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Original Article

Stabilization technology alleviates psychological stress in patients with esophageal carcinoma during perioperative period

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Abstract: Aims and Objectives: To evaluate the effect of stabilization technique on psychological stress in esophageal cancer patients during perioperative period. Background: Esophageal carcinoma is one of common malignant tumors involving with digestive system with the 8th highest incidence among all types of cancer worldwide. Methods: In total, 111 patients diagnosed with esophageal squamous cancer were divided into the intervention (n=57) and control groups (n=54). Patients in the control group underwent operation and routine care, and those in the intervention group additionally received psychological intervention. Another 120 healthy subjects served as healthy controls only receiving mental status assessment using the Hamilton Anxiety Scale (HAMA), Hamilton Depression Scale (HAMD) and Pittsburgh sleep quality index (PSQI). Results: Postoperative scores in the intervention group were significantly lower than those in the control group. In the intervention group, HAMA and HAMD scores significantly changed after surgery, whereas only HAMA score significantly varied in the control group. In the intervention group, except for "use of medicine" and "daytime dysfunction", postoperative PSQI scores of other factors were significantly lower with shorter bed time and length of hospital stay. Approximately 82.8% of patients in the intervention group expectorated within postoperative 48 h and 28.1% for the control group. The scores of appetite, pain, family understanding and cooperation and disease knowledge in QOL were significantly higher in the intervention group. Conclusion: Stabilization technique significantly alleviated the psychological stress of esophageal carcinoma patients and accelerated postoperative recovery.

Keywords: Stabilization technique, esophageal carcinoma, perioperative period, psychological stress, psychological intervention

Introduction

Esophageal carcinoma is one of common malignant tumors involving with digestive system. Approximately 460,000 patients have been newly diagnosed with esophageal carcinoma each year [1]. In China, approximately 150,000 patients have died from esophageal carcinoma yearly, accounting for 25% of all types of malignant tumors [2]. The incidence of esophageal carcinoma is the highest in the population aged above 40 years, especially in males [3].

Epidemiology data revealed that risk factors of esophageal carcinoma mainly include familial inheritance, drinking alcohol, smoking and special diet, etc [4]. The incidence of esophageal carcinoma is closely correlated with the characteristics, behaviors and psychological stress of patients along with the incidence, progress and prognosis of diseases [5-9].

In clinics, above 95% of cases have evolved into the middle- and advanced-stage with a 5-year survival as low as 15% upon their first admission [10]. At present, surgical approach remains primary treatment of early esophageal carcinoma [11]. Poor prognosis of esophageal cancer causes severe threats to patients [12].

To achieve the goal of radical treatment, total gastrectomy and gastric resection are adopted and the retroperitoneal reconstruction may be considered. However, these methods tend to lead to severe surgical trauma and digestive dysfunction. Consequently, these patients pre-

sent with a high degree of psychological stress towards surgical risk, postoperative pain, difficulty in feeding and postoperative complications, etc. During perioperative period, patients are likely to show fear, anxiety and depression, thereby increasing the risk and incidence of postoperative complications [13]. In addition, the dietary habit dramatically changes, which severely affects the postoperative quality of life in patients with esophageal carcinoma. At present, how to improve the quality of life in esophageal cancer patients captivates widespread attention [14].

Previous studies have demonstrated that the diagnosis and treatment of cancer illnesses may provoke a series of psychological stress, which can be alleviated by psychological intervention. However, majority of present researches focus on the effect of psychological intervention upon psychological stress after surgery or chemotherapy. Perioperative evidence remains extremely rare. Moreover, most current studies analyzed psychological intervention delivered during one single stage of treatment, whereas little evidence reveals the effective measures taken during the integrated course of treatment. How to apply psychological intervention into different stages of cancer, improve clinical efficacy and promote postoperative recovery via endocrine system and immune response remain to be further elucidated.

In this study, the effect of stabilization technique upon psychological stress of esophageal carcinoma patients during perioperative period was evaluated, offering clinical evidence for establishing standardized criteria of psychological intervention for esophageal carcinoma patients perioperatively.

Methods

This work was supported by the Ethic Committee of People's Liberation Army General Hospital.

Study subjects

Between May 2011 and June 2013, 120 patients pathologically diagnosed with esophageal squamous cancer in our hospital were randomly assigned into the intervention and control groups. Nine cases discontinued or withdrew from this study (1.2.4 criteria). Finally, 57 cases were enrolled in the intervention group and 54 in the control group. Another 120 subjects were recruited as healthy controls, who merely received psychological evaluation. In the control group, patients underwent surgery and conventional nursing, and those in the intervention group were additionally given with psychological intervention. Informed consents were obtained from both patients and their family relatives prior to study.

Diagnostic and grouping criteria

Diagnostic criteria of esophageal carcinoma

International diagnostic criteria were adopted [15]: (1) Difficulty in swallowing; (2) Endoscopic examination and pathological diagnosis.

Clinical observation and inclusion criteria

The subjects pathologically diagnosed with esophageal squamous cancer, middle-stage, and no distal metastasis of malignant tumors or abdominal adhesion and those who could communicate and with satisfactory compliance.

Clinical observation and exclusion criteria

(1) Having a history of mental illnesses; (2) Use of psychological agents prior to operation; (3) Receiving chemotherapy, radiotherapy, biological and cortical hormone before surgery, which may affect immune function; (4) Complicated with other severe physical diseases; (5) Cognitive function disorders.

Discontinue and withdraw

(1) Those failing to obey the treatment plan or did not complete the whole treatment; (2) Those having serious adverse events during the course of treatment; (3) Poor treatment compliance. The situations above and the causes were recorded.

Intervention methods

"One-to-one" psychological intervention mode was adopted. The subjects involved in the course of intervention included patients and their relatives.

Target of intervention: (1) Physiological/physical stabilization; (2) Psychological/emotional

stabilization; (3) Social and personal stabilization.

Target of intervention: (1) Master effective measurements; (2) Obtain control ability and sense of safety; (3) Take active behaviors to accelerate recovery.

Technique method: stabilization technique was applied to deliver psychological intervention of esophageal carcinoma during perioperative period.

Stabilization technique takes into effect on the basis of establishing stable relationship. It aims to achieve stable status mentally and physically, assist the patients to explore positive resources, increase their control ability and strengthen positive emotion, thereby reconstructing basic sense of security. In addition, it also enhances the tolerance of patients towards trauma and accelerates postoperative recovery.

The 1st stage: preoperative stabilization intervention

Prior to surgery, patients have high expectation of surgical efficacy and success. Meanwhile, they also express concerns about surgical risk, trauma, pain and even surgical accidents. During this stage, patients are extremely hesitant about whether choosing the surgical plan or not.

Establish sound treatment relationship: (1) Relationship establishment: Doctors and nurses should make a self-introduction to the patients, let patients understand they are ready to help, and attempt to establish mutual trust and consolidate mutual relationship. (2) Agreement and informed consents: Informed consents should be signed before operation. Confidential agreement should be signed by the patients. Doctors should design plans and objectives of psychological intervention along with patients. (3) Evaluation and listening: During preoperative psychological evaluation, doctors should actively listen to the patients' problems and concerns and then establish proper treatment.

Health education: (1) Understanding of surgical procedures: physicians should inform the patients with surgical methods and procedures and let them understand the knowledge of this surgery. (2) Analysis of preoperative psychological reactions: preoperatively, each patient may present with fear, anxiety and insomnia. Preoperative psychological stress should be rationalized accordingly. (3) Postoperative physiological and psychological reaction: physicians should provide instructions regarding postoperative pain, diet and expectoration and enhance patients' consciousness of postoperative recovery.

Social support: (1) Evaluation of social support system: financial status and family resources of the patients were evaluated. (2) Instructing the family relatives to offer assistance: physicians should guide their relatives how to understand patients' psychological reactions and effectively communicate with the patients and deliver concrete assistance. (3) Encouraging patients to actively seek support: doctors should encourage patients to express and oust negative feelings, let them feel beloved and respected by others, instruct and encourage them to seek support [16], such as actively communicate with other patients, participate in the anti-esophageal carcinoma group, form a microenvironment for this cancer population and enhance their confidence.

Relaxing training: Relaxing training program included three sections: respiration training, progressive muscle training and meditation. First, doctors explained and taught patients how the treatment proceeded in a "one-to-one" pattern. Patients were taught to conduct exercises using "portable relaxing pillow" 1-2 times daily. "Portable relaxing pillow" is a patented product, equipped with music player.

Patients could listen to the music for relaxation in the ward before sleep and surgery. Psychological doctors should teach and instruct patients to complete relaxing training.

The 2nd stage: stabilization intervention following surgery

For postoperative pain, expectoration and difficulty in eating, stabilization technique was selectively adopted according to patients' individual situations including a variety of sections, deep respiration training, and progressive muscle relaxing training, meditation, mindfulness training, container/deposit box technique,

Table 1. Comparison of general data between two groups

Parameters	Control group (n=54)	Intervention group (n=57)	Healthy controls (n=120)	χ^2	P
Gender (male/female)	38/16	40/17	89/31	1.767	>.05
Age				7.104	>.05
<50 years	3	5	11		
50 years-	22	20	43		
60 years-	24	28	57		
≥70 years	5	4	9		
Education level				1.563	>.05
Senior high school and below	34	35	73		
College and above	20	22	47		
Familial inheritance				2.128	>.05
Yes	4	3			
No	50	54			
Smoking				9.226	>.05
Yes	35	31			
No	19	26			
Drinking alcohol				7.042	>.05
Yes	27	26			
No	27	31			
Dietary habit				10.364	>.05
Inclination to hot, hard, bacon and smoked-cooked food	21	21			
No special habit	33	36			

remote technique, safe island technique and light bar technique.

Evaluation of intervention effect

Study tool

(1) Hamilton Anxiety Scale (HAMA), consisting of 14 items, was used for anxiety evaluation [17, 18]. Score range from 0 to 4: 0 denotes no symptoms; 1 slight; 2 moderate; 3 severe and 4 extremely severe symptoms. According to the National Assessment Coordination Group, total score >29 indicates severe anxiety; >21 indicate obvious anxiety; >14 denotes anxiety; >7 potential anxiety; <6 no anxiety.

(2) Hamilton depression Scale (HAMD) [17, 18] was adopted in the assessment of depression. In this study, 24-item scale was utilized. A majority of HAMD items utilize a scale of 0-4: 0 denotes no symptoms; 1 slight; 2 moderate; 3 severe and 4 extremely severe. Several items utilize a scale of 0-2: 0 denotes no symptoms, 1 slight to moderate and 2 represents severe symptoms. According to the criteria proposed by Davis JM, a score >35 indicates severe depression; >20 slight or moderate depression and <8 denotes no depression.

(3) Pittsburgh Sleep Quality index (scale) was utilized in the evaluation of sleep quality. PSQI scale consists of 19 self-assessment items and 5 other-evaluated items. Eighteen items involve with 7 factor scores including subjective sleep quality, sleep latency time, sleep time, sleep efficiency, interfering factors of sleep, use of hypnotic drugs and daytime function disorders. Score scale of 0-3 was for each item. Total PSQI score of each item ranges from 0 to 21. The higher the score is, the worse the sleep quality is. PSQI score ≥7 is considered as the cut-off point for evaluating sleep problems. The score of one single item >1 indicates sleep problems [19].

(4) Quality of life (QOL) grading: in 1990, the national grading standard was drafted in China [20] and it consists of 12 sub-scales. Quality of life classification: 1 denotes the worst and 5 the best. The total score is 60. QOL score <20 denotes extremely poor, 21-30 poor, 31-40

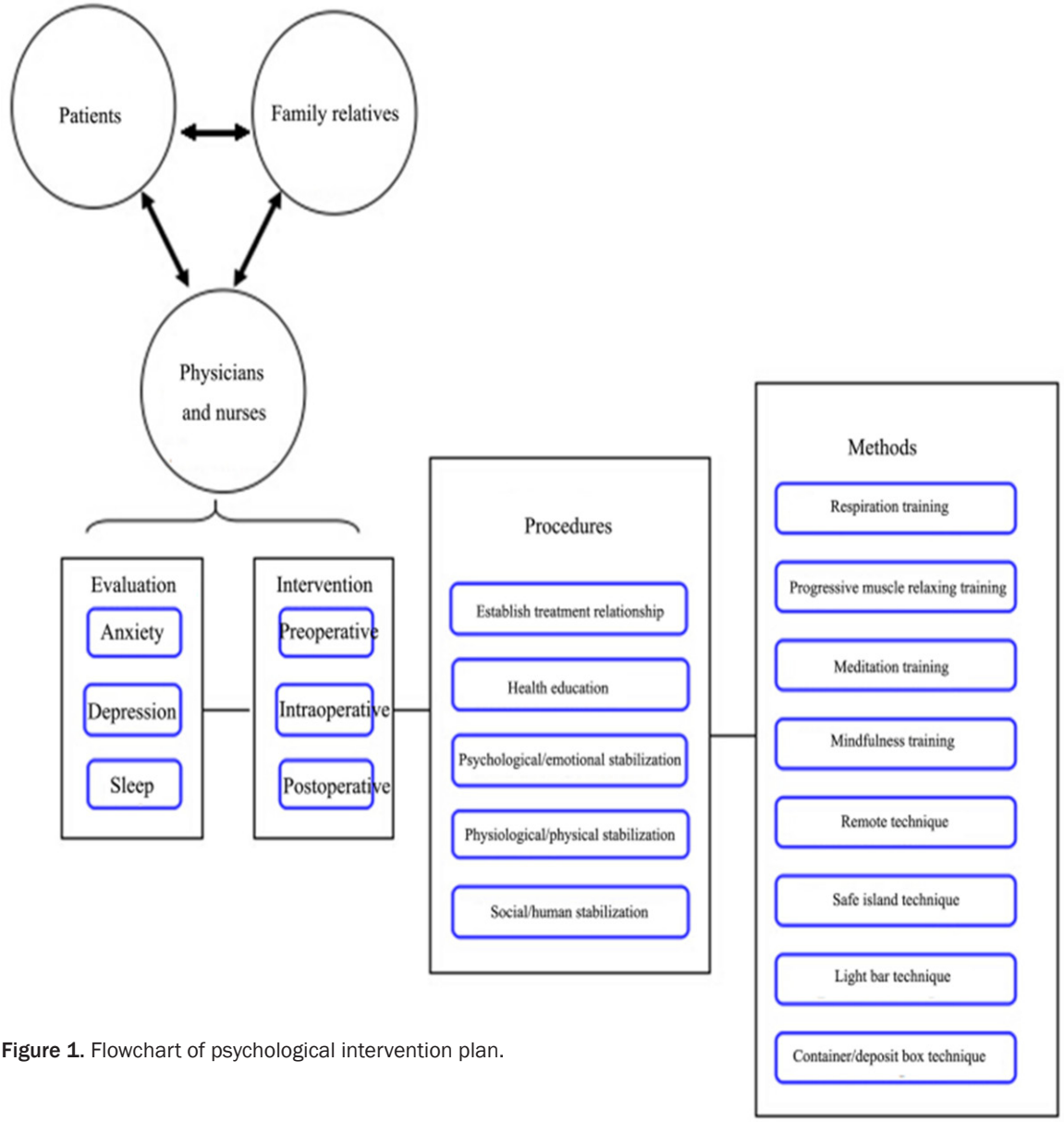

Figure 1. Flowchart of psychological intervention plan.

average, 41-50 relatively good, 51-60 good. The higher the score is, the better the quality of life is.

Evaluation of intervention effect

At 7 days after operation, the quality of life was evaluated by the quality of life grading methods proposed by China [20], appetite, pain, family understanding and cooperation and understanding of disease were selected. The time of analgesia use, postoperative self-expectoration time, bedtime and length of hospital stay were recorded between two groups. The incidence of postoperative complications between two groups was statistically compared to evaluate the influence of stabilization technology upon postoperative recovery in patients with esophageal carcinoma. Measurement data were analyzed using SPSS 17.0 statistical software package.

Results

Clinical data

A total of 231 subjects were enrolled, aged between 41-77 years. In the intervention group, mean age was (56.16±9.84) years, (55.21±10.10) years in the control group and (56.04±

Table 2. Comparison of preoperative depression and anxiety grading between esophageal carcinoma patients and healthy controls (mean ± SD)

Category	Esophageal carcinoma group (n=111)	Healthy controls (n=120)	t	P
HAMD	12.66±5.34*	4.15±2.30	1.341	P<.05
HAMA	22.39±11.07*	6.85±3.14	1.772	P<.05

Note: HAMD, Hamilton depression Scale; HAMA, Hamilton Anxiety Scale. *Denotes statistical significance compared with healthy controls group.

9.53) years for healthy controls. No statistical significance was observed among three groups in terms of gender, age, degree of education, familial factors, history of smoking and drinking alcohol and dietary habits, etc. (all P>0.05). Among them, 6.31% had a familial inheritance, 59.46% with a long-time habit of smoking, 47.75% with 47.75% and 37.84% had a diet habit of hot, hard, bacon and smoked cooked food, as illustrated in **Table 1**. Preliminary establishment of psychological intervention plan is illustrated in **Figure 1**.

Intervention effect of stabilization technique on depression and anxiety

Evaluation results of preoperative depression and anxiety

HAMD and HAMA evaluation revealed that HAMD and HAMA scores in the esophageal carcinoma patients were significantly higher compared with those in their healthy counterparts (all P<0.05), as illustrated in **Table 2**.

Comparison of preoperative and postoperative depression and anxiety grading

Group comparison

Preoperative HAMD (t=0.233, P>0.05) and HAMA scores (t=0.262, P>0.05) did not significantly differ between the intervention and control groups. However, both HAMD (t=1.517, P<0.05) and HAMA scores (t=1.811, P<0.05) significantly differed between two groups after surgery.

Inner-group comparison

In the intervention group, postoperative HAMD (t=1.441, P<0.05) and HAMA scores (t=1.603, P<0.05) significantly differed from preoperative scores. In the control group, both HAMD (t=0.246, P<0.05) and HAMA scores (t=1.480, P<0.05) were considerably changed after surgery (**Table 3**).

Effect of stabilization technique upon sleep quality

Evaluation of preoperative sleep quality

PSQI scale revealed that sleep quality score in patients was significantly higher compared with that of healthy counterparts (t=3.871, P<0.05). Except "use of hypnotic drugs" and "daytime function disorders", preoperative scores of alternative factors significantly differed between two groups before surgery (**Table 4**).

Comparison of preoperative and postoperative sleep quality between two groups

Group comparison

Preoperative sleep quality scores of each factor did not significantly differed between the intervention and control groups, except "hypnotic drugs" and "daytime function disorders", postoperative scores of alternative factors significantly differed between two groups.

Inner-group comparison

In the intervention group, except "use of hypnotic drugs" and "daytime function disorders", the scores of alternative factors significantly differed before and after operation. However, no statistical significance was observed in the control group (**Table 5**).

Effect of stabilization technique upon postoperative recovery

Time of postoperative analgesia and self-expectoration

Time of postoperative analgesia in the intervention group was significantly shorter compared with that in the control group (t=12.474, P<0.01), as shown in **Table 6**. The time of self-expectoration in the intervention group was significantly shorter than that in the control group. In the intervention group, 82.8% of patients had self-expectoration within 48 h after surgery and 28.1% in the control group (χ^2=8.7263, P<0.01), as illustrated in **Table 7**.

Table 3. Comparison of depression and anxiety grading in esophageal carcinoma patients before and after surgery between two groups (mean ± SD)

Group	No. of cases	Before surgery		After surgery	
		HAMD	HAMA	HAMD	HAMA
Intervention group	57	12.74±3.52*	23.52±6.83*	5.18±1.63,	9.71±2.40,
Control group	54	11.62±3.14	21.83±7.73*	9.66±2.71	15.68±4.75

Note: *denotes statistical significance before and after surgery in the same group; HAMD: Hamilton depression Scale; HAMA: Hamilton Anxiety Scale.

Table 4. Comparison of preoperative sleep quality grading between esophageal carcinoma patients and healthy controls (mean ± SD)

Parameters	Esophageal carcinoma group (n=111)	Healthy controls (n=120)	t	P
Sleep quality	1.07±0.72*	0.62±0.18	5.743	<.005
Time of falling sleep	1.61±0.69*	0.87±0.29	7.834	<.005
Sleep time	1.13±0.51*	0.55±0.30	5.391	<0.05
Sleep efficiency	0.91±0.53*	0.11±.05	8.088	<0.05
Sleep disorder	1.39±0.74*	0.45±0.27	6.213	<0.05
Hypnotic drugs	0.28±0.26	0.06±0.02	2.774	>0.05
Daytime function	0.82±0.37	0.72±0.33	1.031	>0.05
Total score	7.50±1.78*	3.67±0.74	3.712	<0.05

Note:*Denotes statistical significance compared with healthy controls group.

Table 5. Comparison of sleep quality grading in esophageal carcinoma patients before and after surgery between two groups (mean ± SD)

Parameters	Before surgery		After surgery	
	Intervention group (n=57)	Control group (n=54)	Intervention group (n=57)	Control group (n=54)
Sleep quality	1.18±0.82	1.25±0.51	0.74±0.41*,#	1.08±0.47
Time of falling sleep	1.59±0.61	1.41±0.88	0.93±0.74*,#	1.57±0.94
Sleep time	1.19±0.56	1.15±0.53	0.59±0.29*,#	1.10±0.51
Sleep efficiency	0.97±0.54	0.94±0.40	0.10±0.02*,#	0.68±0.35
Sleep disorder	1.33±0.60	1.09±0.62	0.67±0.28*,#	0.83±0.57
Hypnotic drugs	0.23±0.03	0.36±0.12	0.22±0.16	0.33±0.19
Daytime function	1.11±0.73	0.82±0.59	0.74±0.63	0.74±0.61
Total score	7.26±1.62	7.56±1.81	3.97±1.34*,#	6.44±1.66

Note: *denotes statistical significance compared with control group after surgery; #represents statistical significance in the intervention group before and after surgery.

Bedtime and length of hospital stay

The time of bed stay (t=13.058, P<0.01) and length of hospital stay (t=12.274, P<0.01) in the intervention group were significantly shorter than those in the control group (**Table 8**).

Effect of stabilization technique upon postoperative 7-day quality of life

The scores of appetite, pain, family understanding and cooperation and understanding of disease significantly differed between two groups, as illustrated in **Table 9**.

Effect of stabilization technique upon postoperative complication

Postoperative complications mainly included anastomosis stenosis, pulmonary infection and anastomosis cannula. In the intervention group, 11 cases presented with postoperative complications with an incidence of 19.3%, whereas 20 patients and 37.0% in the control group. The incidence of postoperative complications did not significantly differ between two groups (χ^2= 3.4853, P>0.05), as illustrated in **Table 10**.

Preliminary establishment of psychological intervention for esophageal carcinoma patients during perioperative period.

Discussion

Esophageal carcinoma is one of common malignant tumors involving with digestive system with the 8th highest incidence among all cancers. Approximately 460,000 patients have been newly diagnosed with esophageal carci-

Table 6. Comparison of postoperative time of analgesia use in patients between two groups

Group	Number of cases (n)	Time of use (h)
Control group	54	60.0±17.4*
Intervention group	57	26.3±8.1

Notes: *Denotes statistical significance compared with intervention group.

Table 7. Comparison of postoperative time of self-expectoration in patients between two groups

Group	Time of self-expectoration			
	24 h	48 h	72 h	96 h
Intervention group (n=57)	13*	34*	8*	2*
Control group (n=54)	6	9	19	20

Notes: *Denotes statistical significance compared with control group.

noma each year (1). In China, approximately 150000 patients died from esophageal carcinoma each year, accounting for 25% of all types of malignant tumors (2). Accumulated evidence has demonstrated that psychological and social factors are associated with the incidence, progress and prognosis of esophageal carcinoma.

Recently, whether psychological intervention could prolong the survival of cancer patients remains debatable. A substantial amount of relevant studies have been conducted [21] to directly push forward the development of the mode of psychological intervention. Recent research found that psychological and social interventions are able to alleviate mental disorders and physical symptoms in cancer patients [22], and enhance a series of treatment-related behaviors, such as balanced diet and physical exercises, etc. In particular, it could significantly increase the patients' compliance to the clinical treatment [23]. Consequently, psychological intervention plays a vital role in the treatment and recovery of cancer patients.

Stabilization technique is designed to achieve stable status mentally and physically, assist the patients to explore positive resources, increase their control ability and strengthen positive emotion, thereby reconstructing the basic sense of security of patients with esophageal carcinoma. During perioperative period, stabilization technology acts as the basis of integrating trauma and re-orientation, assist the patients to overcome anxiety and fear, and actively take measures to combat the disease and cooperate with the treatment.

Effect of stabilization technique upon emotion and sleep

In the diagnosis and treatment of cancer diseases, most patients present with heavy psychological pressure, some of them display obvious anxiety, depression and other psychological disorders, especially approaching the surgery. At present, surgical approach remains the major treatment of early-stage esophageal carcinoma (4). Esophageal carcinoma surgery is likely to cause severe trauma and psychological stress. The patients are concerned about whether the surgery will be successfully performed, the postoperative pain and whether the feeding difficulty could lead to surgical complications. All these feelings can provoke fear, anxiety, depression and negative emotion, thereby enhancing the surgical risk and the incidence of postoperative complications [13]. Meanwhile, pain, fatigue, nausea vomiting and other physical reactions directly affect the postoperative quality of life. In addition, even after the surgery, the patients might worry about the recurrence of cancer and the poor prognosis of functional rehabilitation, which may cause anxiety and negatively affect the sleep quality.

The outcomes in this study noted that esophageal carcinoma patient stay in intensive stress status with many psychological problems, especially the depression, anxiety and sleep problem. Stabilization technique could significantly improve patients' psychological status. Compared with healthy subjects, esophageal carcinoma patients present with a higher level of anxiety and depression before the surgery. The results in this study revealed that patients in the intervention group present with significantly decreased level of anxiety and depression, suggesting that stabilization technique is capable of alleviating and even eliminating the negative emotion in patients during perioperative period. Moreover, postoperative anxiety level in the control group is significantly reduced, whereas depression level does not change, probably because the surgery is the source of stress and the anxiety level declines accordingly after the surgery. HAMA score significantly differs between the intervention and

Table 8. Comparison of postoperative bedtime length of hospital stays in patients between two groups (mean ± SD)

Category	Intervention group (n=57)	Control group (n=54)	t	P
Time of bed stay (h)	48.2±2.5*	60.5±7.4	12.805	<0.01
Length of hospital stay (d)	17.3±2.2*	23.2±3.2	13.650	<0.01

Notes: *Denotes statistical significance compared with control group.

Table 9. Comparison of postoperative 7-day quality of life in patients between two groups (mean ± SD)

Parameters	Intervention group (n=57)	Control group (n=54)	t	P
Appetite score	3.2±0.6*	2.4±0.6	1.784	<0.05
Pain score	2.8±0.4*	1.8±0.7	1.723	<0.05
Family understanding and cooperation	3.7±0.8*	2.1±0.8	1.776	<0.05
Understanding of disease	4.0±0.9*	2.4±0.7	1.804	<0.05

Notes: *Denotes statistical significance compared with control group.

Table 10. Comparison of postoperative complications in patients between two groups [n (%)]

Group	Anastomosis stenosis	Pulmonary infection	Anastomosis cannula
Intervention group (n=11)	4 (7.0)*	5 (8.8)*	2 (3.5)
Control group (n=20)	7 (13.0)	10 (18.5)	3 (5.5)

Notes: *Denotes statistical significance compared with control group.

control groups, indicating that the patients present with high levels of anxiety without psychological intervention. For those receiving no psychological intervention, the degree of depression is not significantly alleviated, possibly because of the long-term pressure on postoperative recovery and clinical prognosis.

In this study, preoperative sleep quality in esophageal carcinoma patients is significantly lower compared with that in healthy counterparts, which is correlated with the source of surgical stress. It is mainly characterized as sleep quality, time of falling asleep, sleep time, efficiency and disorders. Psychological intervention is able to significantly improve postoperative sleep quality in patients. Moreover, stabilization technique could effectively improve patients' sleep quality, time of falling asleep, sleep disorder and enhance overall sleep quality.

The factor of "hypnotic drugs" does not significantly differs between two groups, mainly because patients have poor sleep quality before operation and they are reluctant to receive hypnotic drugs, suggesting that psychological intervention plays a pivotal role in improving preoperative sleep quality. The factor of "daytime function disorders" does not significantly differ, which results from leaving off work and reduced locomotor activity.

Effect of stabilization technique upon postoperative quality of life

Esophageal carcinoma patients not only present with pain and fatigue, but also the symptoms of feeding difficulty and hoarseness, etc. Previous studies revealed that compared with healthy subjects, the physical, social and emotional function and the quality of life significantly decline in esophageal carcinoma patients [24-26]. Since the incidence of difficult feeding after surgery, the physicians should educate the patients to change their feeding habits and ease their psychological stress while feeding by using stabilization technique, which play a vital role in postoperative recovery of normal appetite.

In this study, the scores of appetite, pain, family understanding and cooperation and understanding of diseases in the intervention group are significantly increased compared with those in the control group, indicating stabilization technique can significantly enhance postoperative quality of life.

Social support can render information, comfort and assurance to the individuals [27], and family support is the basic form of social support. Physicians and nurses and patients' relatives collectively construct the complete social support system. Doctors and nurses deliver conventional nursing care, help family relatives to understand patients' psychological reactions, instruct them to offer psychological support

and encourage the patients to express negative emotion. Therefore, nursing staff plays a pivotal role in postoperative recovery and quality of life.

Effect of stabilization technique upon analgesia time

Approximately 70% of esophageal carcinoma patients present with serious and persistent pain. Postoperative cough and shaking the back may worsen incisional pain. Hence, the patients are reluctant to cooperate with the nurses and they avoid cough, deep breathing and changing body postures, etc. Excessive dependence on analgesia agents inhibit the cough reflex and respiration central system, possibly leading to pulmonary infection and pulmonary atelectasis.

Stabilization technique could reduce analgesia time in the intervention group. For those receiving light bar technique, they can self-regulate the pain and raise their consciousness of active recovery.

Effect of stabilization technique upon postoperative time of self-expectoration

During chest open surgery, severe incisional pain, placement of multiple catheters and insufficient strength may make the patients unwilling to receive recovery training, which probably leads to secondary infection or apnea. Deep breathing exercises and cough could fill the lung with gas, expand pulmonary tissues and improve lung function [28]. Previous research revealed that [29] the most painful event for esophageal carcinoma patients is expectoration, followed by pain. In spite of preoperative instruction regarding the importance of self-expectoration, patients are reluctant to attempt to expectorate due to severe pain.

In this study, stabilization technique is able to effectively eliminate the patients' fear about expectoration. The time of self-expectoration in the intervention group is significantly earlier compared with that in the control group.

Effect of stabilization technique upon bedtime and length of hospital stay

Previous studies revealed that standard recovery training, psychological intervention and balanced diet can collectively prevent the incidence of postoperative complications, raise the self-awareness of health, elevate self-nursing capability and promote postoperative recovery [30]. Stabilization technique could significantly shorten the postoperative bed time and length of hospital stay, beneficial to postoperative recovery.

Effect of stabilization technique upon postoperative complication

Since most esophageal carcinoma patients are deprived of nutrition, nutritional support should be delivered actively and effectively. Physicians should instruct patients to have the diet containing high-energy, -protein and -vitamin, which enhance body immunity and decrease the incidence of postoperative complication and infection [28]. Improper diet habit may cause hemorrhage and anastomosis cannula. The volume and strength of stomach are reduced, which inhibits the recovery of intestinal function. Consequently, nutritional support plays a pivotal role in the wound healing and postoperative recovery. The patients should absorb sufficient and balanced nutrients, cultivate healthy dietary habit, increase the frequency of meals and reduce the amount of each meal [31], which can accelerate the recovery of intestinal function, guarantee the sufficient requirement of water, energy and protein, promote the wound healing and prevent the incidence of anastomosis cannula [32, 33]. In this study, however, the incidence of postoperative complications does not significantly differ between two groups. It probably results from the complex influencing factors affecting the postoperative complications and relatively small sample size. Therefore, a large sample-sized study should be urgently conducted.

Study limitations

At present, comprehensive evaluation indexes of psychological stress covering biological, psychological and behavioral aspects are lacking. The measurement tool available is too complicated and time-consuming for hospitalized patients. A more convenient and suitable psychological evaluation system and measurement tool remains to be explored.

Since "one-to-one" psychological intervention pattern is utilized in this study, the sample size is relatively small because of time and experi-

mental condition limitations. On the basis of this study, a standardized operation procedure, which is suitable for a large population, should be established for both patients and their family relatives. Moreover, long-term effect of psychological intervention should be followed up.

Operation instructions should be unified and audio and video materials related to stabilization technology should be complied to facilitate the widespread application of this technique into clinical practice. How to integrate stabilization technology with cognitive behavior treatment, narrative therapy and alternative techniques remains to be elucidated.

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Disclosure of conflict of interest

None.

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