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Comparison of the Efficacy of Gastric Tubes Indwelling in Pre- and Post-Operative Patients with Oral and Maxillofacial Malignancies

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Rapid rehabilitation surgery; Enteral nutrition; Oral and maxillofacial; Malignancy; Nasogastric tubes indwelling

1. Abstract

In order to explore the optimal timing of gastric tubes indwelling in patients with oral and maxillofacial malignancies. We chose eighty patients with oral and maxillofacial malignancies who met the inclusion and exclusion criteria and were hospitalized in the Department of Oral and Maxillofacial Surgery in our hospital from January 2021 to February 2022, were selected and divided into the pre-operative gastric tube indwelling group and post-operative indwelling group randomly. In the pre-operative indwelling group, 40 patients were placed with nasogastric tubes in the mornings before operations and then X-rays were carried out to confirm the position of the gastric tubes. The patients were observed for nausea, vomiting, abdominal distension and other discomforts, once discomfort occurred in certain patients, they would be administered with anti-vomiting treatment and nasal Nutritional Supplement (ONS) of 50-100 ml immediately. If there were any discomforts, patients would be given ONS of 50-100 ml nasally every 3 hours according to their tolerance. The remaining 40 patients were assigned to the post-operative gastric tube indwelling group, patients were indwelled with nasogastric tubes and X-rays were carried out to confirm the positions of the tubes, and then nasal enteral nutrition was given according to the above method subsequent to complete awakening and exclusion of gastrointestinal complications of patients. During the fasting periods, patients were given intravenous rehydration according to their outputs and daily physiological needs. The weights of the patients in both groups were measured before and after operations, the number of inpatient days was counted and the pre-operative and post-operative levels of hemoglobin and plasma albumin were compared at the 1st day, 3rd day and 7th day. In this study there was no statistical difference between the two groups in terms of weights after surgery. The number of inpatient days in the pre-operative indwelling group (15.25 ± 5.18 days) was significantly lower than that in the post-operative indwelling group (21.10 ± 9.74 days). The post-operative levels of hemoglobin and plasma albumin in both two groups were statistically significantly lower than the pre-operative levels ($P < 0.01$). Postoperatively, the levels of hemoglobin and plasma albumin in pre-operative indwelling group recovered to the preoperative levels in the 7th day approximately, the levels of hemoglobin and plasma albumin were of no statistical significance in the in pre-operative indwelling group before and after operation ($P > 0.05$), while the results in the post-operative indwell-

ing group were of statistical significance ($P < 0.01$). Moreover, the plasma albumin levels of both groups were statistically significant compared to the pre-operative levels since 3rd day postoperatively ($P < 0.001$). With this, we consider that pre-operative nasogastric tubes indwelling can ensure early post-operative administration of gastrointestinal nutrition to patients, promote the post-operative plasma albumin recovery and shorten the number of hospital days.

2. Introduction

Oral and maxillofacial malignancies such as tongue, gingival and lip cancers have a certain degree of mastication and swallowing impairment due to their lesions in the first station of the digestive tract, the oral cavity [16, 27, 28]. Patients are unable to ingest food by mouth immediately after surgery, and the long-term nutrition consumption of patients stricken with oral malignant tumors prone to be rapidly mal-nutritive than that with other types of tumors [8, 24, 36]. The incidence of malnutrition in patients with oral and maxillofacial tumors has been reported to be 48.9% overseas [11, 36], and similarly, data from China suggest that malnutrition accounts for 20.45% [5], with the risk of malnutrition rising from 7.5% to 78.8% on the first day after surgery, and all nutritional indicators being significantly reduced [40]. Several Enhanced Recovery After Surgery (ERAS) studies have shown that early postoperative oral feeding can promote recovery of intestinal function, protect intestinal mucosal function, prevent dysbiosis, reduce postoperative complications and shorten postoperative hospitalization days [3, 5, 18, 29, 35]. Therefore, "clinical nutrition therapy" has aroused increasing attentions of medical staffs. Affected by surgery, postoperative changes in the anatomical structure of the maxillofacial region in patients with oral and maxillofacial malignancies can lead to difficulties in the placement of nasogastric tubes, patients' inability to cooperate with the retention of tubes due to wound pain, and the failure to take timely X-rays to confirm the right positions of tube placement may delay patients' postoperative enteral nutrition [1, 15, 32]. Therefore, how to ensure early postoperative nutrition therapy has become a key concern for oral and maxillofacial surgery medical staffs [7]. In this study, nasogastric tubes were left in place before surgery and the patients were given warm water nasally as soon as he was fully awake after surgery, with a gradual transition to nasal feeding of whole nutrients. This method can shorten the patient's inpatient days and promote rapidly the recovery of the patients' nutritional indicators compared to postoperative nasogastric tubes placement, which is a safe and reliable care strategy under the guidance of ERAS concept.

3. Materials and Methods

3.1. Clinical Data

Eighty patients with oral and maxillofacial malignancies who met the inclusion criteria and were hospitalized in our department from January 2021 to February 2022 were then selected and divided into two groups by the split-random number method. The first group was named as post-operative nasogastric tubes indwelling group, with 40 patients. And the other group was named as post-operative nasogastric tubes indwelling group, with the rest 40 patients. Among the patients, the numbers of males are 50, and the females are 30, the ages of which are of (58.33±38.31) years old. All the patients were diagnosed with oral and maxillofacial malignancies: tongue cancer of 50 cases, gingival cancer of 12 cases, palate cancer of 2 cases, mandibular cancer of 8 cases and lip cancer of 8 cases. The basic conditions of the patients in both groups are shown in Table 1. Inclusion criteria: (1) pathologically diagnosed oral and maxillofacial malignant tumors and the need for nasal feeding diet after surgery; (2) no radiotherapy or chemotherapy treatment before surgery; (3) no digestive system diseases; (4) the same group of staffs that perform health care for pre-operative and post-operative patients; (5) no transfusion of blood products during hospitalization. Exclusion criteria: (1) presence of severe anemia (hemoglobin < 60g/L) in the pre-operative examination; (2) combination of malignant tumors from other sites of the body; (3) transfer to ICU for further treatment after surgery; (4) transfusion of blood products during pre-operative period and the first 7 days after surgery; (5) combination of liver cirrhosis, liver failure, glomerulonephritis, nephrotic syndrome, renal failure, long-term dialysis and other wasting diseases; (6) other postoperative complications.

Table 1: Basic clinical information of the patients

Items	Pre-operative (n=40)	Post-operative (n=40)	*p-value*	*t-value / X^2*
Gender (M/F)	27/13	23/17	0.489	0.48
Ages (years)	58.33 ± 11.74	58.00 ± 15.61	0.916	0.105
Admission weights (kg)	57.69 ± 12.07	57.39 ± 10.43	0.906	0.119
Preoperative hemoglobin (g/L)	124.50 ± 18.03	128.02 ± 16.13	0.36	-0.922
Preoperative plasma albumin (g/L)	38.70 ± 3.55	37.54 ± 3.22	0.128	1.54

3.2. Methods

3.2.1. Post-Operative Group: Patients in the post-operative group were fasted for 12 hours preoperatively and 6 hours postoperatively, then the nasogastric tubes were placed in the patients in the 1st day after operations under the circumstance of being awake, cooperative with medical staffs and without gastrointestinal complications. If there were any discomforts, the patients were given 50-100 ml of ONS nasally every 3 hours according to the patients' tolerance conditions [1]. During the fasting period, rehydration was administered according to the patient's output and physiological needs.

3.2.2. Pre-Operative Group: Patients in the pre-operative group were fasted for 12 hours and deprived of water for 6 hours before operations. In the mornings before operations, nasogastric tubes were placed in the patients, further the radiological checks were carried out to confirm and adjust the positions of the tubes.

3.3. Observation Indicators

Fasting weights of patients were measured at the time of admissions and at the time of discharges in both groups. Fasting blood of the patients was drawn for the tests of hemoglobin and plasma albumin at the time of admissions, and in the mornings of the 1st, 3rd and 7th days postoperatively for both groups respectively. The data were collected for further analysis of the total inpatient days of both groups.

3.4. Statistical Methods

All data were analyzed with SPSS statistical software (version 22.0). The results of continuous variables were showed as mean ± standard deviation and the data were compared using paired samples t-test; $P < 0.05$ was considered statistically significant.

4. Results

4.1. Clinical Characteristics of the Both Two Groups of Patients

As the data shown in Table 1, there was no statistical difference between the two groups in terms of general information, admission weights, the levels of pre-operative hemoglobin and plasma albumin ($P > 0.05$) (Table 1).

4.2. Comparison of Early Postoperative Nutritional Indicators and Inpatient Days

As shown in Table 2, all patients had no postoperative complications and there was no statistical difference in weight change between the two groups at the time of admission and discharge. Moreover, no statistical difference in hemoglobin concentration existed except on the 3rd days postoperatively ($P = 0.020$). However, statistically significant difference was found in plasma albumin concentration on 3rd and 7th days postoperatively ($P < 0.001$), and the number of inpatient days was significantly shorter in the preoperative group than that in the postoperative group ($P = 0.001$) (Table 2).

Table 2: Comparison of nutritional indicators and length of hospital stay between the two groups

Items	Time points	Pre-operative (n=40)	Post-operative (n=40)	*p-value*	*t-value*
	At admission	124.50 ± 18.03	128.02 ± 16.13	0.36	-0.922
Hemoglobin (g/L)	Postoperative 1st day	103.22 ± 18.03	105.83 ± 14.39	0.429	-0.796
	Postoperative 3rd day	109.08 ± 13.31	101.95 ± 13.51	0.02	2.376
	Postoperative 7th day	117.67 ±13.09	106.58 ± 11.01	< 0.001	4.104
	At admission	38.70 ± 3.55	37.54 ± 3.22	0.128	1.54
Plasma albumin (g/L)	Postoperative 1st day	30.51 ± 3.09	30.41 ± 3.44	0.896	0.131
	Postoperative 3rd day	34.51 ± 2.03	31.54 ± 2.51	< 0.001	5.823
	Postoperative 7th day	38.19 ± 2.24	33.13 ± 1.97	< 0.001	10.72
Weight (kg)	At admission	57.69 ± 12.07	57.39 ± 10.43	0.906	0.119
	At discharge	57.56 ± 11.58	54.02 ± 9.87	0.145	1.471
Length of inpatient (days)	---	15.25 ± 5.18	21.10 ± 9.74	0.001	-3.352
Timing of post-operative food intake	Post-operative time (h)	5.70 ± 1.22	22.5 ± 2.49	<0.001	-38.343

4.3. Dynamic Changes in Nutritional Indicators and Weight

As the data shown (Table 3, Figure 1, Figure 2, Figure 3), there was no statistically significant difference between the preoperative group and the preoperative weight at discharge ($P = 0.565$). Nonetheless, a significant difference existed between the postoperative group and the preoperative weight at discharge ($P < 0.001$). As for plasma albumin levels, there was a significant difference between the preoperative and postoperative groups on the 1st day compared to the preoperative ($P < 0.001$), but no statistically significant change between the two groups ($P = 0.244$). Besides, there was no statistically significant difference in plasma albumin levels on the 7th day postoperatively in the preoperative group compared to preoperative ($P > 0.05$), but a statistically significant difference in plasma albumin levels on the 7th day postoperatively existed in the postoperative group compared to preoperative ($P < 0.001$) (Table 3).

Table 3: Comparison of nutritional indicators and body weight between the two groups of patients with oral and maxillofacial tumors with different nutritional modalities.

Items	Time points	Pre-operative		Post-operative		p-value (t-value)
		Difference Intra-group	p-value (t-value) Intra-group	Difference Intra-group	p-value (t-value) Intra-group	Between-group
Weight (kg)	Discharge vs Admission	-0.12 ± 1.40	0.575 (0.565)	-3.36 ± 2.56	< 0.001 (8.293)	< 0.001 (7.009)
Hemoglobin (g/L)	7th days post-op vs admission	-6.82 ± 9.56	< 0.001 (4.513)	-21.45 ± 10.65	< 0.001 (-12.740)	< 0.001 (6.462)
	7th days post-op vs 1st days after admission	14.45 ± 8.36	< 0.001 (-10.927)	0.75 ± 9.00	0.601 (0.527)	< 0.001 (7.053)
	7th days post-op vs 3rd days after admission	8.60 ± 5.75	< 0.001 (-9.466)	4.62 ± 5.27	< 0.001 (5.550)	0.002 (3.224)
	3rd days post-op vs admission	-15.43 ± 11.08	< 0.001 (8.807)	-26.08 ± 13.13	< 0.001 (-12.559)	< 0.001 (3.921)
	3rd days post-op vs 1st day post-op	5.85 ± 7.47	< 0.001 (-4.952)	-3.88 ± 9.17	0.011 (-2.672)	< 0.001 (5.199)
	1st day post-op vs admission	-21.27 ± 12.51	< 0.001 (10.754)	-22.20 ± 11.34	< 0.001 (12.380)	0.730 (0.346)
Plasma albumin (g/L)	7th days post-op vs admission	-0.52 ± 4.16	0.435 (0.789)	-4.41 ± 3.08	< 0.001 (-9.045)	< 0.001 (4.755)
	7th days post-op vs 1st day after admission	7.68 ± 3.28	< 0.001 (-14.809)	2.72 ± 2.61	< 0.001 (6.577)	< 0.001 (7.485)
	7th days post-op vs 3rd days after admission	3.67 ± 2.24	< 0.001 (-10.351)	1.58 ± 1.38	< 0.001 (7.265)	< 0.001 (5.017)
	3rd days post-op vs admission	-4.19 ± 3.48	< 0.001 (-7.624)	-5.99 ± 3.20	< 0.001 (11.860)	0.018 (2.412)
	3rd days post-op vs 1st day post-op	4.01 ± 3.21	< 0.001 (7.900)	1.13 ± 2.28	0.003 (-3.149)	< 0.001 (4.620)
	1st days post-op vs admission	-8.20 ± 4.41	< 0.001 (11.751)	-7.13 ± 3.73	< 0.001 (12.089)	0.244 (-1.173)

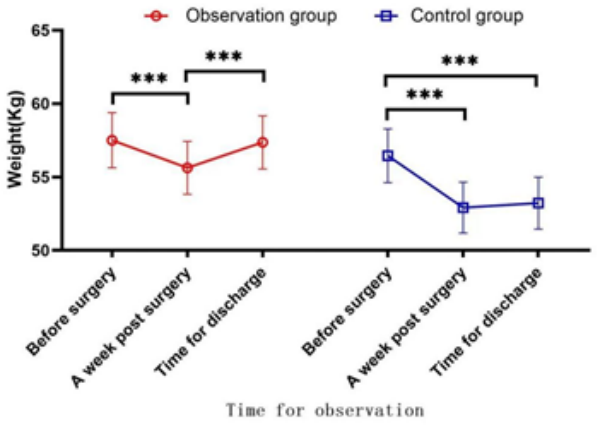

Figure 1: Intra-group comparison of body weight in two groups of patients with oral and maxillofacial tumours under different nutritional modalities.

Notes : ***:P<0.001; **:P<0.01; *:P<0.05

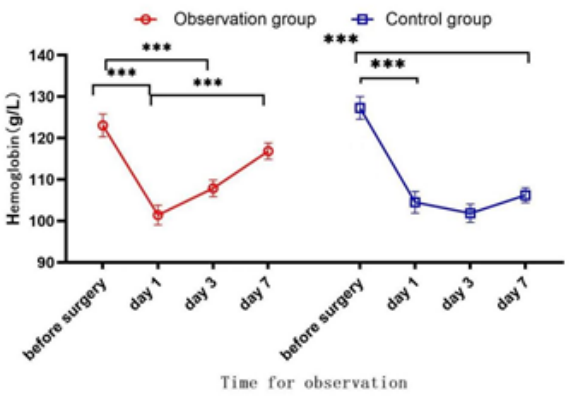

Figure 2: Intra-group comparison of haemoglobin in two groups of patients with oral and maxillofacial tumours under different nutritional modalities.

Notes: ***:P<0.001; **:P<0.01; *:P<0.05

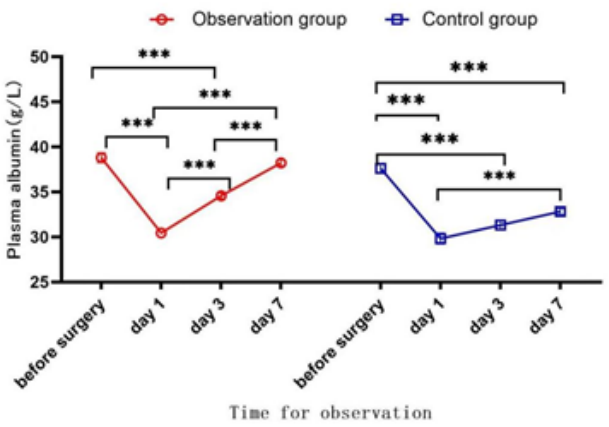

Figure 3: Intra-group comparison of plasma albumin in two groups of patients with oral and maxillofacial tumours under different nutritional modalities.

Notes: ***:P<0.001; **:P<0.01; *:P<0.05

5. Discussion

3.1. Early Postoperative Nutrition Administration can Improve the Nutritional Status of Patients with Oral and Maxillofacial Malignancies and Shorten the Number of Inpatient Days.

Plasma albumin can reliably reflect the nutritional changes of patients in the early postoperative periods [2, 12, 34], which is similar to several reports [9, 30]. In contrast, the postoperative nasogastric tubes indwelling patients were still significantly different from their admission by the 7th day, and the number of postoperative inpatient days was significantly lower in the preoperative group (15.25 ± 5.18 days) than that in the postoperative group (21.10 ± 9.74 days). The reasons are that the postoperative nasogastric tubes had to be indwelled until the patient was fully awake and free of complications such as nausea and vomiting. And a bedside X-ray photograph was required to confirm the position of the tubes, all of which could delay the patient's eating. Although intravenous nutrition is available during the period of non-enteral nutrition, parenteral nutrition is a single nutrient compared to enteral nutrition and can't meet the body's need for protein synthesis [13, 22]. As a result, the nutritional requirements for postoperative recovery increase and the supply is insufficient, resulting in delayed recovery of the patient's nutritional parameters. Several parenteral enteral nutrition societies have pointed out that perioperative nutritional supports can improve postoperative patient outcomes [17, 33]. Patients in the preoperative group were given enteral nutrition as soon as they were awake from surgery, which was exactly in line with the above guidelines, and the recovery of nutritional parameters after surgery was relatively faster.

5.2. Preoperative Gastric Tubes Indwelling can Achieve Early Postoperative Feeding for Patients with Oral and Maxillofacial Tumors.

With the development of ERAS, more and more scholars have started to pay attention to the early postoperative nutrition of patients. Prospective studies have shown that postoperative gynecological patients can be given a light liquid diet on the first postoperative day [14, 21, 25], furthermore, some scholars have shown that it is safe and feasible to start gradually giving a liquid diet to children with a postoperative awakening scores more than 7 in infant laparoscopic surgery in urology, which can reduce the crying rates and shorten the number of postoperative inpatients days [4, 20, 31]. Xiong ZY et al (ZY and Ke et al., 2021). summarized the best evidence on oral nutritional supplementation in perioperative patients: early resumption of oral feeding after surgery is not only safe and beneficial, but also is effective in reducing the incidence of postoperative complications such as infectious diseases. And oral feeding within 24 hours after surgery is advocated worldwide [10, 26, 39]. In this study, the patients in the preoperative nasogastric tubes indwelling group recovered better than that in the postoperative group in all nutritional parameters. In view of the fact that if the postoperative gastric tubes were to be indwelled in patients, the patients must be fully awake, have no gastrointestinal complications and be cooperative with medical staffs. In addition, the postoperative patients' swallowing functions impaired due to anesthesia and the change of anatomical structures, which makes the gastric tubes difficult to be indwelled and delays early nutrition intake postoperatively.

5.3. Preoperative Gastric Tubes Indwelling Possess Advantages Over Postoperative Gastric Tubes Indwelling in Terms of Ease of Handling and Gastric Tubes Positioning.

The hearing of gurgling sound method has been proven that it can't be used for initial positioning of the gastric tube in several studies [19, 23, 38]. The American Association of Critical Care Nurse (AACN) 2016 publication "Initial and ongoing validation of feeding tube placement in adults" states that the gold standard for gastric tube positioning is radiographic radiography [6] and that patients need to be radiographically positioned to confirm gastric tube locations after gastric tubes indwelling, whereas the excision and simultaneous reconstruction of oral and maxillofacial tumors last for a fairly long time (about 8~10 hours). Furthermore, there exists safety threats in the patients' postoperative transport when they are moved to take X-rays, moreover, pain and other discomforts could arise. And filming X-rays at the bedside can expose other patients in the same ward to radiation damage, which is hazardous. This study suggests that preoperative gastric tubes placement has the following advantages: Firstly, the anatomical structures are normal which is easy for tubes placement. Secondly, patients are awake and can cooperate with the nurses. Thirdly, the tubes do not interfere with the patient's movement, and the patient can move by themselves to radiological departments to confirm the positions of the tube on his own. Last but not least, there were no complications of patients from anesthesia due to the placement of the gastric tubes. Hence, we believe that it is safe and better to

place the gastric tube preoperatively.

6. Summary

This study used the ERAS concept to implement early postoperative enteral nutrition by changing the timing of the patient's gastric tubes indwelling, which could effectively improve the patient's nutritional parameters and maximize the patient's benefits. However, the ERAS concept covers three aspects of the patient: preoperative, intraoperative and postoperative. This study is limited to the implementation of early postoperative enteral nutrition measures, which still has certain limitations, and full cooperation with anesthetists and dieticians is still needed in the future to improve the patient's perioperative nutrition and promote the level of postoperative recovery.

7. Relevance for Clinical Practice

In previous clinical work, patients undergoing surgery for oral and maxillofacial malignancies would have a post-operative gastric tube inserted. In this controlled clinical trial, it was found that advancing the placement of patients' gastric tubes to the preoperative period would ensure ease of operation for the nurses, ensure safety after placement and most importantly, ensure early postoperative feeding and provide an effective means of postoperative nutritional support for patients. The comparison revealed that the patients' postoperative nutritional indicators were significantly better than those of the postoperative gastric tube placement group, which was conducive to postoperative recovery, shortening the length of hospital stay and improving patients' treatment outcome and satisfaction.

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References

1. Ahn D, Lee GJ, Sohn JH. Reconstruction of oral cavity defect using versatile buccinator myomucosal flaps in the treatment of cT2-3, N0 oral cavity squamous cell carcinoma: Feasibility, morbidity, and functional/oncological outcomes. Oral Oncol. 2017; 75: 95-99.
2. Ataseven B, du Bois A, et al. Pre-operative serum albumin is associated with post-operative complication rate and overall survival in patients with epithelial ovarian cancer undergoing cytoreductive surgery. Gynecol Oncol. 2015; 138 (3): 560-5.
3. Baluku M, Bajunirwe F, Ngonzi J, Kiwanuka J, Ttendo S. A Randomized Controlled Trial of Enhanced Recovery After Surgery Versus Standard of Care Recovery for Emergency Cesarean Deliveries at Mbarara Hospital, Uganda. Anesth Analg. 2020; 130(3): 769-76.
4. Bertram JF, Goldstein SL, Pape L, Schaefer F, Shroff RC, Warady BA. Kidney disease in children: latest advances and remaining challenges. Nat Rev Nephrol. 2016; 12(3): 182-91.
5. Bisch SP, Jago CA, Kalogera E, Ganshorn H, Meyer LA, Ramirez PT, et al. Outcomes of enhanced recovery after surgery (ERAS) in gynecologic oncology - A systematic review and meta-analysis. Gynecol Oncol. 2021; 161(1): 46-55.
6. Bourgault AM, Heath J, Hooper V, Sole ML, Nesmith EG. Methods used by critical care nurses to verify feeding tube placement in clinical practice." Crit Care Nurse. 2015; 35 (1): e1-7.
7. Crawford JE, Zubair F, Baniulyte G, Wales CJ, Ansell M, Thomson E, et al. Postoperative delirium in patients with head and neck oral cancer in the West of Scotland." Br J Oral Maxillofac Surg. 2021; 59(3): 353-361.
8. Gellrich NC, Handschel J, Holtmann H, Krüskemper G. Oral cancer malnutrition impacts weight and quality of life. Nutrients. 2015; 7(4): 2145-60.
9. Geurden B, Franck E, Weyler J, Ysebaert D. The Risk of Malnutrition in Community-Living Elderly on Admission to Hospital for Major Surgery. Acta Chir Belg. 2015; 115(5): 341-7.
10. Gillis C, Ljungqvist O, Carli F. Prehabilitation, enhanced recovery after surgery, or both? A narrative review." Br J Anaesth. 2022; 128(3): 434-448.
11. Hebuterne X, Lemarie E, Michallet M, de Montreuil CB, Schneider SM, Goldwasser F. Prevalence of malnutrition and current use of nutrition support in patients with cancer. JPEN J Parenter Enteral Nutr. 2014; 38 (2): 196-204.
12. Hulshoff A, Schricker T, Elgendy H, Hatzakorzian R, Lattermann R. Albumin synthesis in surgical patients. Nutrition. 2013; 29(5): 703-7.
13. Lembeck ME, Pameijer CR, Westcott AM. The Role of Intravenous Fluids and Enteral or Parenteral Nutrition in Patients with Life-limiting Illness. Med Clin North Am. 2016; 100(5): 1131-41.
14. Ljungqvist O, de Boer HD, Balfour A, Fawcett WJ, Lobo DN, Nelson G, et al. Opportunities and Challenges for the Next Phase of Enhanced Recovery After Surgery: A Review. JAMA Surg. 2021; 156(8): 775-784.
15. Lubek JE, Ord RA. Lip reconstruction. Oral Maxillofac Surg Clin North Am. 2013; 25 (2): 203-14.
16. Matsuda Y, Okui T, Karino M, Aoi N, Okuma S, Hayashida K, et al. Postoperative oral dysfunction following oral cancer resection and reconstruction: A preliminary cross-sectional study. Oral Oncol. 2021; 121: 105468.
17. Mechanick JI, Apovian C, Brethauer S, Garvey WT, Joffe AM, Kim J, et al. Clinical Practice Guidelines for the Perioperative Nutrition, Metabolic, and Nonsurgical Support of Patients Undergoing Bariatric Procedures - 2019 Update: Cosponsored by American Association of Clinical Endocrinologists/American College of Endocrinology, The Obesity Society, American Society for Metabolic and Bariatric Surgery, Obesity Medicine Association, and American Society of Anesthesiologists. Obesity (Silver Spring). 2020; 28(4): O1-O58.
18. Memtsoudis SG, Fiasconaro M, et al. Enhanced recovery after surgery components and perioperative outcomes: a nationwide observational study. Br J Anaesth. 2020; 124(5): 638-47.

19. Mumoli N, Vitale J, Pagnamenta A, Mastroiacovo D, Cei M, Pomero F, et al. Bedside Abdominal Ultrasound in Evaluating Nasogastric Tube Placement: A Multicenter, Prospective, Cohort Study. Chest. 2021; 159(6): 2366-2372.

20. Nelms CL, Shaw V, Greenbaum LA, Anderson C, Desloovere A, Haffner D, et al. Assessment of nutritional status in children with kidney diseases-clinical practice recommendations from the Pediatric Renal Nutrition Taskforce. Pediatr Nephrol. 2021; 36(4): 995-1010.

21. Nelson G, J. Bakkum-Gamez, Kalogera E, Glaser G, Altman A, Meyer LA, et al. Guidelines for perioperative care in gynecologic/oncology: Enhanced Recovery After Surgery (ERAS) Society recommendations-2019 update. Int J Gynecol Cancer. 2019; 29(4): 651-668.

22. Orrevall, Y, Tishelman C, Permert J, Lundström S. A national observational study of the prevalence and use of enteral tube feeding, parenteral nutrition and intravenous glucose in cancer patients enrolled in specialized palliative care. Nutrients. 2013; 5(1): 267-82.

23. Rainer F, Prenner G, Binder LP, Fickert P, Plank J. Case of nasogastric tube dysfunction. Gut. 2019; 68(2): 206-262.

24. Ravasco, P. (2019). "Nutrition in Cancer Patients." J Clin Med 8 (8).

25. Rinninella, E, Fagotti A, Cintoni M, Raoul P, Scaletta G, Quagliozzi L, et al. Nutritional Interventions to Improve Clinical Outcomes in Ovarian Cancer: A Systematic Review of Randomized Controlled Trials. Nutrients. 2019; 11(6): 1404.

26. Ripolles-Melchor J, Abad-Motos A, Cecconi M, Pearse R, Jaber S, Slim K, et al. Association between use of enhanced recovery after surgery protocols and postoperative complications in colorectal surgery in Europe: The EuroPOWER international observational study. J Clin Anesth. 2022; 80: 110752.

27. Sadakane-Sakuramoto A, Hasegawa Y, Sugahara K, Domen K, Saito S, Nakao Y, et al. Change in Nutritional Status and Dysphagia after Resection of Head and Neck Cancer. Nutrients. 2021; 13(7): 2438.

28. Schreiber A, Mattavelli D, Accorona R, Rampinelli V, Ferrari M, Grammatica A, et al. Endoscopic-assisted multi-portal compartmental resection of the masticatory space in oral cancer: Anatomical study and preliminary clinical experience. Oral Oncol. 2021; 117: 105269.

29. Teigen NC, Sahasrabudhe N, Doulaveris G, Xie X, Negassa A, Bernstein J, et al. Enhanced recovery after surgery at cesarean delivery to reduce postoperative length of stay: a randomized controlled trial. Am J Obstet Gynecol. 2020; 222(4): 372.e1-372.e10.

30. Thomas MN, Kufeldt J, Kisser U, Hornung HM, Hoffmann J, Andraschko M, Werner J, et al. Effects of malnutrition on complication rates, length of hospital stay, and revenue in elective surgical patients in the G-DRG-system. Nutrition. 2016; 32(2): 249-54.

31. Turck, D, C. P. Braegger, Colombo C, Declercq D, Morton A, Pancheva R et al. (2016). "ESPEN-ESPGHAN-ECFS guidelines on nutrition care for infants, children, and adults with cystic fibrosis." Clin Nutr 35 (3): 557-77.

32. Wang, S. M, S. C. Yin, Su XZ, Xu Q, Liu YH, Xu ZF (2021). "Magnitude of radial forearm free flaps and factors associated with loss of volume in oral cancer reconstructive surgery: Prospective study." Head Neck 43 (8): 2405-413.

33. Weimann, A, M. Braga, Carli F, Higashiguchi T, Hübner M, Klek S et al. (2021). "ESPEN practical guideline: Clinical nutrition in surgery." Clin Nutr 40 (7): 4745-61.

34. Wierdak, M, M. Pisarska, Kuśnierz-Cabala B, Witowski J, Dworak J, Major P et al. (2018). "Changes in plasma albumin levels in early detection of infectious complications after laparoscopic colorectal cancer surgery with ERAS protocol." Surg Endosc 32 (7): 3225-33.

35. Yang, R, W. Tao, Chen YY, Zhang BH, Tang JM, Zhong S et al. (2016). "Enhanced recovery after surgery programs versus traditional perioperative care in laparoscopic hepatectomy: A meta-analysis." Int J Surg 36 (Pt A): 274-82.

36. Zhang, Y, S. Tan, Wu G. (2021). "ESPEN practical guideline: Clinical nutrition in surgery." Clin Nutr 40 (9): 5071.

37. Zhang, Z, Z. Wan, Zhu Y, Zhang L, Zhang L, Wan H. (2021). "Prevalence of malnutrition comparing NRS2002, MUST, and PG-SGA with the GLIM criteria in adults with cancer: A multi-center study." Nutrition 83: 111072.

38. Zhao, W, C. Ge, Zhang W, Sun Z, Li (2018). "The important role of positioning in nasogastric tube insertion in unconscious patients: A prospective, randomised, double-blind study." J Clin Nurs 27 (1-2): e162-e168.

39. Zheng, R, C. L. Devin, Pucci MJ, Berger AC, Rosato EL, Palazzo F. (2019). "Optimal timing and route of nutritional support after esophagectomy: A review of the literature." World J Gastroenterol 25 (31): 4427-36.

40. Zhu, C, B. Wang, Gao Y, Ma X.(2018) "Prevalence and relationship of malnutrition and distress in patients with Cancer using questionnaires." BMC Cancer 18 (1): 1272.

41. ZY, X. and H. Ke, et al. "Summary of the best evidence for oral nutritional supplementation in perioperative patients." Chinese Journal of Nursing. 2021; 56(2): 283-8.