

# Effect of Individualized Nutrition Intervention Care Combined with Swallowing Training on Postoperative Nutritional Status in Patients with Laryngeal Cancer

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## Abstract

**Introduction:** Laryngeal carcinoma accounts for 13.9% of head and neck tumors, and squamous cell carcinoma is the main pathological type. At present, the treatment of laryngeal cancer is mainly surgical treatment or postoperative radiotherapy. The surgery is delicate, complex, time-consuming and traumatic. Postoperative patients are prone to dysphagia, leading to an increase in the incidence of malnutrition. Malnutrition can cause a series of negative effects, including weight loss, increased incidence of infection, reduced tolerance of anti-tumor treatment, and extended length of hospital stay. Therefore, how to effectively improve the nutritional status of laryngeal cancer patients through nursing intervention has become an important topic of nursing research. **Objective:** Investigate the effect of individualized nutrition intervention care combined with swallowing training on postoperative nutritional status in patients with laryngeal cancer. **Methods:** A total of 120 consecutive patients who underwent laryngeal surgery at our hospital for the first time between May 2018 and May 2021 were selected for the study and equally divided into the control group and the study group by the random number table method, with 60 patients in each group. Patients in the control group were given swallowing function training and health counseling, and the study group adopted individualized nutrition intervention care based on the control group. The nutritional status, swallowing function, and quality of life (QOL) of the patients were assessed using the Patient-generated Subjective Global Assessment (PG-SGA), MD Anderson Dysphagia Inventory (MDADI), and Quality of Life Questionnaire-Core30 (QLQ-C30) before the intervention and three months after the intervention. **Results:** Before the intervention, the scores of MDADI, PG-SGA, and QLQ-C30 were not significantly different

between the two groups ( $P > 0.05$ ), and three months after the intervention, the scores of MDADI and QLQ-C30 increased and the score of PG-SGA decreased in the study group, with significant differences ( $P < 0.05$ ), patients in the control group had increased scores on the MDADI, with significant difference ( $P < 0.05$ ), while the scores on the PG-SGA and QLQ-C30 were not significantly different ( $P > 0.05$ ). At three months after the intervention, patients in the study group had higher scores on MDADI, QLQ-C30 and lower scores on PG-SGA than the control group, with significant differences ( $P < 0.05$ ); There were significant differences in the scores of MDADI, PG-SGA, and QLQ-C30 between the two groups before and after intervention ( $P < 0.05$ ). **Conclusion:** Combining individualized nutrition intervention care with swallowing training improves the postoperative nutritional status, swallowing function, and QOL of patients with laryngeal cancer.

### Keywords

Laryngeal Cancer, Swallowing Training, Nutritional Status, Individualized Nutrition Intervention Care

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## 1. Introduction

Surgery combined with chemoradiotherapy treatment remains the main treatment method for laryngeal cancer, but surgical treatment is more traumatic to patients. Patients after surgery tend to have eating difficulties and are highly prone to malnutrition and several complications, such as pharyngeal fistula and swallowing disorders [1]. In the past, otolaryngologists paid more attention to tumor margins, the extent of resection, lymph node dissection, etc., and often ignored nutrition therapy. Researchers in recent years have suggested that nutrition therapy is an important treatment for patients with laryngeal cancer [2]. Swallowing disorders, one of the major complications after laryngeal cancer surgery, cause a serious impact on patient recovery. Statistics found that about 45% of patients suffer from swallowing disorders because of surgical injury and tumor factors [3]. Patients with laryngeal cancer are often treated with chemoradiotherapy after surgery, which can lead to muscle fibrosis, decreased salivary gland secretion, and local mucosal swelling in some patients. These symptoms can directly result in swallowing disorders. Swallowing disorders seriously affect patients' absorption of water, energy, and protein and cause aspirated pneumonitis, aspiration, dehydration, etc., which seriously reduce patients' quality of life (QOL) and therapeutic effects [4]. Currently, researchers have fully recognized the harms of swallowing disorders, and conducted studies to guide swallowing training after surgery in patients with laryngeal cancer [5]. A few researchers have suggested that individualized nutrition intervention care significantly improves the postoperative nutritional status in patients with laryngeal cancer. However, the effect of combining individualized nutrition intervention care with

swallowing training has been reported less [6]. Therefore, research subjects were selected carefully in this study to investigate the effect of individualized nutrition intervention care combined with swallowing training on postoperative nutritional status in patients with laryngeal cancer, thus providing a basis for the rehabilitation of patients with laryngeal cancer. The results are reported as follows.

## **2. Materials and Methods**

### **2.1. Research Subjects**

A total of 120 patients who received laryngeal cancer surgery in our hospital for the first time between May 2018 and May 2021 were selected as the study subjects, including 98 males and 22 females aged 50 to 75 years, with a mean age of  $(58.43 \pm 10.27)$  years. The patients were equally divided into the control group and the study group, with 60 cases in each group. This study was approved by the Ethics Committee of our hospital.

### **2.2. Inclusion/Exclusion Criteria**

Inclusion criteria: Malignant laryngeal cancer patients confirmed by pathologic diagnosis [7]; patients who could participate in the study in the whole process; patients who received surgical treatment without preoperative radiotherapy and chemotherapy; patients who were willing to participate in the investigation; patients who had complete clinical data. Exclusion criteria: Hepatic insufficiency; patients who died during treatment; patients with mental disease or psychological illness; patients with severe gastrointestinal disease; patients who quits the study midway; patients with cognition impairment; patients complicated by severe cardiovascular and cerebrovascular diseases.

### **2.3. Research Method**

The nutritional status, swallowing function, and quality of life (QOL) of the patients were assessed using the Patient-generated Subjective Global Assessment (PG-SGA), MD Anderson Dysphagia Inventory (MDADI), and Quality of Life Questionnaire-Core30 (QLQ-C30) before the intervention and three months after the intervention. The MDADI is mainly used to assess swallowing function of patients with head and neck cancer, which includes four subscales, physical (8 items), functional (5 items), emotional (6 items), and global (1 item). Each item is rated on a scale of 1 to 5 points, and the total score is the sum of the individual score of each item, with higher scores indicating better swallowing function. The PG-SGA mainly assesses the nutritional status in patients with tumors, including physical examination, metabolic demand, the relationship between disease and nutritional demands, activities and body functions, symptoms, intake, and weight, with higher scores indicating worse nutritional status. The QLQ-C30 is mainly used to monitor the QOL of cancer patients. It covers 15 domains and includes 30 items. Items 29 and 30 are rated on a scale of 1 to 7 points, and the remaining items are rated on a scale of 1 to 4 points, with higher total scores in-

dicating better QOL and body functions.

Patients in the control group received swallowing function training and health counseling. Health counseling: It mainly contained dietary guidance, physical exercise, and psychological counseling, which included providing patients with a comfortable eating environment, creating a pleasant atmosphere, selecting suitable dinnerware and eating positions for patients, and advising patients and their family members to increase eating frequency and food intake. Swallowing training: It contained empty swallowing training, breathing training, and strengthening training. Empty swallowing training: The secretions of the patients' mouths were first cleaned, and then the patients were instructed to perform an empty swallowing action and observed for larynx lifting. Respiratory training: Patients were instructed to take a deep breath, hold their breath, and breathe out and were informed to keep the breath-holding time as long as possible, and the breath-holding time was recorded. Strengthening training: The empty swallowing training was combined with the breathing training, in which the patients took a deep breath, held their breath while swallowing, and breathed out. Patients received empty swallowing training and breathing training every day, 10 min each. They practiced four to five times a day and seven days a week for three consecutive months.

Based on the control group, the study group adopted individualized nutrition intervention care according to patients' disease level and the results of swallowing training: First, with the help of a dietitian, the total energy required per day was calculated according to the Dietary Guidelines for Chinese Residents [8], which was the sum of quality protein, carbohydrate, and fat mass. The target intake was 25 to 30 kcal/(kg·d), and the protein intake was 1.2 to 1.5 g/Kg/d. Then, individualized nutrition intervention protocols were developed according to the nutrition tower for patients, and the amount and variety of food that patients ingested per day were recorded in detail. Finally, patients and their family members were given dietary education, including selection, quantity, cooking method, and nature of food. Patients' daily intake was recorded. If the patients' intake did not meet the standard or the patients' PG-SGA scores were greater than or equal to four points, nutritional supplementation via a nasal feeding tube or oral administration was given.

#### **2.4. Statistical Treatment**

The recorded data were imported into SPSS 22.0. The measurement data were analyzed by t-test and expressed as  $\bar{x} \pm s$ , and the enumeration data were analyzed by Chi-square test.  $P < 0.05$  indicated that the difference was statistically significant.

### **3. Results**

The patients' general data, including family income, age, and years of education, were not statistically different between the two groups ( $P > 0.05$ ) and were comparable, see **Table 1**. The patients or their family members were informed about

this study and gave their consent.

### 3.1. Comparison of Patients' QOL, Nutritional Status, and Swallowing Function Results before and after Intervention

Before the intervention, the scores of MDADI, PG-SGA, and QLQ-C30 were not significantly different between the two groups ( $P > 0.05$ ), and three months after the intervention, the scores of MDADI and QLQ-C30 increased and the score of PG-SGA decreased in the study group, with significant differences ( $P < 0.05$ ), patients in the control group had increased scores on the MDADI, with significant difference ( $P < 0.05$ ), while the scores on the PG-SGA and QLQ-C30 were not significantly different ( $P > 0.05$ ). At three months after the intervention, patients in the study group had higher scores on MDADI, QLQ-C30 and lower scores on PG-SGA than the control group, with significant differences ( $P < 0.05$ ), please refer to **Table 2**.

### 3.2. Comparison of the Difference of Each Index before and after the Intervention between the Two Groups

There were significant differences in the scores of MDADI, PG-SGA, and QLQ-C30 between the two groups before and after intervention ( $P < 0.05$ ), please refer to **Table 3**.

**Table 1.** Comparison and analysis of general data.

Group	Male/Female	Age (years old)	BMI (Kg/m <sup>2</sup> )	Years of education (years)	Household income (CNY10,000)
Study group (n = 60)	50/10	57.99 ± 10.54	21.69 ± 1.89	211.03 ± 2.41	27.46 ± 2.62
Control group (n = 60)	48/12	59.34 ± 9.62	22.02 ± 2.05	210.86 ± 2.16	28.01 ± 2.93
t/ $\chi^2$ Value	0.075	0.631	0.541	0.258	0.445
P value	0.906	0.676	0.739	0.843	0.713

**Table 2.** Comparison of patients' QOL, nutritional status, and swallowing function results before and after intervention (points).

Group	Time	MDADI	SGA	QLQ-C30
Study group (n = 60)	Before intervention	50.43 ± 8.27	4.89 ± 1.25	48.84 ± 6.35
	Three months after the intervention	63.15 ± 10.58*	3.08 ± 1.17*	55.04 ± 6.28*
Control group (n = 60)	Before intervention	51.37 ± 8.45	4.78 ± 1.32	48.88 ± 6.51
	Three months after the intervention	57.62 ± 8.74*&	3.96 ± 1.26&	51.38 ± 6.38&

Note: \* indicated  $P < 0.05$  when comparing the results before and after the intervention in the same group; & indicated  $P < 0.05$  when comparing the results three months after the intervention between the control group and the study group.

**Table 3.** Comparison of the Difference of Each Index before and after the Intervention between Two Groups (Points).

Group	MDADI	SGA	QLQ-C30
Study group (n = 60)	12.72 ± 3.74	1.81 ± 1.07	6.20 ± 1.02
Control group (n = 60)	6.25 ± 2.09*	0.82 ± 0.13*	2.50 ± 1.13*

Note: \* indicated statistically significant difference ( $P < 0.05$ ) from the study group.

#### 4. Discussion

Laryngeal cancer has become the 14th most common cancer in the world and is the most common malignant tumor of the human larynx, with more male patients than female patients. Swallowing is a complex process involving the regulation of multiple reflexes, cranial nerves, and multiple pairs of muscles, which requires the concerted action of the human esophagus, larynx, pharynx, and oral cavity [9] [10]. Due to treatment factors and tumor factors, patients with laryngeal cancer mostly suffer from swallowing dysfunction. Patients with swallowing dysfunction are easy to choke and have eating difficulties, so they are prone to aspiration, malnutrition, dehydration, etc., seriously affecting their QOL. Laryngeal cancer patients cannot form a positive airway pressure and close the laryngeal orifice when swallowing, leading to difficulty in forming the pressure difference between the esophagus and the respiratory tract, thereby causing swallowing disorder [11] [12] [13]. It has been found that laryngeal cancer patients receiving early swallowing training can effectively reduce the incidence of aspiration [14]. This study found that after three months of training, patients in the two groups showed significant improvement in swallowing function compared with before the intervention, which was consistent with some findings.

Laryngeal cancer patients often experience malnutrition, which is also an important factor affecting treatment outcomes. Malnutrition can lead to a prolonged hospital stay, increased complications, reduced immunity, and fatigue in patients, which can seriously affect the therapeutic effect. Studies have pointed out that more than 35% of patients with laryngeal cancer will lose 5% of their weight within 14 d of surgery. Weight loss will lead to a decrease in prealbumin and albumin levels, which is related to the development of postoperative pharyngeal fistula. Studies found that for patients with head and neck cancer, nutritional interventions can increase their intake of protein and energy, maintain their weight, improve their QOL, and promote recovery. In this study, patients in the study group received individualized nutrition intervention care in addition to swallowing function training and health education in the control group. In this study, individualized dietary programs in combination with patients' disease level and swallowing function were developed with the appropriate type and quantity of food, and timely treatment was given to patients with nutritional risk during treatment, so the nutritional status of patients was significantly improved. QOL contains social, psychological, functional, and physiological aspects. Patients with head and neck cancer have swallowing dysfunction, masti-

catory pain, and reduced taste, which can severely affect their appetite and reduce their need for food variety and quantity, resulting in decreased social activities and malnutrition and compromising their QOL. The study found that individualized nutrition intervention care combined with swallowing training significantly improves postoperative QOL in patients with laryngeal cancer, which is consistent with the results of previous studies [15] [16] [17].

## 5. Conclusion

In conclusion, individualized nutrition intervention care combined with swallowing training improves postoperative nutritional status, swallowing function, and QOL of patients with laryngeal cancer. However, the size of the study subjects is small, and the results have limitations, so further research is needed. Most patients with laryngeal cancer need radiotherapy and chemotherapy after surgery. The nutritional requirements of patients during radiotherapy and chemotherapy have greatly increased, which also has a certain interference with this study. However, considering the adverse risk factor, we should do a good job in screening and evaluating patients' nutrition, implement individualized nutrition support at an early stage, improve the deficiencies in the nutrition process, strengthen the monitoring and management of nutrition, and reduce or avoid the occurrence of malnutrition in patients with laryngeal cancer after surgery.

## Conflicts of Interest

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

## References

- [1] Lei, D.P. and Pan, X.L. (2019) Treatment Options for Advanced Laryngeal Carcinoma. *Chinese Journal of Otorhinolaryngology Head and Neck Surgery*, **54**, 398-400.
- [2] Pan, X.L. and Lin, Y. (2020) The Correct Selection of Treatment Strategies for Laryngeal Cancer to Improve the Survival Rate and Quality of Life for Patients. *Chinese Journal of Otorhinolaryngology Head and Neck Surgery*, **55**, 1111-1115.
- [3] Mao, C.G., Zhou, X.C., Jiang, Y.D., *et al.* (2020) The Evi5 Oncogene Promotes Laryngeal Cancer Cells Proliferation by Stabilizing c-Myc Protein. *Cancer Cell International*, **20**, 115-118. <https://doi.org/10.1186/s12935-020-1127-0>
- [4] Gui, Y.H., Zhou, Y., Chen, F.F., *et al.* (2020) Effects of Different Surgical Treatment on Swallowing Function in Partial Laryngectomy Patients. *Chinese Journal of Modern Nursing*, **26**, 717-720.
- [5] Shen, J., Hu, K., Ma, J., *et al.* (2020) Clinical Analysis of EBRT vs TLM in the Treatment of Early (T1-T2N0) Glottic Laryngeal Cancer. *Journal of Cancer*, **11**, 6686-6694. <https://doi.org/10.7150/jca.46487>
- [6] Cai, B. (2019) Effects of Three Surgical Methods on Early Glottic Carcinoma and Their Influence on Respiratory Function, Swallowing Function and Pronunciation in Patients. *Journal of Chinese Physician*, **21**, 1078-1080.
- [7] Guo, Z.X. (2009) Modern Treatment of Laryngeal Cancer. Jiangsu Phoenix Science Press, Nanjing.

- [8] Chinese Nutrition Society (2010) The Chinese Dietary Guidelines: New Edition 2011. Tibet People's Publishing House, Tibet.
- [9] Ruan, S. and Cai, X. (2020) Growth Arrest Specific Gene 6 Promotes Proliferation and Invasion of Laryngeal Cancer Cells through the Vascular Endothelial Growth Factor (VEGF)/Protein Kinase B (AKT) Pathway. *Journal of Biomaterials and Tissue Engineering*, **15**, 1266-1272.
- [10] Fang, L.X., Zuo, M.L., Chen, S.F., *et al.* (2020) Investigation on the Acceptance of Gastrointestinal Nutrition by Intermittent Oral Administration to Esophageal Tube Feeding in Patients with Dysphagia. *Chinese Journal of Rehabilitation Medicine*, **35**, 85-87.
- [11] Zhao, C., Yu, Y.Y., Wang, X.H., *et al.* (2020) Screening and Clinical Characteristics of Swallowing Disorder and Aspiration in Elderly Patients. *Chinese Journal of Rehabilitation*, **35**, 150-152.
- [12] Fenton, J.E. (2020) Letter to the Editor in Reference to: Interspecialty Referral of Oesophagogastric and Pharyngolaryngeal Cancers Delays Diagnosis and Reduces Patient Survival: A Matched Case-Control Study. *Clinical Otolaryngology*, **45**, 22-26. <https://doi.org/10.1111/coa.13603>
- [13] Chinese Expert Consensus Group of Dysphagia and Nutrition Management (2019) Chinese Expert Consensus on Dysphagia and Nutrition Management (2019). *Chinese Journal of Physical Medicine and Rehabilitation*, **41**, 881-888.
- [14] Yuan, J.J., Li, D.P., Liu, Y.H., *et al.* (2020) Application Strategy and Effect of Cuffed Tracheostomy Tube with Inner Cannula in the Treatment of Postoperative Complications of Laryngeal or Hypopharyngeal Cancer. *Chinese Journal of Oncology*, **42**, 976-979.
- [15] Bai, X.S. and Gao, J. (2019) Observation on the Effect of Medical Intervention-Based Home Care in Improving the Quality of Life of Postoperative Radiotherapy Patients with Laryngeal Cancer. *Chinese Journal of Otorhinolaryngology in Integrative Medicine*, **36**, 166-169.
- [16] Yang, Y. and Song, C.X. (2020) Effect of Resourcefulness Theory-Based Nursing on Benefit Finding and Nutritional Status of Patients with Laryngeal Carcinoma Undergoing Radiotherapy after Laryngectomy. *Chinese Journal of Practical Nursing*, **36**, 1761-1766.
- [17] Zhao, X.Y., Yi, M., Zhou, Y., *et al.* (2019) Effect of Nutritional Support on Postoperative Immune Function and Postoperative Complications in Patients with Laryngeal Carcinoma. *Food and Nutrition in China*, **25**, 86-88.