Effect Of Intraoperative Nursing In Operating Room On Off-Pump Coronary Artery Bypass Grafting And Analysis Of Postoperative Incision Infection

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Abstract

Objective: This study aimed to probe into the effect of intraoperative nursing in operating room on off-pump coronary artery bypass grafting (OPCAB) and the influence of postoperative incision infection.

Methods: A total of 124 patients who came to our hospital for OPCAB operation from January 2017 to January 2020 were selected and divided into observation group (OG, comprehensive nursing in operation room, 65 cases) and control group (CG, routine nursing, 59 cases). At first, the operation indexes of the two groups were recorded and compared, and then the self-care ability of patients was evaluated by Banhel index. Their pain was evaluated by VAS score, the negative emotions of both groups were evaluated by self-rating anxiety scale (SAS) and self-rating depression scale (SDS), and their complications, quality of life and nursing satisfaction were evaluated.

Results: There was no marked difference in operation time, blood loss and blood transfusion between the two groups (P>0.05). One week after operation, the Barthel index and VAS scores in the OG were better than those in the CG (P<0.05), and the SAS and SDS scores in the OG were also dramatically better than those in the CG (P<0.05). The incidence of postoperative complications in the OG was remarkably lower than that in the CG (P<0.05), and the scores of qualities of life and nursing satisfaction in the OG were remarkably higher than those in the CG (P<0.05).

Conclusion: Operating room nursing can effectively promote postoperative recovery of OPCAB, improve patients' quality of life and enhance nursing satisfaction through comprehensive, timely and accurate nursing mode, which is worthy of clinical application.

Keywords: operating room nursing, off-pump coronary artery bypass grafting, incision infection, quality of life

Introduction

Recently, with the improvement of living standards and the change of people's eating habits, the morbidity of coronary heart disease (CHD) is getting higher and higher, becoming more prevalent among a younger age group(Moran et al.,2019; Tang et al.,2018). CHD is mainly caused by vascular obstruction and lumen stenosis caused by atherosclerosis(Zhu et al.,2016). Clinical treatment is mainly drug therapy and percutaneous coronary intervention,

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but for severe CHD patients, we have no choice but to conduct coronary artery bypass grafting(Dhurandhar et al.,2015). Off-pump coronary artery bypass grafting (OPCAB), as a common coronary artery bypass grafting, can complete coronary artery bypass grafting under the condition of beating heart, and it can avoid a series of complications caused by extracorporeal circulation in traditional on-pump coronary artery bypass grafting (CABG)(Borde et al.,2015; Albert et al.,2006).

However, as a surgical method, OPCAB still has the possibility of complications, such as postoperative wound infection. In the past, related studies(Hedges,2005) showed that the recovery of OPCAB patients was relevant to the nursing methods during and after operation. A relatively complete nursing mode in the operating room has

not been explored, but some studies(Jiang and Liu,2017) have shown that timely and high-quality nursing during operation can effectively improve the efficacy of operation and help patients recover after operation. And for OPCAB patients, because their overall age is too large and there are more complicated diseases, comprehensive and thoughtful operating room nursing is needed(Afrand et al.,2014).

Therefore, in order to explore a suitable method and mode for the operation nursing of OPCAB patients, 124 patients who had undergone OPCAB operation were selected in our hospital. Through comprehensive and meticulous nursing cooperation in the operating room, good results were achieved, as follows.

Materials and methods

Altogether 124 patients, including 64 males and 60 females, (58.21±5.13) years old on average, who came to our hospital for OPCAB from January 2017 to January 2020 were divided into two groups: (1) 65 cases in the observation group (OG) received comprehensive nursing in operation room; (2) 59 cases in the control group (CG) were given routine nursing in operating room.

Inclusion criteria: CHD patients who met the surgical criteria of OPCAB were included. Exclusion criteria: Patients with other serious heart diseases, infection, liver and kidney dysfunction, or coagulation dysfunction were excluded. All patients or their legal representatives have signed informed consent, and this test has been approved by the hospital ethics committee.

Surgical methods

All patients were under general anesthesia through endotracheal intubation, and the left internal mammary artery and great saphenous vein of lower limbs were routinely freed after sternotomy through median incision as standby. The pericardium was cut longitudinally, and three pericardial traction lines parallel to the left phrenic nerve level were made. The inferior vena cava pericardium was turned back to sew another traction line near the diaphragm surface and the line was tightened. The target blood vessels at different positions were exposed, the left internal mammary artery was anastomosed with the left anterior descending artery first, and then the vascular stabilizer (O ctopus) was placed. The blood vessel was cut open, and the blood vessel was temporarily blocked with a traction wire at the proximal end of the target blood vessel or a coronary artery stopper was inserted to protect the myocardium. In order to keep the operative field clear and bloodless during the operation, it was sometimes necessary to use a local CO nebulizer to blow air during anastomosis. After the left internal mammary artery was anastomosed with the left anterior descending artery, and other target vessels were anastomosed with each other. After distal vascular anastomosis was completed, the proximal end was anastomosed continuously after the ascending aorta side forceps, and the thoracic cavity was closed after the anastomosis. After operation, they were sent to ICU for intensive care.

Nursing methods

Patients in the CG were given routine operation nursing, including psychological comfort, psychological index monitoring and corresponding basic nursing after entering the operating room. Patients in the OG received a comprehensive nursing mode in the operating room. The specific process was as follows: First, the circulating nurses were cooperated in nursing, the temperature in the operating room was adjusted at about 25℃, and light music that patients like was prepared both in the handover room and the operating room, so as to help relieve their anxiety. There were wall cabinet type heat preservation boxes and cold storage boxes in the operating room used to store physiological saline and necessary common liquids with heat preservation at 40℃ and 6℃ respectively. The saline was ensured to be above 4000 ml to maintain the stability of patients' circulatory system, the rolling range of questions was narrowed, and they were appeased and encouraged to reduce fear of surgery. The nursing staff were adhered to the post all the time during the operation, without leaving or joining the post at will. They helped the doctor adjust patients' position at any time based on the operation needs, and provided the medicines needed by the operation timely and accurately, so as to help to complete the operation efficiently. For surgical instruments, it was necessary to carefully check whether they were in good performance. They should master the use sequence of instruments skillfully, and supply the vascular treatment fluid needed by patients in operation in a timely and efficient manner. The instruments and articles used in the operation were strictly recorded, following aseptic operation to prevent wound infection. When patients were transported from the operating room back to the intensive care unit, quilts should be added to keep them warm. The nursing staff should speed up the transportation, reduce the heat loss of patients, and pay attention to the smooth flow of pipes during transportation to ensure their safety. After operation: Nurses actively observed patients' anesthesia reaction,

consciousness recovery, etc., asked their pain feelings, paid close attention to the changes of vital signs, made nursing records, and examined the skin condition of the surgical incision. If there was bleeding in early stage, handling it in a timely manner. They should provide antibiotic treatment for patients according to the doctor's advice, actively prevented infection, guided the key points of diet after operation, and informed family members to provide patients with liquid food after operation to ensure the normal nutritional status of the body.

Outcome measures

(1) The operation indexes of patients in both groups were recorded and compared. (2) The time of getting out of bed and postoperative hospitalization of patients in both groups were recorded and compared. (3) The postoperative complications between both groups were recorded and compared, including incision infection, arrhythmia, hypoxemia and pulmonary infection. (4) Patients' independent living ability and pain one week after operation were evaluated by Barthel index(Bielewicz et al.,2020) and VAS score (pain index evaluation scale)(Saarinen et al.,2020). (5)

The psychological negative emotions of the two groups before and one week after the operation were evaluated by Self-rating Anxiety Scale (SAS) and Self-rating Depression Scale (SDS)(Yue et al.,2020). (6) Their quality of life one month after operation were recorded and compared through the SF-36 scale(Nilsson et al.,2020). The scale could be divided into three parts: physiological function, psychological function and life function. The higher the score was, the higher the quality of life was. (7) The nursing satisfaction between the two groups were recorded and compared.

Statistical methods

The data were analyzed via SPSS 20.0, and the measurement data were expressed by mean±standard deviation (x±s). The comparison between the two groups was made by T test, and that before and after treatment was assessed via paired T test. The counting data were represented by rate, and the comparison between groups was analyzed through χ^2 test, and the difference was statistically remarkable with P<0.05.

Results
Comparison of general data

There was no marked difference in gender, age, BMI and number of lesions between the two groups (P>0.05), which was comparable. (Table 1)

Table 1. **General data table [n (%)]**

Factor	Observation group (n=65)	Control group (n=59)	Xt/X^2	P
Gender			0.026	0.871
Male	34 (52.31)	30 (50.85)		
Female	31 (47.69)	29 (49.15)		
Age (years)			0.039	0.844
≤ 58	32 (49.23)	28 (47.46)		
> 58	33 (50.77)	31 (52.54)		
BMI (kg/m^2)			0.002	0.965
≤ 23	30 (46.15)	27 (45.76)		
> 23	35 (53.85)	32 (54.24)		
Smoking history			0.004	0.951
Yes	29 (44.62)	26 (44.07)		
No	36 (55.38)	33 (55.93)		
Education level			0.032	0.984
Primary school	20 (30.77)	19 (32.20)		
Middle school	25 (38.46)	22 (37.29)		
College and above	20 (30.77)	18 (30.51)		
Number of lesions			0.021	0.885
2 and below	30 (46.15)	28 (47.46)		
3 and above	35 (53.85)	31 (52.46)		
Liver function indexes				
Serum total protein (g/L)	67.42±2.27	67.64±2.33	0.532	0.596
Glutamic-pyruvic transaminase (μmol/L)	27.57±4.06	27.11±4.45	0.602	0.548
Total bilirubin (μmol/L)	11.07±2.57	11.01±2.51	0.131	0.896

Comparison of surgical indexes of patients between both groups

We recorded and compared the operation time, blood loss and blood transfusion between the two groups. The results showed that there was no obvious difference in operation time, blood loss and blood transfusion between them (P>0.05), indicating that the nursing methods had no obvious influence on the operation effect. (Table 3)

Table 3. **Comparison of surgical indexes between both groups**

Indicators	Observation group (n=65)	Control group (n=59)	Xt	P
Operation time (h)	3.52±0.54	3.59±0.57	0.702	0.484
Intraoperative blood loss (ml)	506.47±16.42	510.21±15.74	1.292	0.199
Blood transfusion (ml)	468.37±12.06	471.33±13.11	1.310	0.193

Comparison of time of getting out of bed and hospitalization after operation between the two groups

We recorded and compared the time of getting out of bed and hospitalization between the two groups. And we found that the time of patients in the OG was remarkably lower than that of the CG (P<0.05). (Figure 1)
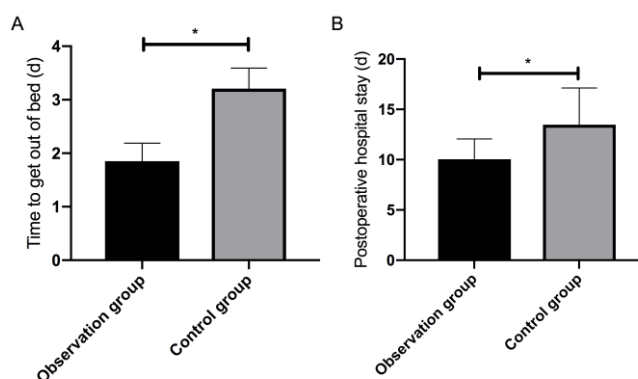

Figure 1. **Comparison of time of getting out of bed and postoperative hospitalization between the two groups**

A: comparison of time of getting out of bed between both groups; B: comparison of postoperative hospital stays between both groups. * means P<0.05.

Comparison of Barthel index and VAS score of patients in both groups one week after operation

The independent living ability and pain one week after operation were evaluated by Barthel index and VAS score: After nursing, the Barthel index of patients in the OG was remarkably higher than that in the CG, while the VAS score was remarkably lower than that in the CG, and the differences were statistically remarkable (P<0.05). (Table 3)

Table 3. **Comparison of Barthel index and VAS score of both groups one week after operation**

Indicators	Observation group (n=65)	Control group (n=59)	Xt	P
Barthel index	93.87±3.87	81.06±3.59	19.05	<0.001
VAS score	4.15±1.06	6.27±1.16	10.63	<0.001

Comparison of negative emotions of patients between both groups before and one week after operation

The psychological negative emotions of both groups before and one week after the operation were evaluated by SAS and SDS scores. The results manifested that there was no marked difference between the two scores before the operation (P>0.05), and the negative emotions scores one week after the operation were obviously improved compared with those before the nursing, but the improvement of patients in the OG was more obvious than that in the CG (P<0.05). (Figure 2)
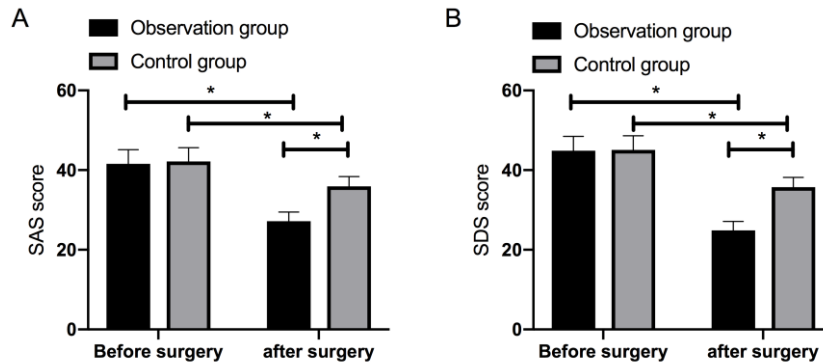
Figure 2. **Comparison of negative emotions between the two groups before and one week after operation**

A: comparison of SAS scores between both groups; B: comparison of SDS scores between both groups. * means P<0.05.

Comparison of complications of patients between both groups

We recorded and compared the incidence of postoperative complications between the two groups. The results showed that there were 2, 1, 1 and 0 patients with incision infection, arrhythmia, hypoxemia and pulmonary infection in the OG, and the incidence rate was 6.15%; the number of patients with incision infection, arrhythmia, hypoxemia and pulmonary infection in the CG was 5, 2, 1 and 1 respectively, and the incidence rate was 15.25%. (Table 4)

Table 4. **Comparison of incidence of complications**

Complications	Observation group (n=65)	Control group (n=59)	X^2	P
Incision infection	1 (1.54)	5 (8.47)	-	-
Arrhythmia	1 (1.54)	2 (3.39)	-	-
Hypoxemia	1 (1.54)	1 (1.69)	-	-
Pulmonary infection	0	1 (1.69)	-	-
Total incidence rate	3 (4.62)	9 (15.25)	4.005	0.045

Comparison of quality of life scores of patients between both groups

The quality of life scores of the two groups were compared one month after operation. And the results showed that the scores of physical function, psychological function and life function of the OG were remarkably higher than those of the CG. (P<0.05) (Figure 3)
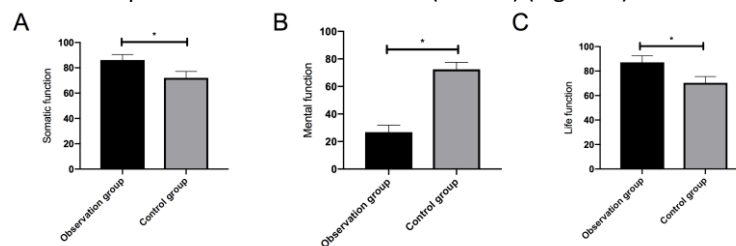

Figure 3. **Comparison of quality of life scores between the two groups**

A: comparison of body function; B: comparison of psychological function; C: comparison of life function. * means P<0.05.

Comparison of nursing satisfaction of patients between both groups

The number of patients in the OG who were very satisfied, satisfied and dissatisfied with nursing was 46, 16 and 3, respectively, with a nursing satisfaction rate of 95.38%. The number of patients in the CG who were very satisfied, satisfied and dissatisfied with nursing was 21, 22 and 16, respectively, with a nursing satisfaction rate of 72.88%. The nursing satisfaction of patients in the OG was dramatically higher than that of those in the CG (P<0.05)

Table 5. **Comparison of nursing satisfaction between both groups [n (%)]**

Group	Observation group (n=65)	Control group (n=59)	X^2	P
Very satisfied	46 (70.77)	21 (35.59)	-	-
Satisfied	16 (24.62)	22 (37.29)	-	-
Dissatisfied	3 (4.61)	16 (27.12)	-	-
Nursing satisfaction	62 (95.38)	43 (72.88)	12.07	0.001

Discussion

In recent years, with the improvement of people's living standard and the change of diet structure, the morbidity of various cardiovascular and cerebrovascular diseases is increasing, and CHD is one of the most common cardiovascular diseases (Sanchez et al.,2018). For CHD patients, they often have myocardial ischemia due to coronary atherosclerosis, and severe patients may even have myocardial infarction. At this time, clinical bypass surgery is often used to save their lives(Dhurandhar et al.,2015). The purpose of OPCAB is to minimize the injury to patients by surgery, and it is also a surgical method which has been widely used in clinical practice(Shen et al.,2018). In the past, studies have shown that comprehensive nursing in some operations can effectively relieve patients' surgical anxiety and improve their surgical prognosis(Herte et al.,2018). However, there are relatively few researches on the application of operating room nursing in OPCAB.

For patients who need OPCAB, because they know less about diseases and operations, they will have some fear for the operation, which is unfavorable for both the operation and postoperative recovery(Kowalewski et al.,2016). Therefore, it is necessary to improve the nursing mode in operation. In order to observe the effect of the improved operating room nursing mode on OPCAB patients, we conducted a controlled experiment. The results showed that there was no remarkable difference in operation time, blood loss and blood transfusion between the two groups, which indicated that the change of nursing mode had no marked effect on the immediate effect of operation. After that, we compared the time of getting out of bed and hospitalization between the two groups. And we discovered that the time in the OG was dramatically lower than that in the CG, which suggested that the improvement of nursing mode in our operating room was helpful to the postoperative recovery of patients. Previously, the application of nursing in the operating room in other operations also achieved good results. For example, some studies(Caughey et al.,2018) have found that strengthening surgical nursing in cesarean section has a certain beneficial effect on relieving maternal pain and improving maternal

delivery route. In our research, for the improvement of the nursing mode in the operating room, we pay special attention to the cooperation of nursing staff. We have made a relatively complete preparation and effective cooperation whether in assisting the anesthesiologist in anesthesia induction or paying attention to all aspects of patients' position during operation. Then, we compared the Barthel index and VAS scores of both groups one week after operation. The results manifested that the Barthel index of the OG was dramatically higher than that of the CG, and the VAS score was dramatically lower than that of the CG, which suggested that the improvement of the nursing mode in the operating room could effectively promote the recovery of patients' independent living ability after operation and alleviate their postoperative pain. The comparison of negative emotions before and after operation also showed that the negative emotions of patients in the OG were improved more obviously than those in the CG. We suspect that this may be due to patients' patience and popularization of disease and operation related knowledge by nurses before operation.

Incision infection is one of the complications of many surgical patients. Incision infection will not only directly affect the surgical effect of patients, but also may lead to further infection, thus causing more serious complications(Van et al.,2019; Puskas et al.,2015). We also compared the incidence of postoperative complications between both groups, and found that the incidence in the OG was remarkably lower than that in the CG, and the most obvious one was the incidence of incision infection. This suggested that the improvement of our operating room nursing mode could effectively reduce the occurrence of postoperative complications and prevent the occurrence of postoperative incision infection. Finally, we compared the quality of life and nursing satisfaction of patients in both groups one month after operation, and the results showed that the quality of life and nursing satisfaction of patients in the OG were dramatically higher than those in the CG. This indicated that our operating room nursing model could effectively promote the postoperative recovery of patients, improve their independent

living ability, and ultimately promote the recovery and improvement of quality of life. Similar to our results, some studies(Qvistgaard et al.,2018)have found that improving the quality of nursing in the operating room can effectively prevent the occurrence of infection at the surgical site.

To sum up, the comprehensive, timely and accurate nursing mode of operating room nursing can effectively promote the postoperative recovery of OPCAB, improve the quality of life and nursing satisfaction of patients, which is worthy of clinical application.

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