Effects of Video Combined with the Teach-Back Method on the Respiratory Function Exercise of Patients Undergoing Thoracotomy

Heping Wu*, Juan Yuan#, Lihong Qiu#

Sun Yat-sen University Cancer Center, Guangzhou, China
Email: #641922356@qq.com

Abstract

Objective: To explore the effect of video combined with the teach-back method on respiratory function exercise in patients undergoing tumor thoracotomy. **Methods:** Eligible patients undergoing thoracotomy for tumor were selected from the thoracic surgery at a level-A tertiary hospital between August 2021 and December 2021 and included in the control group and the observation group (40 patients in each group). To prevent two groups of patients from interacting with each other, the thoracic surgery ward I was distinguished as the control group, which was adopted by the routine instruction. Based on routine instruction, the thoracic surgery ward II conducted respiratory function exercise instruction by video combined with the teach-back method to compare the two groups' compliance with respiratory function exercise, complication rates, and patient satisfaction. **Results:** The patient compliance with respiratory function exercise in the observation group was significantly higher (P < 0.05) and the rate of pulmonary complications in the observation group was lower (P < 0.05) than that in the control group, while the observation group had a high level of satisfaction (P < 0.05). **Conclusion:** Taking video combined with the teach-back method, an effective health education method, can improve the compliance of the respiratory function exercise of patients undergoing thoracotomy for tumor and promote the recovery of pulmonary function to reduce the incidence of postoperative pulmonary complications so as to improve patient satisfaction.

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*First author.
#Co-corresponding authors.

1. Introduction

Thoracotomy is a relatively common procedure in thoracic surgery, which is time-consuming and challenging [1]; postoperative patients have increased sputum in the respiratory tract and decreased clearance ability, which can easily cause a series of complications such as pulmonary infection [2]. Postoperatively, respiratory function exercises should be developed, which play a part in improving respiratory function, enhancing treatment compliance, and reducing complications [3]. Generally, traditional health education is unidirectionally input to patients through oral instruction by nurses and by issuing promotional drawings, while the acceptance and mastery of patients are often ignored by nurses [4].

The teach-back method is a bidirectional mode of information delivery, in which after one-to-one and hand-to-hand demonstration, nurses ask patients to retell and demonstrate what they have learned in their language, and then give them guidance and correction for the wrong or biased. In this way, it reduces the risk of misinterpretation of information [5]. Nowadays, the domestic literature [6] [7] shows that the teach-back method has been commonly applied in health education of patients undergoing surgery for esophageal and lung cancer with achieving some results. As people's short-term memory is limited, it is a direct and convenient way to employ video instruction to strengthen patients' memory of health instruction information [8]. Watching videos requires more sensory organs compared with language teaching. For patients, video mode education is more receptive, and patients can watch videos repeatedly, which is more conducive to memory learning [9]. To enhance patients' compliance with respiratory function exercises, reduce clinical complications, and improve their satisfaction, the study applied video combined with the teach-back method to the instruction of respiratory function exercise after tumor thoracotomy with satisfactory clinical results, which are reported as follows.

2. Objects and Methods

2.1. Objects

A total of 80 patients hospitalized and undergoing thoracotomy in the thoracic surgery ward I and ward II at Tumor Hospital Affiliated with Sun Yat-Sen University from August 2021 to December 2021 were randomly selected for the study. The study was approved by the hospital ethics committee. Patients signed the informed consent form. Inclusion criteria: 1) The patients who are intended to undergo a thoracotomy for the tumor; 2) Patients who have some comprehension and communication skills and can communicate normally; 3) Patients who have no previous history of psychiatric or psychological disorders. Exclusion criteria: 1) Those who have undergone pneumonectomy or wedge resection of the lung; 2) Those whose tumor had pre-existing distant metastases; 3) Those who have cognitive dysfunction. The control group consisted of 29 males and 11 females, ranging from 39 to 72 years old (mean age, 52.45 ± 5.23); Education

Level: Primary school and below: 6 cases; Middle/High school: 24 cases; Junior college and above: 10 cases; Disease Types: Left lobe: 22 cases; right lobe: 18 cases. The observation group consisted of 26 males and 14 females, ranging from 38 to 72 years old (mean age, 51.65 ± 6.13); Education Level: Primary school and below: 5 cases; Middle/High school: 26 cases; Junior college and above: 9 cases; Disease Types: Left upper lobe: 12 cases; left lower lobe: 7 cases; right upper lobe: 11 cases; right lower lobe: 10 cases. There was no statistical significance in age, sex, smoking history, educational level, and surgical methods between the two groups ($P > 0.05$).

2.2. Methods

2.2.1. Intervention Methods of the Control Group in the Thoracic Surgery Ward I

Patients received postoperative health education and guidance on routine thoracotomy, that is, within 48h of admission to pre-operation, patients and their accompanying family members were given the routine health education of thoracotomy nursing by the primary nurse by oral instruction the patients and promotional drawings, and were demonstrated an effective coughing and breathing exercise once by the primary nurse. It included the effective breathing exercise and its objectives, methods, frequency, and precautions, after which exercise was prescribed by the patients themselves.

2.2.2. Intervention Methods of the Observation Group in the Thoracic Surgery Ward II

1) Establishment of a video teach-back education group

The group consisted of 1 leader and 6 members, with the head nurse as the team leader who was responsible for arranging and formulating the behavioral guidelines; 2 nurses-in-charge were the deputy leaders who were responsible for the audit, supervision, and management of the health education content quality; 4 nurses served as group members who were responsible for performing health education; consultant support was provided by 2 attending physicians in the department. All the nurses were uniformly trained in the teach-back method by the head nurse, which included respiratory function training, theoretical approaches to the teach-back method, and communication skills. The training was followed by a scenario-based assessment, which was discussed and summarized to ensure the accuracy of the application of the teach-back method and its quality.

2) Preparation of instructional videos and health education manual on respiratory function exercise

After the joint review of the literature, the education team members determined the video and text of respiratory function exercise, with the video being produced by 3 nurses, and the exercise method was demonstrated by 1 nurse. a) Effective coughing: Patients were instructed to hold their breath deeply for 3 seconds and then cough loud to flush outgas or fluid; 3 to 8 minutes per training session. b) Abdominal respiration: Patients were standing or sitting upright. In

inhaling, the abdomen bulged slowly and inhaled deeply and slowly with the nose to lower the diaphragm to the greatest extent and inhibit the movement of the thorax; In exhaling, shrunk the abdomen inward to the maximum extent, kept the chest motionless, exhaled the gas from the mouth as much as possible, and the breathing rate is 7 - 8 times/min, training for 10 minutes each time. c) Pursed lip breathing: Patients inhaled by noses and closed mouths like blowing candles when exhaling and then exhaled slowly. The ratio of inhalation to exhalation is 1:2.3. Each method of the video was demonstrated three times for a total of 6 minutes. Two nurses were respectively responsible for the voice description, video recording, and editing of the health education content, and made it into a two-dimensional code, which can be viewed repeatedly online by scanning the WeChat official account or on TV in the ward. The other two nurses were responsible for making the health education manual on respiratory function exercises, which includes the principle, purpose, method, and frequency of the exercise. The manual is presented in text and pictures. The video and manual shall be finalized after the quality review by the head nurse and chest doctor.

3) Implementation of the teach-back method

On the second day of admission, the primary nurse will give one-on-one guidance within 30 minutes to the patient at the bedside in line with the video and health education manual. After that, the patients are guided to watch the video repeatedly and exercise respiratory function. The implementation was divided specifically into four steps [9]: a) Deliver information: The intervention includes introducing the objectives, methods, frequency, and precautions of respiratory function exercise, rolling the video of the exercise on mobile phones or wards' TV, and guiding the patients to follow the video to practice. b) Retelling information: To ask the patient a question about the respiratory function exercise, such as "Do you know why you need respiratory function exercise?", "When and how long will this training be done?", "Are there any precautions?" Ask the patient to retell or demonstrate in their expression. Questions should be asked in a relaxed and harmonious tone to avoid psychological stress to the patient. c) Modification and correction: Give affirmation and praise to patients who have a good grasp after retelling and demonstrating the contents, point out the wrong points in time and correct them in time for patients who have unclear complaints and poor grasp, and let patients watch the video again after correction. d) Evaluation effectiveness: For any vague answers or non-standardized demonstration, the patients should be asked to repeat and demonstrate again and practice repeatedly following the video until they retell the educational content accurately and comprehensively. e) Consistent supervision: Make sure that the patient is able to repeat the contents of the video and health education manual correctly and completely, including the purpose of respiratory function exercise, exercise methods, daily frequency, and precautions. The patient should be urged to exercise regularly in line with the video propaganda and education contents every day as well as consult the primary nurse if he/she has any doubt to ensure

full understanding of this video.

2.3. Assessment Indicators

2.3.1. Compliance with Respiratory Function Exercise

During hospitalization, the patients were investigated with the Department-made questionnaire on the respiratory function exercise compliance. The options include "compliance", relative compliance, and "non-compliance". The "compliance": the patient can complete the three exercises, including effective coughing and expectoration, pursed-lip breathing, and abdominal respiration on time and as instructed; the "relative compliance": two of the exercise contents can be completed in line with the instructions, but the frequency cannot satisfy the requirements; the "non-compliance": the patient has no awareness of respiratory function exercise and only reluctantly accepts exercise under the publicity and education of nursing staff, and the time and frequency cannot satisfy the requirements.

2.3.2. Evaluation of Complications

The common pulmonary complications after thoracotomy include pulmonary infection, atelectasis, and pleural effusion. The study employed the diagnostic criteria of pulmonary complications released by Wei Bin [10] to evaluate the incidence of postoperative pulmonary complications in the two groups.

1) Pulmonary infection: anti-infective treatment and positive for any of the following: the original respiratory cough and expectoration symptoms were aggravated and purulent sputum appeared; body temperature > 38.3°C; new or changed opaque areas of the lungs on chest X-ray; WBC count > 12×10^9/L.

2) Atelectasis: there is an opaque area in the lung, the adjacent structures (bronchus, pulmonary vessels, and pulmonary stroma) gather in the atelectasis area, and other lung tissues show compensatory excessive expansion.

3) Pleural effusion: chest X-ray shows that the costophrenic angle becomes blunt, the sharp contour on the same side is lost in the three-dimensional position, the adjacent structure is displaced, or the opaque continuous vascular shadow of unilateral thoracic cavity appears in the supine position.

2.3.3. Patients' Satisfaction Survey

The hospital-made nursing satisfaction questionnaire was used at the time of discharge. At the patient's bedside, the deputy leader distributes the questionnaire which is filled in and recovered on the spot by the patient. The content includes 10 items, such as hospitalization environment, nursing service quality, nursing content, and nurse service attitude with a total score of 89 - 100 as "extremely satisfactory"; 69 - 88 as "relatively satisfactory"; <69 as "dissatisfactory". Satisfaction is the sum of the "extremely satisfactory" rate and "satisfactory" rate.

2.4. Statistical Methods

The data are entered in form of Excel and analyzed statistically by SPSS20.0. The counting data are described by the number of cases, and examined by t-test, χ^2

test, and rank-sum test with the level $\alpha = 0.05$.

3. Results

1) Comparison of compliance of respiratory function exercises between the two groups (Table 1).

Table 1. Comparison to compliance of respiratory function exercises between two groups (cases).

Group	Number of cases	Effective coughing and expectoration			Pursed lip breathing			Abdominal respiration		
		Compliance	Relative compliance	Non-compliance	Compliance	Relative compliance	Non-compliance	Compliance	Relative compliance	Non-compliance
Control Group	40	12	22	6	15	18	7	13	21	6
Observation Group	40	29	10	1	22	15	3	21	16	3
Z			−4.214			−4.332			−4.311	
P			<0.001			<0.003			<0.002	

2) Comparison of incidence of complications between the two groups (Table 2).

Table 2. Comparison of complication occurrence rate after surgery of two groups (cases).

Group	Number of cases	Atelectasis	Pleural effusion	Pulmonary infection	Incidence (%)
Control Group	40	4	3	4	11 (29.00)
Observation Group	40	1	1	1	3 (7.500)
χ^2					6.582
P					0.010

3) Comparison of the satisfaction between two groups of patients (Table 3).

Table 3. Comparison of the satisfaction between two groups of patients [case (%)].

Group	Number of cases	Extremely satisfactory	Relatively satisfactory	Dissatisfactory	Satisfaction
Control Group	40	22 (51.2)	12 (31.5)	6 (15.3)	34 (86.3)
Observation Group	40	34 (85.1)	5 (12.3)	1 (2.5)	39 (98.2)
χ^2		4.71	2.46	5.02	5.12
p-value		<0.05	<0.05	<0.05	<0.05

4. Discussion

1) Video combined with the teach-back method can improve the compliance of respiratory function exercise in patients undergoing tumor thoracotomy

Respiratory function exercise for patients undergoing tumor thoracotomy is one of the effective measures to improve postoperative respiratory function.

However, to achieve effective results, compliance is crucial [11]. The previous routine health education is mainly indoctrinated by nurses to patients, which belongs to the one-way transmission of information. Some patients often forget 40% - 80% of health information immediately after receiving the education due to the influence of environmental, emotional, and other factors. Also, nearly half of the information remembered is misunderstood [12]. For the teach-back method, the two-way information transmission mode of "Teaching-Answering" is employed. The educators ask appropriately and the patients repeat in their own words and actions so that the education evaluation can be carried out in time and the guiding effect can be optimized; moreover, the content of respiratory function exercises is made into videos. Vivid or interesting images are easier to attract the attention of patients who can watch TV videos and practice with them at any time, which improves the compliance of patients' respiratory function exercise and the effect of health education. For video education, voice, text, pictures, and simulation exercises are integrated into the video, so that patients can fully master the essentials of exercise technology. The video content is vivid, intuitive, and vivid, which greatly facilitates patients' understanding, memory, and imitation. It, compared with traditional health education, greatly improves patients' acceptance efficiency of information. The results in Table 1 show that the respiratory function compliance score of the observation group is significantly better than that of the control group (P < 0.05). It shows that patients watch intuitive and easy-to-understand instruction videos repeatedly on the wards' TV or mobile phones, which not only deepens the patients' memory of respiratory function exercise, but also provides one-to-one guidance of action and knowledge, and drives the patients' initiative to exercise to improve the training compliance and accuracy and enhance self-concept and rehabilitation confidence. It is consistent with the results of Huang Li *et al.* [6].

2) Video combined with the teach-back method can reduce the incidence of complications in patients undergoing tumor thoracotomy

Patients undergoing tumor thoracotomy have increased respiratory secretions and decreased cough and expectoration capacity due to factors such as original underlying diseases, surgical anesthesia stimulation, decreased pulmonary function, and postoperative pain, which are more likely to cause pulmonary complications such as pleural effusion, pulmonary infection, and atelectasis, with an incidence of 43.6% [13]. In line with the literature [14], the effective respiratory function exercise is one of the effective methods to improve respiratory function and reduce postoperative complications in patients after the thoracotomy, which can enhance the contraction strength of respiratory muscles and improve the clearance of airway secretions. Therefore, effective respiratory function exercise for patients directly affects the prognosis of patients. As shown in Table 2, by the intervention of video combined with the teach-back method, the pulmonary complications in the observation group were lower than those in the control group (P < 0.05), which indicates that the patients were given correct and effective respiratory function exercise, and the training of patients was supported and

supervised so that the patients could carry out respiratory function exercise early and effectively after the surgery and strengthen the movement of airway cilia to promote the discharge of sputum. It effectively reduces complications such as atelectasis, pleural effusion, and pulmonary infection [15].

3) Video combined with the teach-back method can improve the satisfaction of patients undergoing tumor thoracotomy

Tamura-Lis [16] pointed out that the teach-back method can better promote the health education of patients and improve the satisfaction of patients and their families. The results show that in Table 3, the total nursing satisfaction of patients in the observation group is 98.2%, compared with 86.3% in the control group, and the difference is of statistical significance (P < 0.05). It shows that the nursing health education by video combined with the teach-back method can address the needs of patients for health education information knowledge and make patients and their families feel love and respect during hospitalization, which is further conducive to the establishment of a harmonious nurse-patient relationship, which enables nurses to get the understanding and trust of patients and their families as well as finally improve patients' satisfaction.

5. Conclusion

In summary, the application of video combined with the teach-back method in the respiratory function exercise of patients undergoing thoracotomy can improve patients' compliance with exercise, reduce the incidence of pulmonary complications and achieve high patient satisfaction, which is a safe and effective health education method and worthy of clinical promotion.

Conflicts of Interest

The authors declare no conflicts of interest regarding the publication of this paper.

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