Original Article

Jejunostomy feeding plus oral feeding versus intravenous nutrition plus oral feeding after esophageal cancer resection: a comparative retrospective cohort study

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Background: There are multiple choices for the nutritional management mode after esophageal cancer surgery. Currently, there is still controversy regarding which nutritional management mode has an impact on the postoperative recovery and overall survival (OS) of patients. This study aims to compare the differences between two commonly used clinical nutritional management modes: jejunostomy feeding plus oral intake (JF plus OI) and intravenous nutrition plus oral intake (IN plus OI), in terms of short-term efficacy and 3-year OS, in order to further explore the optimal mode of enteral nutrition management after esophageal cancer surgery.

Methods: We evaluated esophageal cancer patients who underwent radical surgery at Union Hospital of Fujian Medical University between January 1, 2010 and January 1, 2020. The purpose of this analysis was to compare the perioperative complications, Nutritional Risk Screening 2002 (NRS2002) nutritional scores at 1 week, 2 weeks, 1 month, and 3 months after surgery, as well as the 3-year OS rates, between two different nutritional management approaches: JF plus OI and IN plus OI following esophageal cancer surgery.

Results: Among the 822 patients included, 668 and 154 patients belonged to JF plus OI and IN plus OI groups, respectively. After propensity score matching, 149 patients per group were evaluated. The amount of gastric drainage fluid was higher in the IN plus OI group ($P<0.05$), and the incidence of postoperative gastrointestinal emptying disorder and intestinal obstruction was significantly higher in the JF plus OI group ($P<0.05$). The IN plus OI group had a higher incidence of perioperative hypoproteinemia ($P<0.05$), and a higher risk of malnutrition in 2 weeks after surgery ($P<0.05$). The 3-year OS was not significantly different ($P>0.05$).

Conclusions: JF plus OI may be the preferable nutritional management approach after esophageal cancer resection as it can potentially reduce perioperative nutritional deficiency. However, attention should be paid to the risk of gastrointestinal emptying and intestinal obstruction associated with JF.

Keywords: Esophagectomy; jejunostomy feeding (JF); intravenous nutrition (IN); complication; overall survival (OS)

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Introduction

Esophageal cancer is one of the most common malignant tumors. Surgery remains a primary treatment modality for esophageal cancer, specifically aiming to remove the diseased esophagus and reconstruct the digestive tract using the stomach or jejunum or colon (1). Esophageal cancer surgery is inherently traumatic, involving almost the entire upper digestive tract. In addition, the reconstructed digestive tract plays an important role in patient rehabilitation after esophageal cancer surgery by providing both short-term and long-term nutritional support (2,3). The methods of nutritional support after esophageal cancer surgery vary among institutions, but they are mainly divided into two categories: enteral nutrition support and parenteral nutrition support. Enteral nutrition support may include tube feeding (through a jejunostomy or nasoduodenal tube), while parenteral nutrition support mainly refers to intravenous nutrition (IN) support (4). Clinical centers adopt simple or combined nutritional strategies individualized tailored to the patient's conditions and institutional guidelines.

Nutritional status can lead to perioperative complications; thus, effective nutritional management and good nutritional status are conducive to hastening postoperative recovery (5). Jejunostomy feeding plus oral intake (JF plus OI) and IN plus oral intake (IN plus OI) are two commonly used combinations in clinical practice. JF is used to establish a feeding channel on the jejunum through surgery and deliver nutrients directly to the jejunum for absorption. Jejunal feeding generally lasts 2 weeks, and then the strategy is gradually converted to oral feeding. The jejunostomy tube is removed at a selected time according to the oral feeding situation. Meanwhile, IN plus OI is based on intravenous infusion, and patients are fed during or after IN stabilizes.

Implementation methods for these nutritional support strategies vary among centers; as such, data have also been inconsistent. Some studies (5-7) have shown that after esophageal cancer surgery, JF plus OI can provide adequate nutritional support and avoid the risks of long-term intravenous fluids while improving quality of life. Meanwhile, other studies have also found that IN plus OI has advantages concerning the nutritional supplementation and complication rates. Increasing evidence shows that the nutritional status of postoperative patients with esophageal cancer can affect progression-free survival (PFS) and overall survival (OS) (6,7). However, the optimal nutritional management strategy for improving patient outcomes after esophageal cancer resection remains unknown to date. Thus, this study aimed to compare the efficacy and safety of JF plus OI with those of IN plus OI after esophageal cancer surgery, using propensity score matching (PSM). Specific research questions included the impact of the two methods on postoperative complications, nutritional status of patients, and whether there was a difference in the 3-year OS rate between them. We present this article in accordance with the STROBE reporting checklist (available at https://jtd.amegroups.com/article/view/10.21037/jtd-24-657/rc).

Highlight box

Key findings

- Compared to intravenous nutrition plus oral intake (IN plus OI), jejunostomy feeding plus oral intake (JF plus OI) presents a reduced risk of nutritional development during the perioperative period following esophageal cancer surgery. Nevertheless, there remains a significant risk of intestinal obstruction and gastrointestinal perforation, and no long-term survival advantage has been observed.

What is known and what is new?

- Early initiation of enteral nutrition support therapy is more beneficial for the recovery of digestive organ function and fluid secretion.
- In patients who have undergone resection of esophageal cancer, JF plus OI has a higher risk of intestinal obstruction and gastrointestinal emptying dysfunction, while those on IN plus OI has a higher risk of hypoproteinemia and nutritional deficiency 2 weeks postoperatively. The 3-year overall survival is not significantly different between the two nutritional strategies.

What is the implication, and what should change now?

- Our findings offer valuable insights for clinical nutrition decision-making among esophageal cancer patients post-surgery.

Methods

Study design and patients

This retrospective study evaluated patients who underwent surgical resection for esophageal cancer at the Department of Thoracic Surgery, Union Hospital of Fujian Medical University, China, between January 1, 2010 and January 1, 2020. The inclusion criteria were as follows: age 18–75 years, all patients received treatment from the same medical team, minimally invasive surgical method, complete clinical data was obtained for all enrolled patients and complete data.

The study was conducted in accordance with the Declaration of Helsinki (as revised in 2013). The study was approved by Institutional Review Board of Union Hospital of Fujian Medical University (ethical No. 2023JYKY017) and informed consent was taken from all the patients.

Nutritional support protocol

JF plus OI refers to the practice of keeping a jejunostomy nutrition tube in place after surgical resection for esophageal cancer. Enteral feeding nutritional support treatment was initiated on postoperative day 1 and continued for 2 weeks. Post-surgical enteral nutrition protocol recommends initiating nutrition within 24–48 hours. Patient adaptation should be prioritized. Upon successful adaptation, the aim is to deliver 20–30 kcal/kg of body weight daily. Enteral nutrition dosing should be optimized based on patient tolerance. Thereafter, the strategy is transitioned to a combination of oral feeding and enteral nutrition support, gradually increasing the oral food intake while reducing the amount of feeding through the jejunostomy tube. Enteral feeding was discontinued 1 month postoperatively, completing the transition to oral feeding and removal of the jejunostomy tube.

IN plus OI refers to the administration of IN support treatment for 1 week postoperatively. On postoperative day 7, an upper digestive tract imaging review was conducted to ensure the absence of anastomotic fistula and digestive tract obstruction. If no complications were detected, oral fluids were introduced, and the amount of intravenous fluid was reduced. The diet was gradually transitioned to semi-liquid and then general food.

Nutritional status was assessed using the Nutritional Risk Screening 2002 (NRS2002) and the NRS2002 Nutritional Risk Screening table (8). A nutritional risk screening score ≥3 points indicates a high risk for malnutrition.

Research methods

The patients were divided into two groups: the JF plus OI group and the IN plus OI group, based on their postoperative nutrition management. Clinicodemographic data, including age, sex, body mass index (BMI), hypertension, diabetes, smoking history, drinking history, tumor location, pathological type, neoadjuvant therapy, operation mode, operation time, intraoperative blood loss, and postoperative pathological stage, were collected. To minimize prestatistical bias, a 1:1 bias matching analysis was conducted.

The main outcome measures included perioperative drainage (postoperative thoracic drainage flow, postoperative thoracic tube drainage time, postoperative gastric tube drainage flow, and gastric tube drainage time) and the incidence of perioperative complications (pulmonary infection, anastomotic fistula, anastomotic bleeding, gastrointestinal emptying disorder, gastrointestinal obstruction, poor abdominal incision healing, chylothorax, hypoproteinemia, and anastomotic stenosis). Other measures examined were postoperative hospitalization duration (days), total hospitalization cost, and the incidence of NRS2002 scores ≥3 points at 1 week, 2 weeks, 1 month, and 3 months postoperatively. Finally, we compared the 3-year OS after surgery between the two groups. The research protocol is presented in *Figure 1*.

Statistical analysis

Age, BMI, operation time, and intraoperative blood loss were reported as the means ± standard deviations (SDs) and compared between the groups using Student's *t*-test. Sex, hypertension, diabetes, smoking history, drinking history, tumor location, pathological type, neoadjuvant therapy, surgical method, and other variables were expressed as percentages and compared using the Chi-square test. Postoperative pathological stages were also presented as percentages and compared using the rank sum test. We performed PSM matching in a 1:1 ratio for factors that may affect nutritional status in the two patient groups, including age, gender, BMI, hypertension, diabetes, smoking, alcohol consumption, operation time, intraoperative blood loss, as well as factors that may affect patient survival, such as tumor location, pathological type, neoadjuvant therapy, operation method, and pathological stage. Then, the thoracic drainage flow, drainage time, gastric tube drainage

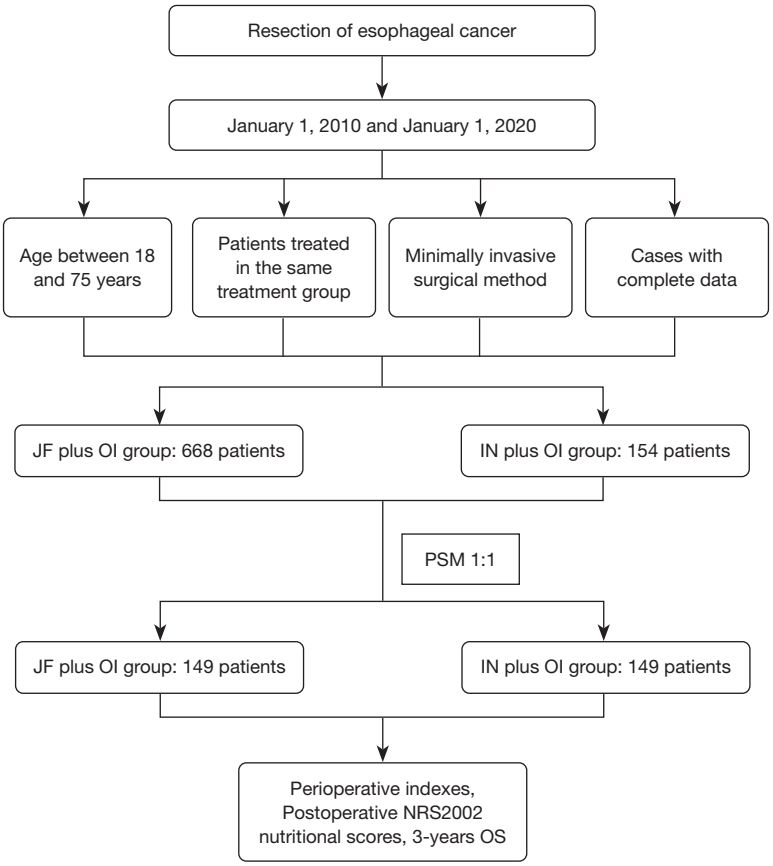

Figure 1 Flow chart of this study. The flow chart presents the retrospective analysis of perioperative indexes and 3-year OS for two nutrition management modes (JF plus OI and IN plus OI) after radical resection of esophageal cancer. This analysis was conducted at the Union Hospital of Fujian Medical University from January 1, 2010 to January 1, 2020. Following a 1:1 bias score, a total of 149 patients were included in each group. The primary outcomes compared between the two groups were the incidence of postoperative complications, postoperative nutrition score, and 3-year OS. JF, jejunostomy feeding; IN, intravenous nutrition; OI, oral intake; PSM, propensity score matching; NRS2002, Nutritional Risk Screening 2002; OS, overall survival.

flow, postoperative hospitalization days, and hospitalization cost, reported as the means ± SDs, were compared between the two groups using Student's *t*-test.

The incidence of postoperative pulmonary infection, anastomotic fistula, anastomotic hemorrhage, gastrointestinal emptying disorder, gastrointestinal obstruction, abdominal incision healing failure, chylothorax, hypoproteinemia, anastomotic stenosis, and NRS2002 scores ≥3 points at 1 week, 2 weeks, 1 month, and 3 months postoperatively were reported as percentages and compared using the Chi-square test. Survival curves of the 3-year OS were generated using GraphPad Prism for Windows (version 9.0.0, GraphPad Software, San Diego, CA, USA) and compared using the log-rank test. All statistical analyses were conducted using SPSS version 23.0 (IBM Corporation, Armonk, NY, USA). Statistical significance was defined as $P<0.05$.

Results

Comparison of clinicodemographic characteristics

Among the 822 patients included, 668 patients received JF plus OI and 154 patients received IN plus OI. There were no significant between-group differences in demographic characteristics ($P>0.05$). Meanwhile, the number of patients with preoperative diabetes complications was lower in the IN plus OI group than in the JF plus OI group (15 patients, 9.74% *vs.* 33 patients, 4.94%). There was no significant difference in personal medical history between the two groups. The primary tumor location was the middle segment of the

Table 1 Comparison of demographic characteristics and some clinical baseline indicators between the two groups

Variables	JF plus OI (n=668)	IN plus OI (n=154)	χ^2/t/Z	P
Age (years)	59.32±7.89	58.98±8.62	0.47	0.63
Gender			0.28	0.59
Male	498 (74.55)	118 (76.62)		
Female	170 (25.45)	36 (23.38)		
BMI (kg/m^2)	22.19±2.88	22.22±3.56	–0.13	0.89
Hypertension	102 (15.27)	28 (18.18)	0.79	0.37
Diabetes	33 (4.94)	15 (9.74)	5.24	0.02
Smoking	368 (55.09)	87 (56.49)	0.10	0.75
Alcohol drinking	100 (14.97)	27 (17.53)	0.62	0.42
Tumor location			6.72	0.03
Up	33 (4.94)	16 (10.39)		
Middle	508 (76.05)	112 (72.73)		
Low	127 (19.01)	26 (16.88)		
Pathological type			7.25	0.02
Squamous carcinoma	663 (99.25)	148 (96.10)		
Adenocarcinoma	2 (0.30)	3 (1.95)		
Small cell carcinoma	3 (0.45)	3 (1.95)		
Neoadjuvant therapy	45 (6.74)	13 (8.44)	0.55	0.45
Operation method			1.31	0.25
Ivor-Lewis	62 (9.28)	19 (12.34)		
McKeown	606 (90.72)	135 (87.66)		
Operation time (min)	307.94±67.33	319.13±76.27	–1.81	0.07
Intraoperative blood loss (mL)	126.05±70.88	147.60±78.97	–3.32	<0.001
Pathological stage			1.55	0.66
I	172 (25.75)	37 (24.03)		
II	215 (32.19)	48 (31.17)		
III	266 (39.82)	63 (40.91)		
IVa	15 (2.24)	6 (3.89)		

Data are presented as n (%) or mean ± SD. JF, jejunostomy feeding; OI, oral intake; IN, intravenous nutrition; BMI, body mass index; SD, standard deviation.

esophagus, and the proportion of upper segment esophageal cancer was significantly higher in the IN plus OI group than in the JF plus OI group (10.39% *vs.* 4.94%, P=0.03). The tumor pathological types were also significantly different between the two groups (P=0.02). Intraoperative blood loss was also significantly higher in the IN plus OI group than in the JF plus OI group (147.60±78.97 *vs.* 126.05±70.88 mL, P<0.001). *Table 1* presents the baseline clinicodemographic patient characteristics. After PSM, there was no significant difference in preoperative diabetic ratio, esophageal tumor location, esophageal pathological types, and intraoperative blood loss between the two groups (*Table 2*).

Table 2 Comparison of demographic characteristics and some clinical baseline indicators between the two groups after PSM

Variables	JF plus OI (n=149)	IN plus OI (n=149)	χ^2/t/Z	P
Age (years)	59.72±7.49	59.11±8.66	0.65	0.51
Gender			0.29	0.58
Male	111 (74.50)	115 (77.18)		
Female	38 (25.50)	34 (22.82)		
BMI (kg/m^2)	22.50±2.83	22.26±3.60	0.63	0.52
Hypertension	30 (20.13)	26 (17.45)	0.35	0.55
Diabetes	12 (8.05)	14 (9.40)	0.16	0.68
Smoking	77 (51.68)	86 (57.72)	1.09	0.29
Alcohol drinking	21 (14.09)	27 (18.12)	0.89	0.34
Tumor location			0.77	0.68
Up	9 (6.04)	12 (8.05)		
Middle	117 (78.52)	111 (74.50)		
Low	23 (15.44)	26 (17.45)		
Pathological type			1.41	0.50
Squamous carcinoma	147 (98.66)	144 (96.64)		
Adenocarcinoma	1 (0.67)	3 (2.01)		
Small cell carcinoma	1 (0.67)	2 (1.34)		
Neoadjuvant therapy	11 (7.38)	12 (8.05)	0.04	0.82
Operation method			2.57	0.10
Ivor-Lewis	121 (81.21)	131 (87.92)		
McKeown	28 (18.79)	18 (12.08)		
Operation time (min)	322.72±69.73	315.14±70.71	0.69	0.35
Intraoperative blood loss (mL)	140.67±92.07	142.62±71.62	0.08	0.83
Pathological stage			1.22	0.74
I	37 (24.83)	35 (23.49)		
II	52 (34.90)	46 (30.87)		
III	57 (38.26)	63 (42.28)		
IVa	3 (2.01)	5 (3.36)		

Data are presented as n (%) or mean ± SD. PSM, propensity score matching; JF, jejunostomy feeding; OI, oral intake; IN, intravenous nutrition; BMI, body mass index; SD, standard deviation.

Comparison of perioperative indicators and postoperative NRS2002 nutritional scores

Table 3 presents the comparison of perioperative indicators and postoperative NRS2002 nutritional scores between the two groups. There was no significant difference in the time of gastric tube drainage between the two groups. However, the volume of gastric tube drainage fluid was larger in the IN plus OI group than in the JF plus OI group (P<0.001). The incidence of postoperative intestinal obstruction was higher in the JF plus OI group than in the IN plus OI group (6 *vs.* 0, P=0.03). The IN plus OI group involved a significantly higher percentage of patients with

Table 3 Comparison of perioperative indexes and postoperative NRS2002 nutritional scores between the two groups

Variables	JF plus OI (n=149)	IN plus OI (n=149)	t/χ^2	P
Thoracic drainage (Union Hospital of Fujian Medical University) (mL)	1,470.24±1,172.08	2,200.80±8,528.11	−1.03	0.30
Chest tube residence time (Union Hospital of Fujian Medical University) (days)	9.56±10.58	7.99±9.26	1.36	0.17
Gastric tube drainage (Union Hospital of Fujian Medical University) (mL)	764.71±622.45	1,100.74±818.66	−3.98	0.001
Gastric tube drainage time (Union Hospital of Fujian Medical University) (days)	11.77±8.41	11.46±7.09	0.35	0.72
Postoperative complications				
Pulmonary infection	33 (22.15)	45 (30.20)	2.50	0.11
Anastomotic fistula	17 (11.41)	26 (17.45)	2.20	0.13
Anastomotic bleeding	0	3 (2.01)	–	0.24
Delayed gastric emptying	9 (6.04)	1 (0.67)	6.62	0.01
Intestinal obstruction	6 (4.03)	0	–	0.03
Poor healing of abdominal incision	2 (1.34)	0	–	0.49
Chylothorax	4 (2.68)	5 (3.36)	0.11	0.73
Hypoproteinemia	5 (3.36)	24 (16.11)	13.79	<0.001
Anastomotic stenosis	10 (6.71)	17 (11.41)	1.99	0.15
Postoperative hospital stay (days)	15.12±10.82	15.45±10.58	−0.25	0.80
Hospitalization costs (Union Hospital of Fujian Medical University) (yuan)	82,090.62±23,208.93	87,041.08±40,953.28	−1.28	0.20
NRS2002 score ≥3 points				
1 week after surgery	87 (58.39)	99 (66.44)	2.06	0.15
2 weeks after surgery	41 (27.52)	82 (55.03)	23.27	<0.001
1 month after surgery	35 (23.49)	40 (26.85)	0.45	0.50
3 months after surgery	19 (12.75)	23 (15.44)	0.44	0.50

Data are presented as n (%) or mean ± SD. NRS, Nutritional Risk Screening; JF, jejunostomy feeding; OI, oral intake; IN, intravenous nutrition; SD, standard deviation.

hypoproteinemia than the JF plus OI group (16.11% *vs.* 3.36%, P<0.001).

Furthermore, the proportion of patients with an NRS2002 nutrition screening score ≥3 points at 2 weeks postoperatively was significantly higher in the IN plus OI group than in the JF plus OI group (55.03% *vs.* 27.52%, P<0.001). However, further evaluation of the NRS2002 scores at 1 and 3 months postoperatively showed no significant difference between the two groups (P>0.05).

Comparison of 3-year OS

The 3-year OS rate in the JF plus OI group was 84.56% (n=23 deaths), whereas it was 79.87% (n=30 deaths) in the IN plus OI group, with no significant between-group difference (HR =0.79, 95% CI: 0.46–1.35, P=0.39). The survival curves for the two groups are depicted in *Figure 2*.

Discussion

Postoperative nutritional support therapy is an important aspect of perioperative management for patients with esophageal cancer. However, there is limited literature on the effects of nutritional support treatment, particularly gastric tube drainage after esophageal cancer surgery. This study found comparable gastric tube dwelling time between both groups, but the JF plus OI group was associated with significantly less gastric fluid drainage. These findings

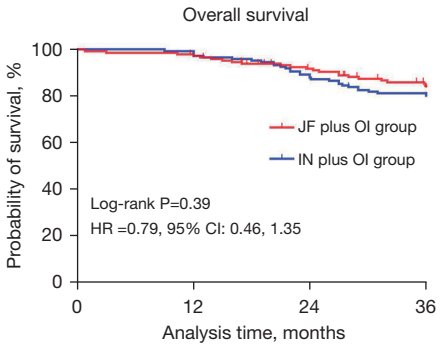

Figure 2 Three-year OS curves of the two groups. The 3-year OS of JF plus OI and IN plus OI groups was tested by log-rank (P=0.39, HR =0.79, 95% CI: 0.46, 1.35), and there was no statistical difference between the two groups. JF, jejunostomy feeding; OI, oral intake; IN, intravenous nutrition; OS, overall survival; HR, hazard ratio; CI, confidence interval.

suggest that early restoration of enteral nutrition support therapy is more beneficial than the recovery of digestive organ function and fluid secretion.

Implementation of safe and efficient nutrition support strategies can facilitate rapid patient recovery. In clinical practice, perioperative indicators and complication rates are commonly used to evaluate the safety and effectiveness of postoperative nutritional management strategies for esophageal cancer (9). A 10-year national cohort study by Turner *et al.* explored the use of JF and found that patients who received jejunostomy had a higher risk of catheter-related wound complications than those who did not (17.0% *vs.* 14.1%, P=0.02). They also had a higher incidence of all-cause complications (40.4% *vs.* 35.5%, P=0.01) (10).

Gastrointestinal emptying disorder and intestinal obstruction are common indicators used to evaluate the safety of enteral nutrition support therapy after esophageal cancer surgery. Omori *et al.* conducted a 5-year follow-up study and found that patients with jejunostomy had a significantly higher incidence of small intestinal obstruction than those without jejunostomy (12% *vs.* 0%, P=0.006) (11). Similarly, Nakai *et al.* reported a 9.6% incidence of small bowel obstruction, with 53% of the patients requiring re-surgical treatment (12). In the current study, the incidence of postoperative gastrointestinal emptying disorders or intestinal obstruction was higher in the JF plus OI group than in the IN plus OI group.

The incidence of postoperative pulmonary infection and anastomotic fistula is the primary evaluation index for the postoperative rehabilitation of patients with esophageal cancer. In this study, the IN plus OI group had a higher incidence of postoperative pulmonary infection than the JF plus OI group (30.20% *vs.* 22.15%), but the difference was not significant. The incidence of anastomotic fistula was similar in both groups. The NUTRIENT II trial, a prospective randomized controlled trial conducted in the Netherlands, demonstrated that direct oral feeding in the early stage had comparable postoperative recovery and discharge times to enteral feeding. The incidence of perioperative complications, particularly pulmonary infection and anastomotic fistula, was not increased (13).

A retrospective study of 716 patients by Zhuang *et al.* showed no significant difference in the incidence of anastomotic fistula between JF and nasal feeding. However, jejunostomy nutrition showed an advantage in the healing time of anastomotic fistula, suggesting that it may be more effective after the occurrence of anastomotic fistula. This highlights the potential for improved nutrition management strategies (14). Furthermore, their study also compared the incidence of anastomotic hemorrhage, anastomotic stenosis, chylothorax, postoperative hospitalization time, and hospitalization cost and found no significant differences. A meta-analysis by Lee *et al.*, with a sample size of 36,284 patients, showed that compared to no jejunostomy, routine indenture jejunostomy was not associated with a longer length of postoperative hospital stay or incidence of chylothorax (15).

Early malnutrition and inadequate calorie intake are common among patients who start oral feeding early (13). In our study, as many as 16.11% of patients in the IN plus OI group experienced postoperative hypoproteinemia, and this rate was significantly higher than that in the JF plus OI group. Furthermore, more than 50% of patients in the IN plus OI group were at risk of malnutrition, and this risk at 2 weeks postoperatively was significantly different from that in the JF plus OI group. Davies *et al.* conducted a retrospective study that lasted 12 months and found that using JF as a supplement to oral feeding after discharge had advantages over starting eating directly after discharge with respect to weight loss and sarcopenia. Among patients who started eating directly after discharge, 43.2% experienced nutritional failure within 90 days. In the JF group, only 8.5% of readmissions were due to nutritional issues within 1 year (16). Kanie *et al.* reported that 23.5% of patients who underwent resection of esophageal cancer required JF for more than 90 days, particularly older patients with poor physical condition and low body weight (17).

Ishida *et al.* (18) identified sarcopenia as a significant risk

factor for mortality in patients undergoing digestive system surgery. Omori *et al.* (11) also demonstrated that patients who received JF had significantly improved 5-year PFS and OS (P<0.05). In the current study, although the 3-year OS was higher in the group receiving combined jejunal and oral feeding, the difference was not significant.

Our findings showed that patients who received JF plus OI had significantly lower rates of perioperative nutritional deficiency than those who received IN plus OI. However, attention should be paid to the risk of gastrointestinal emptying and intestinal obstruction associated with JF. In addition, JF plus OI had no advantage with respect to the risk of concurrent nutritional deficiency at 1 and 3 months after surgery. However, there was no significant difference in OS between the two modalities. These results suggest that JF plus OI may be the preferable nutritional management approach after esophageal cancer resection as it can potentially reduce perioperative nutritional deficiency.

This study has some limitations. Further research is warranted to validate these findings and explore other potential factors influencing postoperative outcomes.

Conclusions

In conclusion, in patients who have undergone resection of esophageal cancer, JF plus OI has a higher risk of intestinal obstruction and gastrointestinal emptying dysfunction, while IN plus OI has a higher risk of hypoproteinemia and nutritional deficiency 2 weeks postoperatively. The 3-year OS is not significantly different between the two nutritional strategies. These findings have important implications in developing nutritional guidelines to improve the outcomes of patients undergoing esophageal cancer resection.

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Footnote

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Conflicts of Interest: All authors have completed the ICMJE uniform disclosure form (available at https://jtd.amegroups.com/article/view/10.21037/jtd-24-657/coif). The authors have no conflicts of interest to declare.

Ethical Statement: The authors are accountable for all aspects of the work in ensuring that questions related to the accuracy or integrity of any part of the work are appropriately investigated and resolved. The study was conducted in accordance with the Declaration of Helsinki (as revised in 2013). The study was approved by Institutional Review Board of Union Hospital of Fujian Medical University (ethical No. 2023JYKY017) and informed consent was taken from all the patients.

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