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Original Article

Improvement effect of fast track surgery on lung cancer patients in perioperative period and influence on negative emotions

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Abstract: Objective: It is aimed to discuss the influence of Fast Track Surgery (FTS) model on psychological states, body function improvement and pain degree of lung cancer patients in perioperative period. Methods: 110 lung cancer patients who were admitted to the First People's Hospital of Wenling and treated with laparoscopic surgery from March, 2017 to March, 2018 were selected as objects of study and divided into two groups through the method of random number table, including 55 patients in control group receiving routine nursing in perioperative period and 55 patients in observation group receiving FTS model in perioperative period, so as to compare the recovery time of body functions, occurrence rate of complications and analgesic effect after surgery in two groups and measure the level changes of C-reactive protein (CRP), tumor necrosis factor-α (TNF-α) and interleukin-6 (IL-6) in serum. The Self-Rating Anxiety Scale (SAS) and Self-Rating Depression Scale (SDS) were used to evaluate the change of psychological states before surgery and 7 d after surgery in two groups. Results: The first flatus time, extubation time, the first off-bed activity time and length of stay in observation group were shorter than those in control group after surgery ($P<0.05$). The occurrence rate of complications in observation group was 16.36%, which was lower than 36.36% in control group ($x^2=5.666$, $P<0.05$). The Visual Analogue Scale (VAS) scores and IL-6 and TNF-α levels in observation group were lower than those in control group at different time points after surgery ($P<0.05$). The SAS and SDS scores reduced obviously in two groups after surgery in comparison with those before surgery and these scores in observation group were lower than those in control group 7 d after surgery ($P<0.05$). Conclusion: The application of FTS concept to perioperative period of lung cancer could shorten the recovery time of body functions more effectively and achieve a better analgesic effect. And meanwhile, it could also eliminate systemic inflammation and relieve negative emotions.

Keywords: Fast track surgery, lung cancer, perioperative period, negative emotions

Introduction

The lung cancer is one of the malignant tumors with the highest incidence rate in the world. As shown in the data issued by WHO, the lung cancer is the primary cause for the death of male patients with malignant tumors and the second cause for the death of female cancer patients [1]. Due to the aging of population, environmental pollution, acceleration of life pace and many other factors, the prevalence rate of lung cancer increases year by year and the number of lung cancer patients ranks the first all over the world at present [2]. Now, surgery is the main treatment method for lung cancer. The continuous development of laparoscopic technique not only improves the clinical efficacy, but also enhances the tolerance of patients to a certain extent. But some studies showed that there was a relatively high occurrence rate of severe complications after lung cancer surgery, such as pleural effusion and lung infection, etc., which affected the prognosis effect of patients [3, 4]. Most patients treated with lung cancer surgery have such negative emotions as anxiety and tension, etc., so it is the direction of lung cancer surgical therapy to enhance the surgical safety and relieve the negative emotions of patients. The Fast Track Surgery (FTS) concept is a comprehensive intervention pro-

Table 1. Comparison on the general data of lung cancer patients in two groups

Group	Gender		Age (years old)	Types of tissues		
	Male	Female		Squamous-cell carcinoma	Adenocarcinoma	Others
Control group (n=55)	35 (63.64)	20 (36.36)	56.84±7.02	29 (52.73)	17 (30.91)	9 (16.36)
Observation group (n=55)	31 (56.36)	24 (43.64)	57.11±8.23	33 (60.0)	16 (29.09)	6 (10.91)
t/x^2	0.606		0.185	0.591	0.043	0.695
P	0.436		0.853	0.442	0.835	0.405
Group	ASA grading		TNM staging			
	Grade I	Grade II	Ia	Ib	IIa	IIIa
Control group (n=55)	28 (50.91)	27 (49.09)	23 (41.82)	19 (34.55)	9 (16.36)	4 (7.27)
Observation group (n=55)	32 (58.18)	23 (41.82)	25 (45.45)	18 (32.73)	7 (12.73)	5 (9.09)
t	0.587		0.148	0.041	0.293	0.121
P	0.444		0.701	0.840	0.589	0.728

gram that promotes the postoperative recovery. Based on the surgical nursing model developed from evidence-based medicine, FTS optimizes the nursing techniques and methods through multidisciplinary collaboration to reduce the surgical stress reaction of patients, accelerate the rapid recovery of all body functions and enhance the safety [5, 6]. At present, the FTS concept is widely used after lung cancer surgery, but most analyses only focus on the influence of this nursing model on odynolysis and recovery effect after surgery. In this study, some other values of FTS were discussed, including anesthetic effect, body function improvement, odynolysis and elimination of inflammatory factors.

Materials and methods

General data

110 lung cancer patients who were admitted to the First People's Hospital of Wenling and treated with laparoscopic surgery from March, 2017 to March, 2018 were selected as objects of clinical study and divided into two groups through the method of random number table, including 55 patients in control group and 55 patients in observation group. There was no statistical difference in age, gender, TNM staging, cancer types, American Society of Anesthesiologists (ASA) grading and lung function in two groups ($P>0.05$), as shown in **Table 1**.

Inclusion and exclusion criteria

Inclusion criteria: patients diagnosed with lung cancer through cytologic and histopathologic examinations; those in conformity with relevant diagnostic criteria stipulated in Guidelines for Diagnosis and Treatment of Lung Cancer issued by National Comprehensive Cancer Network (NCCN) [7]; those receiving no other treatments before surgery; those complying with the indications of pulmonary resection for lung cancer; and those signing the informed consent form willingly and approved by Medical Ethics Committee. Exclusion criteria: patients with severe hepatic and renal dysfunctions in a critical condition; those complicated with severe cardiovascular and cerebrovascular diseases; those with mental disorders, language barriers and consciousness disorders; and those with blood diseases and acute infectious diseases, etc. Withdrawal criteria: patients quitting midway due to transferring to another hospital or other reasons; and patients died or lost contact after surgery, etc.

Methods

The routine nursing model was applied to control group. ① Preparation before surgery. Preparation of operating room: it shall be necessary to disinfect instruments and equipments, ensure the normal operation of equipments and prepare gauze and first-aid medicines, etc. Preparation of patients: it shall be necessary to inform patients of the surgical time, help patients with the routine preparation of gastrointestinal tract, explain the importance of cooperation with treatment, encourage patients to face the surgery positively and closely monitor the heart rate, oxyhemoglobin saturation and other vital signs of patients. After surgery, it shall be necessary to strength the nutritional support, make a scientific diet plan for patients

and instruct them to have a good rest and maintain ample sleep so as to accelerate the recovery of body functions.

The FTS concept was applied to observation group. (1) Psychological nursing before surgery. Most patients treated with lung cancer surgery will have such negative emotions as anxiety, fear and depression, etc. and the long-term negative emotions will lead to endocrine disorders and increase the risk of complications after surgery, so it shall be necessary to evaluate the psychological states of patients and conduct the psychological intervention in patients with negative emotions through emotional regulation and cognitive regulation. The nurses can relieve the negative emotions of patients through explanation of disease knowledge with comforting/encouraging words. ① The nurses shall explain the precautions before, during and after surgery to make patients understand the whole surgical process and possible problems. ② The nurses shall explain the purpose and significance of FTS nursing to reassure patients and help them cooperate with medical workers in a better way. (2) Preoperative preparation. The patients shall not eat anything within 6 h before surgery nor drinking anything within 12 h before surgery. They shall take 500 ml oral glucose solution before the prohibition of drinking. (3) Nursing during surgery. The temperature shall be kept at 22-25°C and the relative humidity shall be 45-60% RH in operating room [8]. The infusion fluid and flushing fluid shall be heated and kept warm in incubator to make the body temperature maintained at 36.5°C or so. In the process of anesthesia, the disoprofol can be added to achieve the short-acting analgesia, but the injected dose and injection speed shall be controlled properly. The Visual Analogue Scale (VAS) scores were used for pain assessment. The higher the scores, the severer the pain (range of scores: 0-10). The analgesics can be used appropriately to relieve the pain during surgery. (4) Nursing after surgery. ① Prevention of complications. The nurses shall remove the urinary catheter 6 h after surgery and pinch and press the thoracic drainage tube every half hour to avoid the blocking of thoracic drainage tube and ensure the normal drainage of thoracic drainage tube. The volume, color and property of drainage liquid shall be observed in real time. If the color darkens and the volume of drainage increases, the nurses shall observe whether there is anastomotic fistula, hemorrhage and other complications. If the color of drainage liquid is normal and the volume decreases gradually, the nurses shall remove the thoracic drainage tube 24 h after surgery. After extubation, the nurses shall closely observe whether the patients have abnormal breathing, chest distress, polypnea and other adverse reactions. The patients suffering intense pain after surgery can use the patient-controlled analgesia pump to evaluate the analgesic effect [9]. ② Dietary instruction. The patients shall lie flat for 6 h after surgery. The patients shall start with liquid diet and then transit to semi-liquid and normal diets, with high-fiber and high-protein foods regarded as the best. The patients shall have more meals a day but less food at each to accelerate the recovery of gastrointestinal function. ③ Rehabilitation training. When the patients lie in bed, the nurses shall instruct them to do respiratory training, coughing training and passive exercise of arms and legs. The nurses shall encourage the patients to get out of the bed and do exercise 1 d after surgery, but the activity intensity shall comply with their body tolerance. In each stage, the exercise mode and amount shall be adjusted gradually according to the recovery situation of patients [10]. ④ Discharge instruction. Before discharge, the nurses shall assist patients' family members to go through the discharging formalities, explain the precautions after discharge to patients and their family members and instruct them to reexamine 7 d after surgery.

Observation targets

(1) Comparison of recovery situation after surgery. The first flatus time, extubation time, the first off-bed activity time and length of stay after surgery were recorded in two groups. (2) Complications. The types of complications (lung infection, atelectasis, hypoxemia and chylothorax, etc.) in perioperative period and corresponding occurrence rates were recorded in two groups. (3) Analgesic effect. The VAS was used to evaluate the changes of pain degree 6 h, 12 h, 24 h, 48 h and 72 h after surgery in two groups. (4) Anxiety/depression assessment. The Self-Rating Anxiety Scale (SAS) and Self-Rating Depression Scale (SDS) were used to assess the emotions of patients 1 d before surgery and 7 d after surgery, with 50 scores as

Table 2. Comparison of recovery indexes after surgery in two groups ($\bar{x}$ ± sd)

Group	The first flatus time (d)	Extubation time (d)	The first off-bed activity time (h)	Length of stay (d)
Control group (55)	3.17±0.58	3.72±0.62	30.41±4.58	8.59±1.62
Observation group (55)	1.70±0.53	1.26±0.75	12.63±2.77	6.55±1.20
t	13.876	18.748	24.635	7.504
P	<0.001	<0.001	<0.001	<0.001

Table 3. Comparison on the occurrence rates of complications in perioperative period in two groups [n (%)]

Group	Hypoxemia	Lung infection	Atelectasis	Arrhythmia	Chylothorax	Occurrence rate
Control group (n=55)	4 (7.27)	5 (9.09)	6 (10.91)	2 (3.64)	3 (5.45)	36.36
Observation group (n=55)	1 (1.82)	1 (1.82)	4 (7.27)	3 (5.45)	0	16.36
x^2						5.666
P						0.017

the threshold for two scales, including mild anxiety/depression (50-59 scores), moderate anxiety/depression (60-69 scores) and severe anxiety/depression (≥70 scores) [10]. (5) Detection of inflammatory cytokines. 3 ml venous blood was collected in the morning 1 h before surgery and 1 d, 4 d and 7 d after surgery. After centrifugalization, the upper layer of serum was stored in the refrigerator of -20°C for test. The Enzyme-Linked Immunosorbent Assay (ELISA) method was used to measure the changes in concentration of interleukin-6 (IL-6) and tumor necrosis factor-α (TNF-α) in serum.

Statistical methods

The SPSS22.0 statistical software was used for experimental data; the enumeration data was represented by %; the x^2 test was used for comparison between groups; the measurement data was represented by mean ± standard deviation ($\bar{x}$ ± sd) with the data in conformity with normal distribution; the paired-samples *t* test was used for comparison before and after intervention in group; the independent-samples *t* test was used for comparison between groups; and the Mann-Whitney U test was used for the data not in conformity with normal distribution. *P*<0.05 meant that the data difference had statistical significance.

Results

Comparison of general data in two groups

There was no statistical difference in age, gender, TNM staging, cancer type, ASA (American Society of Anesthesiologists) grading and lung function in two groups (P>0.05), as shown in **Table 1**.

Comparison of recovery indexes after surgery in two groups

The first flatus time, extubation time, the first off-bed activity time and length of stay after surgery were respectively 1.70±0.53 d, 1.26±0.75 d, 12.63±2.77 d and 6.55±1.20 d in observation group receiving the FTS nursing concept and 3.17±0.58 d, 3.72±0.62 d, 30.41±4.58 d and 8.59±1.62 d in control group, showing *t*=13.876, *t*=18.748, *t*=24.635 and *t*=7.504. This indicated that the data difference had statistical significance between groups (*P*<0.001), as shown in **Table 2**.

Comparison on the occurrence rates of complications in perioperative period in two groups

The occurrence rate of complications in perioperative period was 16.36% in observation group, including 1 case of hypoxemia (1.82%), 1 case of lung infection (1.82%), 4 cases of atelectasis (7.27%) and 3 cases of arrhythmia (5.45%), and 36.36% in control group, including 4 cases of hypoxemia (7.27%), 5 cases of lung infection (9.09%), 6 cases of atelectasis (10.91%), 2 cases of arrhythmia (3.64%) and 3 cases of chylothorax (5.45%), showing x^2= 5.666 and *P*=0.017. The details are shown in **Table 3** and **Figure 1**. When the patients had 2 or more complications simultaneously in the test, the severer or severest one prevailed.

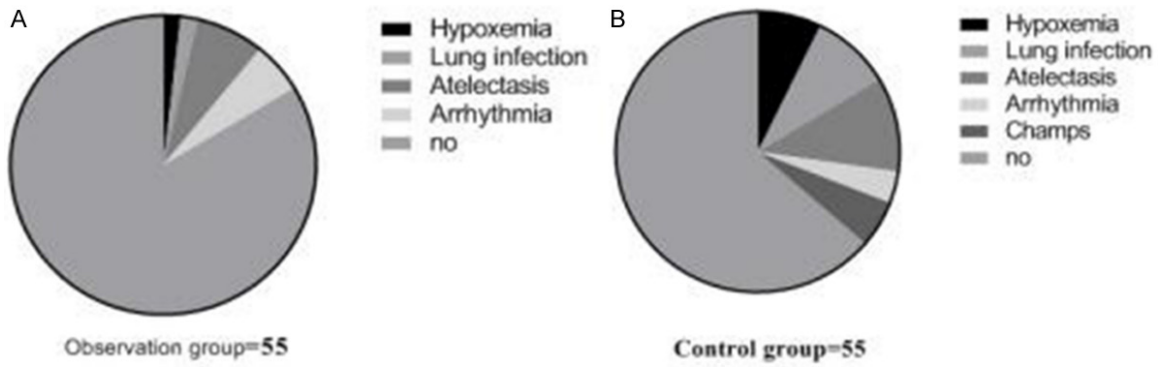

Figure 1. Comparison of complications in two groups. The occurrence rate of complications was 16.36% (9 cases) in observation group, including 1 case of hypoxemia, 1 case of lung infection, 4 cases of atelectasis and 3 cases of arrhythmia (A), and 36.36% (20 cases) in control group, including 4 cases of hypoxemia, 5 cases of lung infection, 6 cases of atelectasis, 2 cases of arrhythmia and 3 cases of chylothorax (B), showing x^2=5.666 and P<0.001.

Table 4. Comparison of VAS scores at different time points after surgery($\bar{x}$ ± s, score)

Time point	Control group	Observation group	*t*	*P*
6 h	2.17±0.84	0.89±0.36	10.387	<0.001
12 h	1.87±0.72	0.64±0.19	12.250	<0.001
24 h	1.77±0.65	0.53±0.17	13.687	<0.001
48 h	1.84±0.70	1.27±0.42	5.178	<0.001
72 h	1.96±0.57	0.74±0.28	14.247	<0.001

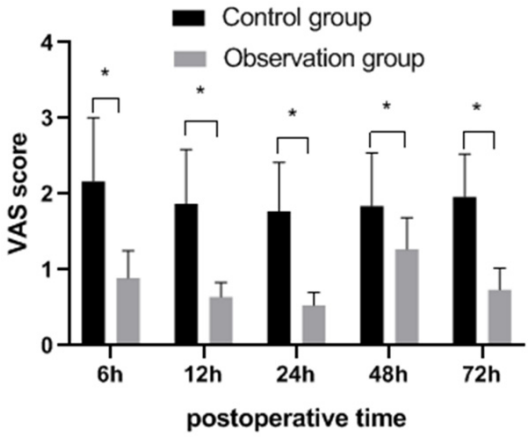

Figure 2. Comparison of VAS scores at different time points after surgery in two groups. The VAS scores of observation group 6 h, 12 h, 24 h, 48 h and 72 h after surgery were much higher than those of control group, which indicated that the data difference had statistical significance (P<0.001).

Comparison of VAS scores at different time points after surgery

The VAS scores of observation group were 0.89±0.36 6 h after surgery, 0.64±0.19 12 h after surgery, 0.53±0.17 24 h after surgery, 1.27±0.42 48 h after surgery and 0.74±0.28 72 h after surgery and those of control group were 2.17±0.84, 1.87±0.72, 1.77±0.65, 1.84±0.70 and 1.96±0.57 correspondingly, showing t=10.387, t=12.250, t=13.687, t=5.178, t=5.178 and t=14.247. This indicated that the data difference had statistical significance between groups (P<0.001), as shown in **Table 4** and **Figure 2**.

Level changes of inflammatory factors in serum in perioperative period in two groups

There was no statistical difference in TNF-α and IL-6 levels 1 d before surgery in two groups (P>0.05). The IL-6 level was 318.36±28.54 pg/ml 1 d after surgery, 410.30±32.52 pg/ml 4 d after surgery and 178.54±36.22 pg/ml 7 d after surgery in control group (P<0.001) and 217.63±29.77 pg/ml, 203.35±27.46 pg/ml and 101.58±19.27 pg/ml correspondingly in observation group (P<0.001), showing t=18.114, t=37.106 and t=13.912. The TNF-α level was 80.63±9.02 pg/ml 1 d after surgery, 97.25±16.24 pg/ml 4 d after surgery and 68.55±8.63 pg/ml 7 d after surgery in control group (P<0.001) and 9.44±6.30 pg/ml, 63.74±6.08 pg/ml and 54.47±5.92 pg/ml correspondingly in observation group (P<0.001), showing t=14.283, t=13.332 and t=5.978. The TNF-α and IL-6 levels after surgery were much higher than those before surgery in two groups, and these levels reduced gradually within a short time. The amplification for the concentration of inflammatory factors in observation group was lower than that in control group and the concentration could restore to the level before sur-

Table 5. Changes of TNF-α and IL-6 levels at different time frames of perioperative period in two groups ($\bar{x}$ ± sd, pg/ml)

Index	Group	1 d before surgery	1 d after surgery	4 d after surgery	7 d after surgery
IL-6	Control group (55)	74.63±16.25	318.36±28.54*	410.30±32.52*	178.54±36.22*
	Observation group (55)	76.20±15.74	217.63±29.77*	203.35±27.46*	101.58±19.27*
t	-	0.515	18.114	37.106	13.912
P	-	0.608	<0.001	<0.001	<0.001
TNF-α	Control group (55)	46.21±5.52	80.63±9.02*	97.25±16.24*	68.55±8.63*
	Observation group (55)	45.72±5.19	59.44±6.30*	63.74±6.08*	54.47±5.92*
t	-	0.392	14.283	13.332	5.978
P	-	0.696	<0.001	<0.001	<0.001

Note: *represents for the comparison before and after surgery in group, *P*<0.05.

Table 6. Comparison of SAS and SDS scores in perioperative period in two groups ($\bar{x}$ ± s, score)

Group	Before surgery		One week after surgery	
	SAS	SDS	SAS	SDS
Control group (n=55)	46.51±6.22	52.72±5.48	37.85±5.69*	42.36±5.05*
Observation group (n=55)	46.29±5.82	53.06±5.54	32.73±5.85*	37.43±4.64*
t	0.192	0.324	4.737	5.331
P	0.848	0.747	<0.001	<0.001

Note: *represents for the comparison before and after surgery in group, *P*<0.05.

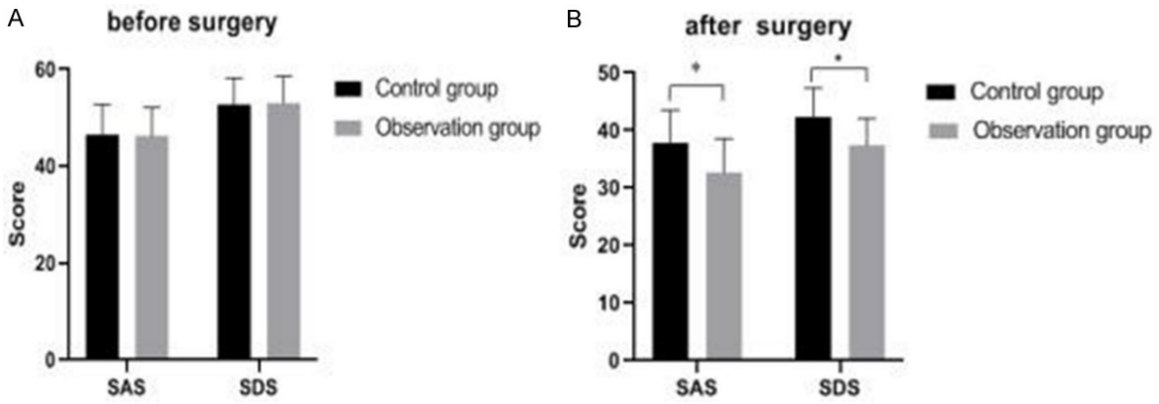

Figure 3. Comparison of SAS and SDS scores in two groups in perioperative period. As for the comparison of SAS and SDS scores in two groups before nursing (A), there was no statistical difference in these scores between groups (*P*>0.05). As for the comparison of SAS and SDS scores in two groups after nursing (B), the SAS and SDS scores of observation group were much lower than those of control group, which indicated that the difference had statistical significance between groups (*P*<0.001).

gery within a shorter time in observation group in comparison with that in control group, as shown in **Table 5**.

Comparison of anxiety and depression scores in perioperative period in two groups

There was no statistical difference in SAS and SDS scores in two groups before surgery (*P*>0.05). The SAS and SDS scores were respectively 32.73±5.85 and 7.43±4.64 in observation group and 37.85±5.69 and 42.36±5.05 in control group 7 d after surgery, showing t=4.737 and t=5.331. This indicated that the data difference had statistical significance between groups (P<0.001), as shown in **Table 6** and **Figure 3**.

Discussion

The lung cancer is a malignant tumor with the highest incidence rate in China, ranking first in

the incidence rates of malignant tumors in China. There is a higher cure rate for patients treated with radical surgery in early stage. And the pneumonectomy can achieve the anatomical resection in a real sense, with definite clinical efficacy [11]. But the lung cancer surgery is invasive, and most patients know little about surgical treatment, so they tend to have negative emotions, such as fear and anxiety, etc. Even if the surgical trauma has been reduced with the development of minimally invasive technology, the traumatic stress pain after surgery is also the main factor that affects the disease regression [12-14]. Besides, the risk of complications will increase due to improper methods of sputum excretion and breathing. And the pain, stress reaction, complications and negative mentality will form a vicious circle, which can influence the prognosis effect of patients after surgery. In view of this, it has become a research hotspot about the methods to implement pain intervention and complication prevention in perioperative period.

FTS is a surgical treatment scheme to reduce and relieve the stress reaction of patients to surgery and shorten the recovery process of body functions and the overall rehabilitation process after surgery through scientific nursing intervention in perioperative period [15]. The FTS concept has attracted the attention of people gradually in recent years. And the corresponding surgical treatment scheme in perioperative period emerges from the traditional nursing models gradually by combining the theoretical and technical features of minimally invasive surgery, anesthesiology and nursing, etc. to form an integrated and scientific intervention model. **Table 2** showed that the recovery time of gastrointestinal function, extubation time, the first off-bed activity time and length of stay in observation group were much shorter than those in control group, which implied that the FTS concept could promote the recovery of body functions in lung cancer patients after surgery. The fasting intervention before surgery in FTS concept can reduce the traumatic and stress reactions and protect the nutrition and metabolism of human body in a better way, which is more suitable for physiological needs and more conducive to the improvement of medical quality. Furthermore, the nutritional intervention and exercise training can also improve the body functions obviously in the early stage after surgery [16, 17]. The nurses shall remove the urinary catheter and assist the patients to get out of the bed and do exercise 1 d after surgery, which will not only eliminate the discomfort caused by the stimulation of urinary catheter, but also promote the discharge of chest fluid and thus shorten the using time of thoracic drainage tube. The off-bed activity can promote the recovery of gastrointestinal function, relieve the gaseous distention, accelerate the flatus, improve the lung function and decrease the occurrence rate of complications [18]. **Table 3** also verified that the occurrence rate of complications in observation group was much lower than that in control group, which implied that the FTS concept could improve the safety of lung cancer surgery in perioperative period.

Pain is the primary reason for stress reaction of patients after surgery. The body environment will change in a stress state, which leads to the abnormal metabolism of fat, protein and glucose. Especially, the retroregulation of hormones greatly reduces the synthetic amount of these 3 nutriments [19]. The postoperative pain will promote peripheral tissues to release a large number of cytokines, which manifests as the dramatic increase of their concentration in blood. Cytokines are micromolecular polypeptides synthesized and secreted by immune and non-immune cells. In most cases, the immune cells interact with each other under the mediation of cytokines and thus play a role in trauma, pain and other stress reactions. The surgical trauma causes the damage to body tissues and the hyperalgesic mediators produce proinflammatory cytokines, such as IL-6 and TNF-α, etc. Some researches indicated that IL-6 and TNF-α were closely related to the acceleration of pain in patients. Good postoperative analgesic nursing can relieve the excessive stress reaction, regulate the level of cytokines, balance the levels of inflammatory and anti-inflammatory factors and relieve the immunosuppression. Numerous studies showed that the intraoperative analgesia and postoperative patient-controlled analgesia can not only relieve the postoperative pain, but also reduce the level of proinflammatory factors in blood and thus inhibit the excessive stress reaction [20-22]. As shown in **Table 4**, the VAS scores in observation group were much lower than those in control group at different time frames 3 d after surgery. Meanwhile, as shown in **Table 5**, the IL-6 and TNF-α levels in blood in observa-

tion group were much lower than those in control group 7 d after surgery, which may be caused by the combination of intraoperative and postoperative analgesia in FTS concept. When the analgesics were used according to the depth of anesthesia in real time during surgery and the stress reaction caused by surgical trauma was relieved by combining patient-controlled analgesia pump and nonsteroidal anti-inflammatory drugs after surgery, the pain degree of patients was mild and the concentration of proinflammatory factors in blood reduced more obviously.

The negative mentality is an independent factor that induces the acute pain and other complications of surgery patients. The negative emotions caused by stress reaction can lead to the erethism of central sympathetic nerve and even affect the normal operation of hypothalamic-pituitary-adrenal axis, which will further cause the abnormal hormone secretion and increase the risk of complications [23]. The clinical practice verified that good psychological state was one of the elements to maintain individual health [24]. **Table 6** showed that the SAS and SDS scores in observation group were much lower than those in control group 7 d after surgery, which was consistent with the results of Dziedzic [25] et al. This implied that the psychological health education before surgery in FTS concept could help patients keep a positive and optimistic mentality. In this study, the psychological nursing before surgery was improved based on FTS concept, namely the health education after exact diagnosis. After the determination of surgical time, the psychological changes of patients were observed closely. The psychological features of patients were understood through active communication and their doubts were removed through encouraging and comforting words so as to relieve the negative emotions and enhance the confidence of patients in treatment. This study had two shortcomings. First, for the sake of statistics, only the severer complication was recorded for the calculation of total occurrence rate when the patients suffered from two or more complications simultaneously, so there may be some errors in safety assessment. Second, the living quality of patients could be affected by operative effect, postoperative recovery, emotional state and complications, etc., but the near-term and long-term living qualities of patients were not compared in this study. It is expected to fully evaluate the value of FTS concept to the living quality of patients treated with lung cancer surgery in future studies.

In conclusion, the application of FTS concept to perioperative nursing of lung cancer patients could relieve the pain after surgery, promote the recovery of body functions, reduce the level of inflammatory factors, shorten the recovery time of body functions after surgery and improve the safety.

Disclosure of conflict of interest

None.

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