tube shall be connected. For patients with large injury area, multiple splicing can be carried out to make multiple drainage tubes connected in series. ④The VSD dressing is expected to be sutured to ensure that the dressing

can completely cover the wound. If the wound is deep, the VSD dressing should be fully filled into the bottom of the wound. The semipermeable membrane should cover the skin of 1-3cm around the wound and wrap the membrane around the drainage tube to avoid loosening and air leakage. Subsequently, the negative pressure 50~60kPa of the VSD negative pressure instrument was adjusted to maintain 7d. After the negative pressure drainage was completed, the drainage tube was removed and the wound dressing was thoroughly removed. For patients with large amount of pus secretion or large wound area, the dry sterile dressing can be changed regularly, and continuous negative pressure drainage was performed again. When the wound surface was obviously reduced and the secretion was reduced, a large number of granulation could be stopped.

Observation indicators

(1) Observe the trauma area before and 7 days after treatment.

(2) To compare the wound healing effect of the two groups. Evaluation criteria: ①Excellent: all grafted skin survived without infection or other complications; ②Good: a large number of grafted skin survived without inflammatory reaction, with less exudate; ③ Fair: part of the grafted skin survived with more exudate and slight inflammatory reaction; ④Poor: a small number of grafted skin survived or basically died; a large number of exudate or serious inflammatory reaction occurred Inflammation. Effective rate = (excellent + good) / total cases X100%.

(3) Observe the incidence of infection, pruritus of skin, degeneration and necrosis of bone and tendon after treatment.

Statistics

Data included in spss22.0 software analysis, ($\bar{x} \pm s$) means measurement data, t test; (%) means counting data, chi square test, $P < 0.05$ has statistical significance.

RESULTS

Comparison of trauma area before and after treatment

There was no significant difference between the

two groups ($P > 0.05$) in the area of trauma before treatment and after treatment ($P < 0.05$), but the area of trauma in the study group was significantly smaller than that in the control group ($P < 0.05$), as shown in Table 1.

Group	Number of cases	Before treatment	After treatment	t	P
Research group	68	62.18±12.63	31.15±7.63	17.341	0.000
Control group	68	63.04±13.27	43.38±11.56	9.212	0.000
t	-	0.387	7.281	-	-
P	-	0.699	0.000	-	-

Treatment effect comparison between the two groups

The total effective rate of the study group was 92.65% (63 / 68) after treatment, which was significantly higher than that of the control group (73.53% (50 / 68) ($P < 0.05$), as shown in Table 2.

Group	Number of cases	Excellent	Good	Can	Difference	Total effective rate
Research group	68	39 (57.35)	24 (35.29)	4 (5.88)	1 (1.47)	63 (92.65)
Control group	68	22 (32.35)	28 (41.18)	14 (20.59)	4 (5.88)	50 (73.53)
χ^2	-					8.843
P	-					0.003

Comparison of complications between the two groups

The incidence of complications in the study group was significantly lower than that in the control group ($P < 0.05$), as shown in Table 3.

Group	Number of cases	Osteonecrosis of bone and tendon	Infected	Skin Itch	Incidence rate
Research group	68	1 (1.47)	2 (2.94)	1 (1.47)	4 (5.88)
Control group	68	3 (4.41)	6 (8.82)	4 (5.88)	13 (19.12)
χ^2	-				5.445
P	-				0.020

DISCUSSION

Limb trauma is mainly caused by physical shock,

blows and other external violence. It has the characteristics of long treatment time and slow recovery. Wound repair after limb trauma is also a major problem in surgical clinical treatment at this stage⁷. Failure to provide timely symptomatic treatment will expose you to the risk of amputation, which will have a serious impact on the patient's physical and mental health. In the routine treatment of limb trauma, the wound is mainly cleaned first, and the dressing is repeated several times. After the inflammatory reaction is controlled⁸, the granulation begins to grow and then the wound is repaired. However, the treatment period is longer, and the dressing change is frequent. The growth of granulation is slow^{9, 10}; and the operation of flap transplantation is complicated, the treatment cost is high, and the practical application is limited. VSD can completely seal the surgical wound and can drain the wound secretion through the drainage tube to reduce the wound stimulation¹¹, which has high application value in the treatment of limb trauma.

The study found that after treatment with VSD, the wound area of the study group was significantly smaller than that of the control group, and the wound healing effect of the study group was significantly better than that of the control group ($P < 0.05$). The reason analysis shows that the VSD device is mainly composed of wound surface VSD dressing, semi-permeable membrane, negative pressure device and other equipment¹², in which the wound VSD dressing effectively reduces the pressure on the wound surface, and can effectively protect the wound granulation; The semi-permeable membrane can provide a closed environment for wound healing, effectively preventing external bacteria from affecting wound healing¹³; while the negative pressure drainage device can drain wound secretions and exudates, and the devices in VSD can coordinate with each other to promote wounds. Heal and improve prognosis. In addition, negative pressure drainage can remove wound secretion, relieve vascular load and wound edema, relieve muscle and skin pressure, improve local blood circulation near wound surface, and further improve wound healing speed. XueFuzhen¹⁴ and others believe that VSD can close

the wound with the help of bio-transparent membrane, which can prevent the invasion of external bacteria while ensuring the outflow of the wound gas, while the negative pressure drainage can ensure the smooth flow of the wound, which can effectively reduce the chance of wound infection. It is of great significance in improving the healing effect of wounds. A group study of 120 patients with trauma of extremities found that the wound healing time of the observation group was significantly shorter than that of the conventional control patients after VSD treatment, and the wound healing rate of the observation group was up to 93.3% (56/60), significantly higher than the control group 71.7% (43/60) ($P < 0.05$), similar to the results of this study, can further confirm that VSD is of great significance in improving the therapeutic effect of trauma patients with limbs.

The incidence of postoperative complication in the study group was significantly lower than that in the control group ($P < 0.05$). The reason was that VSD had good drainage effect, which could promote the closure of the cavity and prevent tissue liquefaction tissue necrosis or tissue secretion. At the same time, the use of biological semi-film can isolate the wound surface and the external environment, providing a closed environment for wound healing, thereby preventing bacterial infection and reducing the incidence of infection complications. In addition, high negative pressure can also improve blood circulation, prevent edema, promote granulation growth to the concave surface, can effectively prevent complications such as bone and tendon exposure and necrosis, and has higher treatment safety. NimaOuzhu¹⁵ and others found that the incidence of complications after VSD treatment was only 15.56% (7/45), which was significantly lower than that of conventional treatment ($P < 0.05$). The results are similar, and NimaOuzhu et al. conducted a drug susceptibility test on wound bacteria and its antibiotic resistance research. It was found that VSD had less influence on the resistance of wound bacteria because it did not need multiple dressing changes, and the application safety was better. high.

In the practical application of VSD, it is necessary to pay attention to the thorough cleaning

of the wound surface. Especially for the wound with multiple closed cavity damage, it is necessary to open the cavity to clean the four chambers; and the VSD treatment has higher requirements for wound sealing, and it is necessary to pay close attention to the existence of the drainage process. If the negative pressure is too low, the drainage is poor, the air leaks, etc., the leak should be found in time, and the semi-permeable membrane should be used for sealing treatment [16]; in addition, the negative pressure of VSD should be controlled at 50-60kPa, so pay close attention to the treatment. The patient feels that if local pain occurs, it can be reduced in combination with the actual situation to reduce the negative pressure. At the same time, attention should be paid to the drainage volume and liquid properties. If abnormal conditions such as bloody drainage are required, surgical intervention should be performed in time.

CONCLUSION

In summary, VSD treatment of patients with limb trauma can effectively improve the recovery rate of wounds, prevent complications such as wound infection, and significantly improve the clinical treatment effect. It is an ideal method for the treatment of wound healing in the limbs at present and has therapeutic application value.

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