

Risk Factors and Nursing Intervention of Pressure Sore in Surgical Patients

Shumei Zheng¹, Yuexian Ma^{1*}, Xiaofeng Yang² and Chunmiao Xu³

¹ Department of Nursing, The Second Affiliated Hospital of Qiqihar Medical University

² The Third Affiliated Hospital of Qiqihar Medical University

³ Qiqihar Medical University

* Correspondence Author: mayuexian1971@163.com

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Abstract. Purpose To explore the occurrence of pressure sore in surgical patients, analyze the risk factors, and formulate targeted nursing interventions. **Method** 1163 surgical patients were selected as the study object to understand the related factors of pressure sore. The independent risk factors of pressure sore in surgical patients were analyzed by multivariate logistic regression. **Result** There were 92 patients with pressure sores in all subjects, the incidence of pressure sores was 7.91%, there were 31 cases of general surgery, 23 cases of orthopedic surgery, 14 cases of gynecological surgery, 11 cases of Neurosurgery, 8 cases of thoracic surgery and 5 cases of urinary surgery. There was no significant difference in the incidence of pressure sores among the operation groups ($P > 0.05$); Logistic regression analysis showed that the independent risk factors of pressure sore in surgical patients included age ≥ 60 years old (OR=2.408, 95%CI: 1.274~4.554), have a history of diabetes (OR=1.978, 95%CI: 1.123~3.485), position of side and prone operation (OR=1.732, 95%CI: 1.090~2.750) and operation time ≥ 3 h (OR=2.026, 95%CI: 1.016~4.039) (all $P < 0.05$). **Conclusion** The incidence of pressure sores is high in all kinds of operations, among them, age ≥ 60 years old, diabetes history, side and prone operation position and operation time ≥ 3 hours are independent risk factors of pressure sore in surgical patients. Medical institutions should give targeted nursing interventions for the above risk factors to effectively control the risk of pressure sore in surgical patients.

Pressure sore refers to long-term ischemia, anoxia and malnutrition caused by continuous, unresponsive or friction or shearing of local tissues of human body. It can cause skin or subcutaneous tissue damage and pressure sore. The main clinical symptoms of the patient are erythema, blister and ulcer in the pressure part, which can cause secondary infection and lead to skin rupture. In serious cases, it can also cause septicemia and life-threatening [1, 2]. Because of the uncontrollable operation time, the influence of anesthesia on the hemodynamics of patients, and the vasoactive drugs used in the operation, the risk of pressure sore in patients undergoing operation is high [3]. Therefore, analyzing the risk factors of pressure sore in surgical patients, taking active and targeted perioperative nursing interventions, improving the safety management of surgical patients, can effectively control the occurrence of operation related pressure sore, and promote the improvement of medical and nursing quality of patients [4]. This study provides scientific basis for the formulation of effective nursing and prevention measures by analyzing the related influencing factors of pressure sore in surgical patients.

1 Object and Method

1.1 Research object

1163 patients who were operated in our hospital from January 2018 to December 2019 were selected as the study subjects, aged ≥ 18 years old, all of them had surgical indications. Patients

with pressure sores, skin diseases, skin defects or sclerosis were excluded. All patients or their families signed informed consent. The subjects included 622 male patients and 541 female patients, aged 18-76 years, with an average age of (49.04 ± 8.97) years. The types of operation included 401 cases of Department of general surgery, 325 cases of Department of orthopedics, 210 cases of Gynecology, 92 cases of Department of Neurosurgery, 77 cases of Department of thoracic surgery and 58 cases of Department of urology.

1.2 Research methods

① Basic information. Record the basic personal information of all patients (gender, age, smoking history, combined cardiovascular disease and diabetes), measure height and weight, calculate BMI = weight (kg) / height²(m²); ② Surgery and anesthesia. The operative position, anesthesia mode, anesthesia grade, operation time and intraoperative hemorrhage were recorded. Before operation, peripheral venous blood was drawn, serum was centrifuged, total protein (TP) and albumin (ALB) were measured by automatic biochemical analyzer.

1.3 Statistical methods

All data were input by Excel software and analyzed by SPSS 23.0 software. The measurement data is expressed in $\bar{x} \pm s$, *t* tests and compares the differences of indicators between the two groups, and the counting data is expressed by rate, the differences of the indexes between the two groups were tested and compared by χ^2 , and the independent risk factors of pressure sore were analyzed by multivariate Logistic regression. Inspection level (α) = 0.05.

2 Results

2.1 Research object: incidence of pressure sore

In all the subjects, 92 patients had pressure sores. The incidence of pressure sores was 7.91%, including 61 (66.30%) patients with stage I pressure sores, 27 (29.35%) patients with stage II pressure sores, and 4 (4.35%) patients with stage III pressure sores. According to the type of operation, 31 cases were in general surgery (the incidence of pressure sore was 7.73%), 23 in orthopedics (the incidence of pressure sore was 7.08), 14 in gynecology (the incidence of pressure sore was 6.67%), there were 11 cases of Neurosurgery (11.96%), 8 cases of thoracic surgery (10.39%), 5 cases of Urology (8.62%). There was no significant difference in the incidence of pressure sores among the operation groups ($P > 0.05$). See Table 1.

Table 1 Research object: incidence of pressure sore

Operative type	Total number of cases	Cases of pressure sore	Incidence of pressure sore(%)
General surgery	401	31	7.73
Orthopedic surgery	325	23	7.08
Gynecologic surgery	210	14	6.67
Neurosurgical surgery	92	11	11.96
Thoracic surgery	77	8	10.39
Urology Surgery	58	5	8.62
χ^2			3.531
<i>P</i>			>0.05

2.2 Single factor analysis of pressure sore in surgical patients

The patients in the pressure sore group were aged over 60 years (54 cases, 58.70%), had smoking history (45 cases, 48.91%), had cardiovascular disease history (36 cases, 39.13%), had diabetes history (15 cases, 16.30%), the proportion of BMI ≥ 25 kg /m² (31 cases, 33.70%), the proportion of position of side and prone operation (32 cases, 34.78%), the proportion of general anesthesia (55 cases, 59.78%), the proportion of anesthesia grade ≥ 3 (21 cases, 23.83%), the ratio of operation time ≥ 3 h (39 cases, 42.39%) and bleeding volume ≥ 400 ml (41 cases, 44.57%) were higher than

those of non-pressure ulcer group, the difference was statistically significant ($P < 0.05$); the serum TP and ALB levels of pressure ulcer group (61.57 ± 8.15 G / L and 30.95 ± 5.60 g / L, respectively) were lower than those of non-pressure ulcer group, the difference was statistically significant ($P < 0.05$). See Table 2.

Table 2 single factor analysis of pressure sore in surgical patients [n (%)]

Influencing factor		Pressure sore group (92 cases)	Non pressure sore group (1071 cases)	t/χ^2	P
Age	<60	54(58.70)	443(41.32)	10.450	<0.05
	≥ 60	38(41.30)	629(58.68)		
Gender	Male	52(56.52)	570(53.17)	0.382	>0.05
	Female	40(43.48)	502(46.83)		
Smoking history	Yes	45(48.91)	398(37.13)	4.993	<0.05
	Nothing	47(51.09)	674(62.87)		
History of cardiovascular disease	Yes	36(39.13)	289(26.96)	6.237	<0.05
	Nothing	56(60.87)	783(73.04)		
Diabetes history	Yes	15(16.30)	73(6.81)	10.929	<0.05
	Nothing	77(83.70)	999(93.19)		
BMI	<25 kg/m ²	61(66.30)	827(77.15)	5.505	<0.05
	≥ 25 kg/m ²	31(33.70)	245(22.85)		
Operative position	Supine position	60(65.22)	839(78.26)	8.203	<0.05
	Side and prone position	32(34.78)	233(21.74)		
Anesthesia mode	Intraspinal anesthesia	37(40.22)	553(51.59)	4.381	<0.05
	General anesthesia	55(59.78)	519(48.41)		
Anesthesia classification	<Level 3	71(77.17)	914(85.26)	4.258	<0.05
	\geq Level 3	21(23.83)	158(14.74)		
Operative time	<3 h	53(57.61)	436(40.67)	9.977	<0.05
	≥ 3 h	39(42.39)	636(59.33)		
Intraoperative hemorrhage	<400 ml	51(55.43)	708(66.04)	4.204	<0.05
	≥ 400 ml	41(44.57)	349(33.96)		
TP($\bar{x} \pm s$, g/L)		61.57 \pm 8.15	69.45 \pm 9.28	7.887	<0.05
ALB($\bar{x} \pm s$, g/L)		30.95 \pm 5.60	36.09 \pm 5.97	7.962	<0.05

2.3 Multivariate Logistic regression analysis of pressure sore in surgical patients

The age, gender, smoking history, cardiovascular disease history, diabetes history, BMI, operation position, anesthesia mode, anesthesia classification, operation time, operation bleeding volume, TP and ALB were used as independent variables, the results of logistic regression analysis are shown in Table 3. The independent risk factors of pressure sore in surgical patients include age ≥ 60 years (OR = 2.408, 95% CI: 1.274-4.554), diabetes history (OR = 1.978, 95% CI: 1.123-3.485),

the operation position (OR = 1.732, 95% CI: 1.090-2.750) and operation time ≥ 3 hours (OR = 2.026, 95% CI: 1.016-4.039) ($P < 0.05$). See Table 3.

Table 3 multivariate logistic regression analysis of pressure sore in surgical patients

Influencing factor	β	SE	Wald χ^2	OR (95% CI)	P
Age ≥ 60	0.879	0.325	7.315	2.408(1.274~4.554)	<0.05
Have a history of diabetes	0.682	0.289	5.569	1.978(1.123~3.485)	<0.05
Position of side and prone operation	0.549	0.236	5.412	1.732(1.090~2.750)	<0.05
Operation time ≥ 3 h	0.706	0.352	4.023	2.026(1.016~4.039)	<0.05

3. Discussion

Pressure sore is caused by the long-term compression of local tissues of the body, resulting in blood circulation disorder, hypoxia and ischemia and other symptoms. The risk of pressure sore in surgical patients is relatively high. If the control is not good, it may worsen the ulceration or necrosis of soft tissue, seriously affect the normal skin function, increase the pain and medical expenses of patients, and also have a certain impact on the surgical treatment effect [5, 6]. This study found that 92 patients in all subjects had pressure sores, the incidence of pressure sores was 7.91%, which was consistent with the results of previous studies [7,8], indicating that the risk of pressure sores was great because the patients kept fixed position for a long time, and the patients could not feel the pain stimulation caused by compression under anesthesia, therefore, the risk of pressure sore is very high; Among the patients with pressure sore, there were 31 cases of general surgery, 23 cases of orthopedic surgery, 14 cases of gynecological surgery, 11 cases of Neurosurgery, 8 cases of thoracic surgery and 5 cases of urology surgery. There was no significant difference in the incidence of pressure sore among the operation groups ($P > 0.05$), which indicated that all the surgical departments should pay attention to the prevention and control of pressure sore and reduce the risk of pressure sore.

In this study, we found that patients with age ≥ 60 years old, smoking history, cardiovascular disease history, diabetes history, BMI ≥ 25 kg / m², side and prone operation position, general anesthesia, anesthesia grade ≥ 3 , operation time ≥ 3 h, the amount of intraoperative bleeding ≥ 400 ml and the level of serum TP and ALB were related to the occurrence of pressure sore. At the same time, the results of logistic regression analysis showed that the independent risk factors of pressure sore were age ≥ 60 (OR = 2.408, 95% CI: 1.274-4.554), there was a history of diabetes mellitus (OR = 1.978, 95% CI: 1.123-3.485), side and prone operation position (OR = 1.732, 95% CI: 1.090-2.750), and operation time ≥ 3 h (OR = 2.026, 95% CI: 1.016-4.039), which was consistent with previous research results [9,10]. The specific reasons are as follows: ① the skin of the older patients is relatively loose and less elastic, the ability of tissue regeneration is poor, and their own sensory function is also declining, so the compression time is too long during the operation, it is difficult for the body to make reflective protection, resulting in skin tissue defects [11]; In addition, the organs and tissues of older patients also have degenerative changes, often accompanied by various chronic diseases, and due to the impact of the disease, poor nutritional status, also increased the risk of operating pressure sore [12]. ② Diabetes, diabetes patients in a long-term metabolic disorder and hyperglycemia, can cause blood circulation disorders, malnutrition, subcutaneous tissue damage and skin infection and other complications, is one of the reasons for the occurrence and development of pressure sores in surgical patients [13]. ③ During the operation, the patient's body position will remain unchanged for a long time. In the lateral and prone position, there are many bone protrusion sites, the greater the pressure on the site, and the lower the blood circulation function [14]. In addition, in the process of movement, the patient will also cause skin scratches and other phenomena on this part, which will further lead to hypoxia and ischemia of subcutaneous tissue and increase the risk of pressure sore [15]. ④ The operation time and operation time are

closely related to the local tissue compression time of patients. The longer the operation time is, the worse the hypoperfusion and hypoxia ischemia state of patients will be [16]. At the same time, with the increase of anesthesia time, the patient's blood circulation disorder will be more obvious. It is difficult for anaerobic metabolites to be discharged from the body in time, and the temperature of the skin under pressure will be reduced, thus significantly increasing the incidence of pressure sore [17].

According to the independent risk factors such as age ≥ 60 years old, diabetes history, side and prone operation position and operation time ≥ 3 h, the specific nursing strategies for pressure sore prevention of surgical patients are formulated as follows [18-20]: ① Preoperative evaluation measures: nurses should have a detailed understanding of the basic situation, disease symptoms, skin condition, operation type, anesthesia mode and psychological status of the patients before operation. Meanwhile, the risk factors of pressure sore should be assessed, the high-risk population should be screened out in time, the targeted perioperative nursing plan should be formulated, the nutritional status and skin status of the elderly patients should be improved as much as possible, and the blood sugar and cardiovascular diseases of the patients should be controlled before the operation to reduce the risk of pressure sore. ② Position nursing measures: on the premise of ensuring the operation, make the patients in a more comfortable position. In supine position, focus should be placed on protecting the protruding parts such as the back pillow and sacrococcygeal part. In lateral position, focus should be placed on protecting the protruding parts such as the ears, shoulders, elbows, hips, knees and inner and outer ankles. In prone position, it is necessary to protect the protruding parts such as cheek, knee joint, male genitalia and female breast. If the operation time is too long, apply MEBO to the possible pressure parts of the patient before operation, keep the towel flat and the position pad, support and pad properly used, and prevent pressure sore in advance. ③ During the operation, the nursing staff shall closely observe the skin tissue state of the patient's pressure part, and regularly carry out pressure reducing massage and warm keeping measures on the patient's pressure part without affecting the operation measures, so as to promote blood circulation; at the same time, patrol the temperature and humidity changes in the operating room, adjust the temperature between 22-25 °C and the humidity between 50% - 60%, ensure that the patient is operated under appropriate conditions, and wipe the flushing liquid, body fluid, blood and medicine liquid produced by the operation in time, so as to keep the patient's skin dry.

To sum up, the incidence of pressure sore in surgical patients is relatively high, which occurs in general surgery, orthopedics, gynecology, neurosurgery, thoracic surgery, urology and other types of surgery, of which age ≥ 60 years old, diabetes history, side, prone operation position and operation time ≥ 3 h are independent risk factors for pressure sore in surgical patients. In order to control the risk of pressure sore effectively, medical institutions should give targeted nursing interventions to the above risk factors.

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