

# Effect of individualized comfortable nursing on prognosis of vacuum sealing drainage in patients with orthopedic trauma

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## Abstract

To explore the effect of individualized comfortable nursing on prognosis of vacuum sealing drainage (VSD) in patients with orthopedic trauma. 110 patients with orthopedic trauma VSD were randomly divided into the control group and the observation group, with 55 patients in each group receiving routine care and comfortable care. The wound healing time, visual analog scale, quality of life score, the level of inflammatory factors, the incidence of complications, and patient satisfaction were compared between the 2 groups. The average time of wound healing in the observation group was significantly lower than that in the control group ( $P < .01$ ). The satisfaction rate in the observation group was significantly higher than that in the control group ( $P = .029$ ). Meanwhile, the results showed that visual analog scale and quality of life scores in the observation group was significantly improved than that of the control group after receiving intervention ( $P < .05$ ). After receiving intervention, the levels of TNF- $\alpha$  and IL-6 of patients in both groups were decreased, and the levels of TNF- $\alpha$  and IL-6 in the observation group were significantly decreased than those in the control group. Moreover, the incidence rate of adverse reaction in the observation group was significantly lower than that in the control group ( $P < .01$ ). Comfortable nursing can reduce the wound healing time, the postoperative pain level, the incidence of complications, and improve patient satisfaction, which is of great significance for the prognosis of VSD in patients with orthopedic trauma.

**Abbreviations:** QOL = quality of life, VAS = visual analog scale, VSD = vacuum sealing drainage.

**Keywords:** comfort care, efficacy, orthopedic trauma, vacuum sealing drainage

## 1. Introduction

With the development of economy and the convenience of transportation, the incidence of orthopedic trauma is increasing. Orthopedic trauma is a common trauma disease in clinic, including skin and soft tissue, bone, muscle, blood vessels, nerves and other injuries.<sup>[1]</sup> The condition is usually complex and critical, or may be accompanied by bleeding, infection, and pain.<sup>[2,3]</sup> Posttraumatic infection is a common complication after internal fixation of fractures, which complicates the clinical process of patients and leads to long-term intensive care and hospitalization. With the wide use of internal fixation devices, the infection rate after fracture is increasing.<sup>[4]</sup> Therefore, it is necessary to explore the treatment plan for prevention and treatment of orthopedic trauma infection.<sup>[5]</sup>

Open drainage is usually used to treat infection in orthopedic trauma. During this period, pus, necrotic tissue and exudate can be drained to improve clinical symptoms. However, the treatment process is usually very long and the results are often poor.<sup>[6]</sup> Therefore, vacuum sealing drainage (VSD) technology is applicable to the treatment of wound surface

treatment and deep drainage after a variety of acute and chronic soft tissue injuries, and has been widely used in the treatment of orthopedic trauma patients, with significant effect.<sup>[7-9]</sup> However, after VSD, conventional nursing methods can no longer meet the needs of patients' prognosis, and more comprehensive, effective and targeted nursing is needed.<sup>[10]</sup> Comfortable nursing is a new nursing method derived from the current social requirements. It is accepted by patients with its effective nursing mode, in-depth nursing research, scientific nursing methods, and progressive nursing philosophy. The way is to take targeted nursing measures to make patients reach the most pleasant state physically and psychologically, or shorten and reduce the unpleasant degree.<sup>[11]</sup> At the same time, nurses can reduce the incidence of adverse events during drainage and promote wound healing through nursing intervention on patients.<sup>[12]</sup> However, few clinical studies have investigated the role of nursing intervention in the treatment of orthopedic trauma infection with VSD. Therefore, the purpose of this study is to analyze the impact of individualized comfort care on the prognosis of VSD in patients with orthopedic trauma.

HX and ZG contributed equally to this work.

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The datasets generated during and/or analyzed during the current study are available from the corresponding author on reasonable request.

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## 2. Data and methods

### 2.1. General information

From May 2021 to May 2022, 110 patients with orthopedic trauma using VSD were randomly divided into the control group (55 cases) and the observation group (55 cases). Inclusion criteria: Patients who meet the diagnosis of “orthopedic trauma” confirmed by CT or X-ray; Patients with complete clinical data and signed informed consent; No other clinical studies were conducted during the study period, and follow-up can be conducted after treatment; The patient cognitive function was normal. Exclusion criteria: Patients < 18 years old; Patients with secondary severe infection; Patients with severe other system diseases; Pregnant or lactating women; Patients with a history of mental disorders or cognitive impairment; Patients undergoing other medical research; Coagulation dysfunction. This study was approved by the ethics committee of the first people hospital of Jiangxia district.

### 2.2. Methods

The control group was given routine nursing care, including routine vital sign monitoring, hygienic treatment, medication guidance, health education, postoperative functional recovery: Monitor the heart rate, respiratory rate and blood pressure dynamically, and recheck the blood routine test and urine routine test regularly; Routine wound cleaning and replacement of equipment to keep the affected area clean and sanitary; Instruct patients to take medicine, inform them of the correct dosage, method of taking medicine and adverse reactions; Health education on diseases shall be carried out for patients, and knowledge about relevant diseases and their complications shall be popularized.

The observation group: comfortable nursing was adopted on the basis of routine nursing: Environmental care: create a good postoperative environment for patients, including improving the overall service attitude, keeping the room clean and warm, bright and soft indoor light, fresh and odorless air, to increase patients comfort; Psychological nursing: patiently communicate with patients, provide targeted psychological counseling for patients, explain adverse reactions and complications, relieve patients psychological pressure, comfort and encourage patients, enhance self-confidence, and maintain a positive attitude to promote postoperative recovery; Diet care: recommend a healthy diet plan for patients. Eat a light diet, increase the intake of protein and other nutrients, and promote wound healing; Posture nursing: after orthopedic trauma VSD, patients need to maintain a certain position to promote wound treatment. Long term maintenance will affect patients discomfort, even lead to pressure sores, venous thrombosis and other complications. Nurses need to appropriately change their positions according to patients demands, massage and relax the parts of patients who have been oppressed for a long time to alleviate patients discomfort; Functional nursing: during the hospitalization, the nursing staff should carry out active or passive functional training for the patients, encourage them to exercise moderately, promote blood circulation, and maintain a good state of the body; Medication nursing: guide patients to use drugs, and inform them in detail about the frequency, dosage and effect of drugs, so that patients can effectively maintain scientific medication compliance; VSD wound nursing: regularly check the patient incision exudation, redness, swelling, heat and pain, observe the color of drainage fluid, measure the drainage volume, timely report the patient VSD drainage and wound healing, and record it in the record, and ask the competent doctor for further drainage nursing plan.

### 2.3. Outcome indicators

The wound healing time of the 2 groups of patients was compared: 1 point for “0 to 6 days,” 2 points for “7 to 14 days,”

and 3 points for “more than 14 days.” The lower the score, the better the postoperative care; Satisfaction of the 2 groups of patients: Self-made satisfaction questionnaire was used to evaluate the satisfaction of patients: < 60 points: dissatisfied; 60 to 80: satisfied; > 80 points: very satisfied. The higher the satisfaction, the better the nursing effect;<sup>[13]</sup> Visual analog scale (VAS) scoring: VAS was used to assess the pain level.<sup>[14]</sup> A 10 cm vernier scale was used. “10” and “0” were marked on both ends of the 10 scales. 10 meant severe pain and 0 meant no pain. The patient carries out a rating scale according to the degree of pain. The lower the score, the less pain; Quality of life (QOL) score: SF-36 scale was used to evaluate patients’ emotional, social, role and cognitive functions, with a total score of 100 points.<sup>[15]</sup> The higher the score, the better the quality of life; Tumor necrosis factor- $\alpha$  (TNF- $\alpha$ ), Interleukin-6 (IL-6) level: Take 3 mL of fasting venous blood and centrifugate (3500 rpm, 10 minutes). The supernatant was separated to obtain serum. Detection of TNF- $\alpha$  and IL-6 by ELISA. The kit is provided by Shanghai Bangjing Industry Co., Ltd. (Project No. 48T/96T) and operated according to the kit instructions. The more the value tends to the normal value, the more ideal the intervention effect will be; The adverse reaction symptoms of patients were compared according to the number of cases counted by symptom self-made scale.

### 2.4. Statistical analysis

SPSS 26.0 statistical software was used to analyze and process the data, *t* test was used to compare the measurement data, and Wilcoxon rank sum test was used to compare the grade data. Comparison of adverse reaction rate and satisfaction rate were performed by  $\chi^2$  test. *P* < .05 indicates that the difference is statistically significant.

## 3. Results

### 3.1. General clinical data

In the control group, there were 31 males and 24 females, with an average age of (35.66  $\pm$  5.44) years. There were 35 males and 20 females in the observation group, with an average age of (37.42  $\pm$  4.77) years. The comparison of baseline data of orthopedic trauma between the 2 groups is shown in Table 1. There was no statistically significant difference.

### 3.2. Distribution of wound healing time and comparison of healing time

There was a significant difference between the 2 groups in the time of wound healing by segments (*P* < .01). The time of wound healing in the observation group was mostly distributed in “7 to 14 days,” while that in the control group was mostly distributed in “>14 days.” The average time of wound healing in the observation group was significantly lower than that in the control group (*P* < .01), as shown in Table 2.

### 3.3. Patient satisfaction evaluation

Among the patients in the observation group, there were 46 cases of “Very satisfied” and 9 cases of “Satisfied,” the satisfaction rate was 100.0%. Among the patients in the control group, there were 19 cases of “Very satisfied,” 29 cases of “Satisfied,” and 7 cases of “Dissatisfied,” the satisfaction rate was 87.3%. The satisfaction rate in the observation group was significantly higher than that in the control group (*P* = .029), as shown in Table 3.

### 3.4. VAS evaluation

The pain degree of the 2 groups was compared by VAS score. The results showed that the pain degree of the patients in the

**Table 1**

**Comparison of general clinical data between the 2 groups.**

Variables	Control group	Observation group	t/χ <sup>2</sup>	P
Gender			0.016	.901
Male	31	35		
Female	24	20		
Average age (yr)	35.66 ± 5.44	37.42 ± 4.77	0.071	.847
Average weight (kg)	69.11 ± 2.21	68.98 ± 2.32	0.301	.796
Infection sites			0.334	.545
Femur	13	12		
Tibia	4	3		
Foot and ankle	12	14		
Perone	5	6		

**Table 2**

**Distribution of wound healing time and comparison of healing time between the 2 groups.**

Group	n	Distribution of wound healing time			Average wound healing time (d)
		0–6d	7–14d	>14d	
Control group	55	0	8	47	17.83 ± 3.38
Observation group	55	7	39	9	11.00 ± 3.74
t/χ <sup>2</sup>			-21.021		-5.473
P			<.01		<.01

**Table 3**

**Comparison of patient satisfaction.**

Group	n	Very satisfied	Satisfied	Dissatisfied	Satisfaction rate
Observation group	55	46 (83.64)	9 (16.36)	0 (0.0)	100.00%
Control group	55	19 (34.55)	29 (52.73)	7 (12.73)	87.30%
χ <sup>2</sup>		14.91			
P		.029			

Variables	Control group	Observation group	t/χ <sup>2</sup>	P
Upper forearm	21	20		

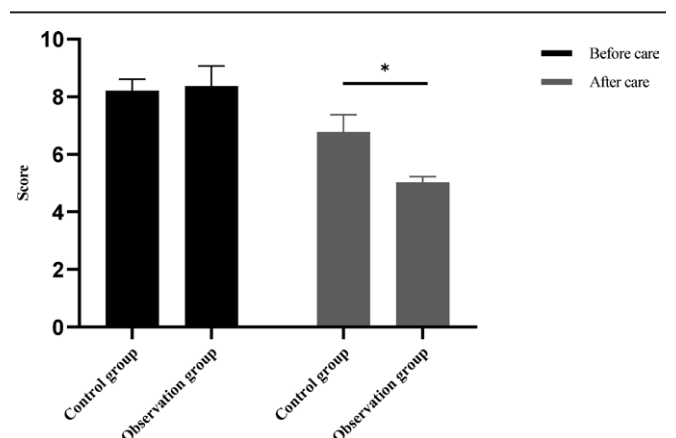
observation group was significantly lower than that of the control group ( $P < .05$ ), as shown in Figure 1.

### 3.5. QOL score

Before receiving nursing intervention, there was no significant difference in the scores of emotional functions, social function, role function, and cognition function between the control group and the observation group (all  $P > .05$ ). After receiving intervention, the QOL scores of patients in both groups were significantly improved, and the observation group was significantly higher than the control group (all  $P < .05$ ), as shown in Figure 2.

### 3.6. Comparison of inflammatory factor levels

Before receiving intervention, there was no significant difference in the levels of TNF-α and IL-6 between the observation group and the control group (all  $P > .05$ ). After receiving intervention,



**Figure 1.** Comparison of VAS scores between the 2 groups. VAS = visual analog scale.

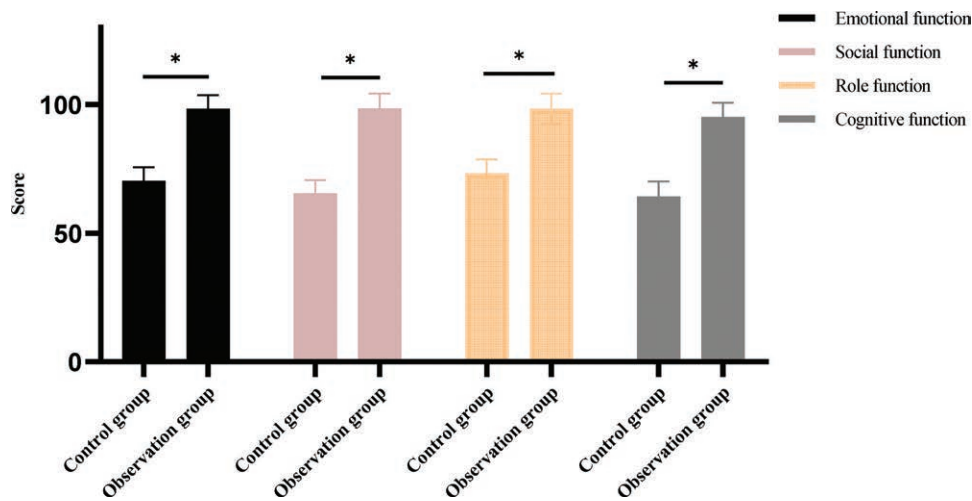


Figure 2. Comparison of QOL scores between the 2 groups. QOL = quality of life.

the levels of TNF- $\alpha$  and IL-6 of patients in both groups were decreased, and the levels of TNF- $\alpha$  and IL-6 in the observation group were significantly decreased than those in the control group, as shown in Figure 3.

3.7. Adverse reactions evaluation

Among the patients in the observation group, there were 3 cases of “Fever,” 5 cases of “Numbness of limbs,” 2 cases of “Hemorrhage,” and 1 case of “Infected,” the incidence rate of adverse reaction was 20.0%. Among the patients in the control group, there were 8 cases of “Fever,” 13 cases of “Numbness of limbs,” 5 cases of “Hemorrhage,” and 6 cases of “Infected,” the incidence rate of adverse reaction was 58.18%. The incidence rate of adverse reaction in the observation group was

significantly lower than that in the control group ( $P < .01$ ), as shown in Table 4.

4. Discussion

Orthopedic trauma is a common type of trauma in clinic, which includes not only bone trauma, but also skin, muscle and other soft tissue trauma injuries, such as no good treatment and nursing after trauma, or can cause a series of complications such as fever, infection, venous thrombosis, and even death.<sup>[16,17]</sup> VSD plays an important role in the treatment of orthopedic trauma infection, with the following advantages:<sup>[18]</sup> It can reduce the work intensity, thus preventing cross infection; Under negative pressure, it can suck out bacteria, accumulate blood and necrotic tissue, and avoid wound infection; It is beneficial to the growth of healthy granulation; Negative pressure is not conducive to the viability of bacteria. The application of VSD technology has expanded to a variety of wounds caused by trauma. Its mechanism includes the use of negative pressure suction devices to connect with wound dressings to generate negative pressure at the wound surface to keep the wound clean, remove necrotic tissue, promote the growth of granulation tissue, and promote wound healing.<sup>[19,20]</sup>

VSD is a commonly used wound treatment technology after orthopedic trauma at present. During the recovery period after surgery, comfortable nursing can improve the treatment effect to a greater extent.<sup>[21]</sup> Comfort nursing is a new nursing mode proposed in recent years.<sup>[22,23]</sup> It focuses on patients and respects the dominant position of patients. Through continuous research by nursing researchers, it expands the scientific content of this nursing plan and gradually deepens the connotation of nursing. Put forward comfortable nursing, make preparations, advance possible nursing defects, mistakes and accidents in the nursing process, combine individualized clinical nursing path, provide high-quality and accurate nursing for patients, and provide

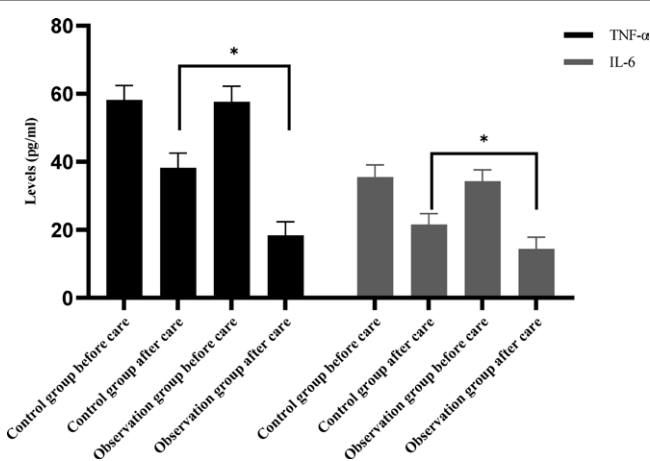


Figure 3. Comparison of inflammatory factor levels between the 2 groups.

Table 4

Comparison of adverse reactions between the 2 groups.

Group	n	Fever	Numbness of limbs	Hemorrhage	Infected	Incidence rate
Control group	55	8	13	5	6	58.18%
Observation group	55	3	5	2	1	20.00%
$\chi^2$		29.9				
P		<.01				

clinical decisions to reduce postoperative complications and improve the quality of life of patients in hospital.<sup>[24-26]</sup> In this study, the patients in the observation group took comfort care, including environmental comfort care, psychological comfort care, diet comfort care, posture comfort care, and postoperative functional comfort care, which played a certain role in assisting the recovery of patients diseases, effectively improving the cure rate of patients, reducing the occurrence of adverse reactions and complications, and reducing the wound healing time. It alleviates the pain level of patients during treatment and improves patient satisfaction, which is of great significance for the recovery and prognosis of patients after orthopedic trauma VSD.

The present study had several limitations. Firstly, the small sample size of the study was a major limitation. Secondly, another limitation of the study was the single-center study. The thirdly limitation is that our study was conducted among the Chinese population.

To sum up, comfort care has played an important role in orthopedic trauma using VSD, and it is necessary to promote the application of comfort care in the recovery and prognosis of various diseases.

### Author contributions

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**Validation:** Zhaodi Guo, Li Chen, Na Luo.

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**Writing – original draft:** Huifang Xie.

**Writing – review & editing:** Na Luo.

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