

# Clinical Efficacy of VSD in the Treatment of Orthopedic Trauma and Infected Wounds

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## Abstract

**Objective:** To study the clinical effects of negative pressure closed drainage (VSD) in the treatment of orthopedic trauma as well as infected trauma. **Methods:** Fifty patients with orthopedic trauma and infected wounds admitted to hospital from March 2017 to May 2019 were selected and randomly grouped, and the various clinical effects of the two groups were compared. **Results:** All clinical effects of patients in the observation group were better than those in the control group ( $P < 0.05$ ). **Conclusion:** The treatment of orthopedic trauma and infected trauma patients by VSD technology can improve the clinical effect and is worth promoting.

## Keywords

Negative Pressure Closed Drainage Surgery; Orthopedic Trauma; Infected Wounds; Clinical Efficacy.

## 1. Introduction

Patients with orthopedic trauma and infected trauma are usually treated in orthopedic departments of hospitals. Because it is difficult to treat patients with infected trauma, if the trauma is not treated reasonably, it is more likely to cause motor nerve dysfunction in the trauma area, which seriously affects the health and quality of life of patients [1-2]. Traditional treatment for orthopedic trauma and infected wounds usually involves routine dressing changes and drainage, but the lengthy dressing changes increase the pain level of patients, so the clinical efficacy is poor [3]. Negative pressure closed drainage (VSD) is commonly used in clinical orthopedics to treat patients with orthopedic trauma as well as infected wounds, and the treatment is effective and can effectively reduce the pain level of patients in treatment [4]. In this paper, the authors selected 50 cases of orthopedic trauma and infected trauma patients admitted to hospital from March 2017 to May 2019, aiming to analyze the therapeutic effect of VSD technique on orthopedic trauma as well as infected trauma patients, and the following description is made.

## 2. Materials and Methods

### 2.1. General Information

**Table 1.** Comparison of general information ( $\bar{x} \pm s$ ) [n (%)]

Group	Number of cases	Age group (years)	Average age (years)	Male Patients	Female patients
Observation group	25	21-67	44.88±12.64	21	4
Control group	25	23-70	46.12±12.86	19	6
$X^2/t$	-		0.237		0.333
P	-		0.732		0.564

Fifty patients with orthopedic trauma and infected wounds admitted to hospital from March 2018 to May 2019 were selected and randomly grouped, and the general data are shown in Table 1.

## 2.2. Methods

After admission, both groups of patients were treated with conventional debridement surgery, i.e., pathogenic examination of the purulent secretions from the infected wounds of the patients as well as drug-sensitive examination, followed by debridement.

Control group: conventional treatment: conventional treatment is initiated according to the patient's trauma by applying a dressing to the infected trauma and then changing the dressing reasonably according to the patient's trauma changes, generally every one to two days. Next, if the patient has a deep and extensive wound, a drainage strip is placed and the patient's purulent secretions are examined for pathogenicity and drug sensitivity every five to seven days. Then, if the patient's skin is partially necrotic or the wound is severely infected, two or more debridements are required and only after the patient's wound grows new granules, the patient's wounded skin is directly sutured or skin is implanted on the wound; if the patient's wound is large, the granules take a long time to grow or grow poorly, flap transfer is required to eliminate the wound.

Observation group: negative pressure closed drainage: After routine debridement, VSD dressing was cut rationally and applied externally to the patient's trauma according to the actual condition of the trauma. The skin around the wound is then cleaned and kept dry, and the patient's wound is then taped with a translucent biofilm to keep it in a fully closed state. Finally, the patient is drained by continuous negative pressure suction by connecting the negative pressure drainage bottle to the drainage tube, and then giving the negative pressure source and adjusting it until the contraction of the dressing can be clearly observed, and at the same time, the negative pressure suction status needs to be regularly observed to facilitate effective and timely treatment of obstruction and air leakage during negative pressure suction. Second, if the wound becomes infected, the patient's wound needs to be irrigated with sensitive antibiotics or gentamicin. After five to seven days of continuous negative pressure suction, the VSD dressing is removed and sutured if the trauma is small and the granulation is good; if the trauma is too large and the granulation is good, a skin graft is used to eliminate the trauma; if the trauma is too deep and the soft tissue defect is obvious, the patient needs to be covered with two or more VSD dressings until the granulation is good. good results of neogenesis and do trabecular implantation, the VSD dressing needs to be covered for the same time as the first time.

## 2.3. Observation Indicators

- ① Quality of life scores.
- ② Negative emotion scores.
- (iii) Pain score (VAS score).
- ④ inflammatory factors and stress levels.
- ⑤ Complication rate.

## 2.4. Statistical Treatment

SPSS 20.0 statistical software was used for analysis, mean + standard deviation ( $\bar{x} \pm s$ ) for measurement data, t-value test, and rate (%) for count data, X<sup>2</sup> test, and when  $P < 0.05$ , the difference between the two data groups was statistically significant.

### 3. Results

#### 3.1. Comparison of Quality-of-life Scores

See Table 2.

**Table 2.** Comparison of quality-of-life scores ( $\bar{x} \pm s$ ) (points) (a)

Group	Number of cases	Somatic function		The effect of somatic function on role		Body Pain		Overall Health	
		Before treatment	After treatment	Before treatment	After treatment	Before treatment	After treatment	Before treatment	After treatment
Observation group	25	56.33±8.17	72.56±10.34	53.36±7.56	67.20±9.40	55.37±7.62	70.06±9.91	57.15±7.05	72.36±10.25
Control group	25	55.40±8.09	65.78±9.25	51.92±7.40	61.87±8.54	54.96±7.55	63.42±8.48	56.69±6.89	66.64±8.27
t	-	0.404	2.443	0.681	2.098	0.191	2.545	0.233	2.172
P	-	0.688	0.018	0.499	0.041	0.849	0.014	0.817	0.035

**Table 2.** (continued) ( $\bar{x} \pm s$ ) (points) (b)

Group	Number of cases	Vitality		Social Functions		The effect of emotions on role functioning		Mental Health	
		Before treatment	After treatment	Before treatment	After treatment	Before treatment	After treatment	Before treatment	After treatment
Observation group	25	51.12±6.45	66.81±8.45	61.10±5.44	75.52±10.12	58.81±6.72	73.34±9.92	57.76±6.49	72.20±9.30
Control group	25	50.74±6.27	60.27±7.72	60.18±5.12	69.90±8.63	57.93±6.59	67.79±8.43	57.28±6.33	65.24±8.10
t	-	0.211	2.857	0.616	2.113	0.467	2.132	0.264	2.822
P	-	0.834	0.006	0.541	0.040	0.642	0.038	0.792	0.007

#### 3.2. Comparison of Negative Emotion Scores

See Table 3.

**Table 3.** Comparison of negative mood scores ( $\bar{x} \pm s$ ) (points)

Group	Number of cases	Anxiety score		Depression score	
		Before treatment	After treatment	Before treatment	After treatment
Observation group	25	56.35±4.19	35.65±3.27	55.19±5.67	32.76±3.16
Control group	25	56.71±4.26	43.68±4.38	55.28±5.69	45.78±4.19
t	-	0.301	7.345	0.056	12.405
P	-	0.765	0.000	0.956	0.000

#### 3.3. Comparison of VAS Scores

See Table 4.

**Table 4.** VAS scores ( $\bar{x} \pm s$ ) (points)

Group	Number of cases	Pre-operative	1 month after surgery	3 months after surgery	12 months after surgery
Observation group	25	8.49±1.26	2.85±0.65	2.37±0.53	2.03±0.37
Control group	25	8.53±1.21	4.06±1.15	3.46±1.02	2.11±0.39
t	-	0.114	4.580	4.741	0.744
P	-	0.909	0.000	0.000	0.461

#### 3.4. Comparison of Inflammatory Factors and Stress Levels

See Table 5.

**Table 5.** Comparison of inflammatory factors and stress levels ( $\bar{x} \pm s$ )

Group	Number of cases	IL-1 (µg/L)	TNF-α (µg/L)	E (ng/ml)	NE (ng/ml)	R (pg/ml)
Observation group	25	46.88±1.26	3.81±0.42	102.62±13.41	98.82±13.56	3.10±0.36
Control group	25	67.46±3.69	7.64±1.12	179.65±16.79	172.72±16.84	6.27±0.59
t	-	26.390	16.010	17.924	17.090	22.933
P	-	0.000	0.000	0.000	0.000	0.000

### 3.5. Comparison of Complication Rates

See Table 6.

**Table 6.** Comparison of the incidence of complications [n (%)]

Group	Number of cases	Pressure sores	Respiratory infections	Urinary tract infections	Incidence
Observation group	25	1	1	0	1 (4.0)
Control group	25	2	2	2	6 (24.0)
X <sup>2</sup>	-	-	-	-	4.153
P	-	-	-	-	0.042

## 4. Discussion

The treatment of orthopedic wounds and infected wounds through conventional measures is usually carried out through routine dressing changes and drainage. During dressing changes, drainage is required to continuously drain the purulent secretions and necrotic tissues from the wounds [5]. In addition, the granulation can be stimulated to promote the growth of granulation, thus obtaining the desired therapeutic effect [6]. Secondly, for patients with more extensive and deeper wounds, intensive drainage with drainage strips and tubes is usually required for effective treatment [7]. Because this modality usually produces strong pain during the change of medication, so the change of medication usually affects the patient's psychology, and then, the drainage tube is easily blocked, if not treated in time, it will affect the patient's treatment effect, therefore, the effect is not satisfactory through conventional treatment [8].

The negative pressure closed drainage (VSD) differs from the conventional treatment method by the application of VSD dressings, which are highly malleable and can be applied in the form of negative pressure suction to ensure adequate and uniform contact between the dressing and the patient's wound [9]. Compared to the conventional drainage technique, the negative pressure drainage has a lower probability of blockage and can achieve full drainage, thus achieving good results [10]. In addition, during VSD treatment, after the successful application of VSD dressing, the health care provider needs to clean the skin around the patient's wound [11] to keep it dry, and then use translucent adhesive film to do all-round sealing to keep the patient's wound clean and dry [12], which can make the proliferation of capillaries on the wound surface significantly increased, promote the tissue edema to occur to subside, and play a role in cell proliferation to repair. This can make the wound heal faster [13]. Secondly, the application of translucent film VSD material is fully closed to maintain the negative pressure environment in the drainage area, and through uninterrupted and timely drainage, it can also maintain isolation from the outside world, effectively avoiding contamination and cross-infection, and creating good conditions for wound repair through quality drainage. Finally, the patient does not need to change the medication several times, which can avoid the patient's intense pain during the change [14].

Although the implementation of negative pressure closed drainage has a high treatment cost, the application of this method can reduce the pain level of patients, promote the healing of patients' wounds, and thus regulate or reduce the time of infection, thus avoiding the excessive

application of antibiotics [15]. The results of this study showed that all treatment effects of patients in the observation group were better than those in the control group. This shows that the treatment of traumatic infections with negative pressure closed drainage can have good therapeutic effects, eliminate inflammatory factors and promote wound healing.

In conclusion, the treatment of patients with orthopedic trauma as well as infected wounds by VSD technique has excellent clinical efficacy and promotes wound healing, which is of high value and worth promoting.

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