

Construction and application of standard nursing procedures for treating infection after spinal internal fixation by pulse combined with closed negative pressure

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Abstract. Application of standardized nursing procedures in pulse combined with closed negative pressure therapy for patients with infection after spinal internal fixation, discuss its scientificity and operability. From July 2018 to December 2021, 54 patients with postoperative infection after spinal internal fixation were treated with pulse combined with vacuum sealing in our department. 42 patients in usual care were used as the control group. Among them, 12 patients in the observation group were nursed using standardized operating procedures, the VAS scores of the two groups were compared at 6h, 12h and 24h after operation. Patient and family satisfaction and quality of care. After application of standardized nursing procedures, the VAS scores of the patients decreased significantly at 6h, 12h and 24h after operation; hospital days, days of antibiotic used, the incidence of ineffective negative pressure was significantly reduced; the satisfaction of patients and their families was significantly improved. The difference was statistically significant ($P < 0.05$). Implementing standardized nursing procedures can significantly reduce the incidence of ineffective negative pressure, reduce postoperative VAS score of patients, shorten the days of hospitalization and antibiotic use, improve patient and doctor satisfaction. At the same time, it can provide homogenization guidance for clinical nursing practice.

Keywords: Vacuum sealing drainage; pulse flushing; infection after spinal internal fixation; standardized nursing procedures

1. Introduction

With the continuous development of medical technology, spinal fusion and internal fixation is one of the most important techniques for spinal instability, degenerative diseases, fracture and dislocation [1]. This method is an invasive procedure for device implantation, causes postoperative infection [2]. It has been reported in the literature that the postoperative incision infection rate in patients with spinal surgery is 0.7% to 11.9%. The infection rate after internal fixation increased by 3% to 6% [3]. In recent years, the use of pulse irrigation combined with closed vacuum aspiration in the treatment of infection after spinal fusion and internal fixation occupies a clinical advantage [4]. Especially in the practice of deep infection, the clinical advantage is more obvious [5]. Nursing after negative pressure sealing and drainage operation is a new technology with strong specialized skills, which is difficult to master in a short period of time. During the actual negative pressure closed drainage nursing operation, due to the unsmooth, non-standard, unprincipled and other factors of the operation process, it is easy to cause the occurrence of invalid drainage. At the same time, there is a great impact on the treatment effect, therefore, in order to ensure the best therapeutic effect, ensure efficient drainage. Practical problems encountered by the orthopaedic quality control team of our hospital after negative pressure sealing and drainage, Developing standardized nursing procedures for vacuum sealing drainage. Standard operation procedure (SOP) is to describe a nursing operation in a unified format or process curve according to the operation purpose, operation steps and operation requirements, used to guide and standardize this operation [6]. Its essence is to streamline, refine and scientific the operation, so that the operator can be competent to complete this operation after qualified training, avoid the disadvantages of traditional experiential operation and apprenticeship training. The members of the research team have consulted the textbook "Negative Pressure Closed Drainage Technology" edited by Huade Qiu and Jiahong Song, a large number of domestic and foreign literature materials, and theoretical research methods [7],

Integration with clinical practice, preliminary formulation of nursing operating procedures for the treatment of patients with infection after spinal internal fixation by pulsed combined with negative pressure sealing and drainage, good results achieved.

2. Materials and Methods

2.1 General information

Methods from July 2018 to December 2021, 54 patients with postoperative infection after spinal internal fixation were treated with pulse combined with vacuum sealing in our department. 42 patients in usual care were used as the control group. Among them, 12 patients in the observation group were nursed using standardized operating procedures. Among them, there were 8 males and 4 females in the observation group. The age ranged from 46 to 84 years old, with an average of (37.8 ± 15.4) years old. In the control group, there were 28 males and 14 females, the age ranged from 42 to 78 years old, with an average of (39.8 ± 16.1) years old. There was no statistical difference in gender and age between the two groups ($P > 0.05$), which was comparable.

2.2 Inclusion and exclusion criteria

We include criteria as follows: Diagnosed by CT or MRI; good control of basic disease; patients without severe mental disorders; in line with the indications of pulse combined with closed negative pressure therapy; patients and their families are aware of and voluntarily accept; those with normal cognition and communication skills; agree to participate in this study. Exclusion criteria are following: Patients with severe organ dysfunction; patients with mental illness who do not cooperate; patients with other malignant tumors; other serious basic diseases of coagulation dysfunction; patients who cannot cooperate with treatment or drop out.

2.3 Research methods

2.3.1. Establish a standardized nursing operating procedure intervention team

Establishing a standardized nursing procedure intervention team led by the head nurse of the department. The team members are 1 associate chief physician (doctor), 1 attending physician (master's degree) and 4 nurse in charge (as the group leader in charge), the professional work experience and ability are strong. It can accurately analyze the key indicators to improve the nursing quality of pulse flushing combined with closed negative pressure and provide reasonable solutions.

2.3.2. Establishment of standardized nursing procedures

The members of the research team reviewed a large number of domestic and foreign literature and combined with the method of summarizing common problems with the quality control team of the clinical department. Preliminary draft rules of procedure for nursing, including evaluation and operating procedures at three stages: material preparation, pre-operation, operation and post-operation. It covers key factors such as observation of negative pressure value of pulsatile combined vacuum sealing drainage therapy, length of negative pressure drainage tube, height of negative pressure drainage bottle placement, time to connect drainage bottle and flushing fluid, sealing of wound surface, fluctuation of drainage fluid in drainage tube, and health education. Operated by responsible nurse or responsible team leader, the head nurse supervised and guided the nursing procedures throughout.

2.3.3. Clinical application methods

The control group implemented routine nursing management, including preoperative education, routine care and education on precautions after vacuum sealing drainage. In the observation group, the clinical nurses were trained uniformly and standardized by department-level teachers. The responsible nurse who receives the training is responsible for implementing the nursing care to the patient by applying standardized nursing operating procedures. Preoperative care includes as

following: Evaluating the patient and the equipment used for patient, body tolerance, self-care ability, drainage purpose, degree of cooperation, wound and drainage conditions, skin conditions around the closed wound and the patient's mood. After evaluation, the patient was given a picture and text of the composition of vacuum sealing drainage and the operation diagram, the responsible nurse explained the principle of vacuum sealing drainage and the steps of its operation by referring to the pictorial diagram. After the patient leaves the bed and enters the operating room, disinfect and replace the bedding items. Preparation of materials, preparation of flushing fluid, flushing tube, connection tube, negative pressure drainage bottle, treatment towel, one negative pressure suction device, one clamping forceps, basic treatment tray, sterile gloves, pen, notebook, pin, identification of drainage tube, and screen if necessary.

Post-operative care includes as following: Communicate with the doctor to determine the flushing fluid volume and determine the wound surface size. Checking the central negative pressure, whether all devices are intact, whether all components of the negative pressure drainage bottle are intact without air leakage, and whether the connection of each negative pressure pipeline is tight without air leakage. Checking the patient information; correctly install the negative pressure device, hang the negative pressure suction bottle under the bed, 20~30 cm lower than the drainage site. The drainage bottle was connected within 3 min after the patient returned to the ward during the operation to avoid tube blockage. Draping the treatment towel at the end of the connection tube of drainage tube, clip the drainage tube at 5 cm from the upper end of the connection tube, place the curved plate below the side of the connection, disinfect the connection port of VSD drainage tube and the peripheral suction tube interface for two times. Taking the port as the center, perform annular disinfection, and then longitudinally disinfect and connect the drainage tube and the drainage tube on the vacuum suction apparatus above the port. Releasing the clamping forceps brought back during the operation. closing the negative pressure gauge switch, open the suction valve switch, and adjust the negative pressure between 0.02 and 0.06 mpa. Connecting the irrigation fluid to the wound surface, first flush for 15 min, drip rate 100 drops/min, and then adjust the drip rate 40 drops/min to maintain irrigation. Pins to fix the pipeline and the bedside to prevent the pipeline from slipping. Labeling the pipeline and indicate the date and time. Observing whether the drainage tube is unobstructed, whether there is air leakage at each connection, and properly fix it. Observing whether the negative pressure value is maintained between 0.02 and 0.06 mpa. Touching whether the VSD dressing has a hard solid sensation, whether there is air leakage at the semipermeable adhesion site, and whether the cast is obvious. Whether the liquid column in the drainage tube fluctuates, whether the drainage tube is folded, twisted and compressed. Closely observing the surrounding skin color and the patient's limb sensation, accurately recording the drainage volume and flushing fluid volume after hand washing.

2.3.4 Evaluation method

We compared the days of postoperative intravenous antibiotic use and hospitalization days between the two groups. Patient and family were satisfied. The patient satisfaction questionnaire star survey scale designed by our hospital has 3 dimensions and 10 items. There are 10 questions, including nurses' education on operation, nurses' technical level, nursing quality, service attitude, and nurses' solutions to your problems. Each item was scored by 5 grades. The patient scans the questionnaire star QR code for the survey the day before discharge, from dissatisfied, average, somewhat satisfied, satisfied, very satisfied, respectively, from 1 to 5 points, the higher the score patient satisfaction, the Cronbachsa coefficient of the questionnaire is 0.95.

2.3.5. Statistical method

Data entry and analysis using Excel 2003 and SPSS 23.0, Measurement data expressed as ($\bar{x} \pm s$), Comparison between groups using t test; count data are expressed by [n(%)], Comparison between groups using 2test, $P < 0.05$ indicated that the difference was statistically significant.

3. Results

3.1 Comparison of nursing satisfaction between the two groups of patients and their families

The difference between the two groups was statistically significant ($P < 0.05$) is shown as Table I.

Table I. Comparison of Nursing Work Satisfaction

Group	Samples	Patient satisfaction		Family satisfaction	
		Samples	Percentage	Sampels	Percentage
SOG	12	12	96.0	11	98.7
TCG	42	42	84.0	38	88.0
χ^2		4.67		4.35	
P		< 0.05		< 0.05	

3.2 Comparison of postoperative nursing quality between the two groups

The difference between the two groups was statistically significant ($P < 0.05$) is shown as Table II.

Table II Comparison of Postoperative Nursing Quality

Group	Tubes	Pass rate of drainage tube fixation	Correct placement rate of drainage bag	Untight seal of translucent membrane	Blocked drain
SOG	52	42 (80.76)	46 (88.46)	26 (50.00)	29 (55.76)
TCG	24	23 (95.83)	24 (100.0)	23 (95.83)	1 (4.16)
χ^2		7.832	7.641	13.923	
P		< 0.05	< 0.05	< 0.05	

3.3 Comparison of postoperative hospital stay and intravenous antibiotic using days between the two groups

The difference between the two groups was statistically significant ($P < 0.05$) is shown as Table III.

Table III. Comparison of Postoperative Hospital Stay and Antibiotic using days

Group	Sample s	Hospitalization time	Antibiotic days
SOG	12	14.90±0.60	8.32±1.44 (10d)
TCG	42	18.90±1.30	9.94±1.68 (14d)
t		18.965	4.538
P		< 0.01	< 0.05

4. Discussion

Vacuum sealing drainage technology facilitates wound healing, it has been widely used in clinical practice [8]. In recent years, clinical orthopaedic surgical treatment has tended to be in-depth, difficult, minimally invasive, and specialized supporting equipment has increased. The operation difficulty of clinical nurses is greatly increased [9]. This study is based on a large number

of literature and clinical practice of vacuum sealing drainage. It was found that the nurse did not connect the negative pressure in time. Switch on the negative pressure and do not adjust the negative pressure value, afterwards negative pressure and flushing time delay, cause the drainage tube to be blocked by blood clot and invalid negative pressure occurs, leading to Vacuum Sealing Failure, brings many safety hazards to patients. The clinical effect of negative pressure sealing therapy is greatly reduced. Standardized nursing procedures management is a new management model with the goal of improving the quality of nursing work, clinical economic benefits and social image. With good management effect, it is highly praised by clinical managers.

Standardized nursing operation procedures management requires full participation, combined with clinical practice, guaranteed to be "documented, There are rules to follow, the person responsible". Therefore, it is necessary to establish standardized nursing operating procedures for nursing clinical work. According to the particularity and importance of the nursing care of the negative pressure closed drainage device and the negative pressure closed pipeline, it can more comprehensively and accurately avoid the most common and frequent nursing problems in negative pressure sealing treatment and nursing. It has better guidance, operability and practicality for clinical nursing practice, effectively shorten hospital stays and antibiotic days, Improved patient satisfaction. It can be seen that the establishment of standardized nursing operating procedures management has given full play to the therapeutic effect of closed negative pressure in the treatment of infection after spinal internal fixation.

With the rapid development and increasing specialization of medical care in the world, nurses need to provide more sophisticated and specialized care to patients [10]. Standardization, concretization and unification of specialist nursing have become the strategies and needs of clinical work development. Standardized nursing operating procedures are the optimal operating program designs that can be realized under the current conditions, summed up through continuous practice. It originated from modern industrial production and enterprise operation [11].

5. Conclusion

Construction of standardized nursing operating procedures can reduce postoperative pain and improve patient satisfaction. It is conducive to providing the best technical guidance for the clinical nursing staff performing the operation. Through establishing the homogeneity of operations, thereby improving the quality of care in the department.

Construction of standardized nursing procedures for infection after closed negative pressure treatment of spinal internal fixation, it is based on ensuring the improvement of nursing quality. At the same time, the length of hospital stay and the duration of antibiotic use were shortened. Improving patient and family satisfaction, increasing the ability of patients to return to society, it has important application value for the guidance of clinical nursing work.

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