Reevaluation of the Merits and Demerits of Prophylactic Gastrostomy in Patients with Head and Neck Cancer Undergoing Concurrent Chemoradiotherapy

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Abstract

Concurrent chemoradiotherapy (CCRT) is one of the standard treatment strategies for patients with locally advanced head and neck squamous cell carcinoma (HNSCC). Prophylactic percutaneous gastrostomy (pPEG) has been reported to be useful for nutritional intervention during CCRT. On the other hand, disadvantages such as complications of gastrostomy itself and long-term PEG dependence have also been reported. In the present study, we conducted a retrospective review of the data of HNSCC cases treated with CCRT and reevaluate the merit and demerit of pPEG. Patients with pharyngeal carcinoma treated by CCRT between 2015 and 2020 were enrolled for this analysis. In this study, we limited our analysis to those who received the following treatments: Radiation therapy was planned for a total dose of 70 Gy, and the concomitant chemotherapy regimen was high-dose (100 mg/m^2) CDDP administered intravenously once every three weeks (three cycles). A total of 54 patients who underwent pPEG met the inclusion criteria. Fifteen patients who had received similar treatment without pPEG during the study period were used as a control group for comparison. The results revealed that in the pPEG group, there were fewer cases with a weight loss of 10% or more, nutritional intervention was started relatively early, and the hospitalization period after the end of CCRT was shorter as compared with the status in the non-PEG group. In regard to PEG tube dependence, the rate of PEG tube usage at 6 months after CCRT was relatively low, at approximately 13%. No significant factor was identified in this study regarding the need for nutritional intervention by routes, including PEG tube, nasogastric tube, and total parenteral nutrition, other than oral intake. In the review of the literature, it seemed difficult to make a simple comparison due to the lack of uniformity in the selection criteria for pPEG, patient background, and treatment intensity.

Keywords

- prophylactic percutaneous endoscopic gastrostomy
- head and neck cancer
- concurrent chemoradiotherapy

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Introduction

Among standard treatment strategies for head and neck cancer, concurrent chemoradiotherapy (CCRT) is an important option for patients with advanced forms of the disease.[1,2] The importance of nutritional management during CCRT is already widely known, and multiple studies have reported the association between adequate nutritional management, reduced risk of side effects of CCRT, and higher CCRT completion rates.[3–5] However, a substantial number of patients become incapable of receiving oral nutrition owing to disease progression or side effects of CCRT.

Prophylactic percutaneous endoscopic gastrostomy (pPEG) is in practical use in some institutions as it is useful for patients experiencing oral feeding problems during CCRT; however, the appropriateness of pPEG remains controversial.

In our hospital, pPEG has been performed mainly for patients undergoing CCRT for pharyngeal cancer. In this study, we conducted a retrospective review of the medical records of patients who underwent pPEG versus those who did not to reevaluate the merits and demerits of pPEG.

Materials and Methods

Patients and Treatment Specifics

Patients with pharyngeal cancer who underwent CCRT with high-dose cisplatin (CDDP) as the first-line treatment in our department between 2015 and 2020 were included in this retrospective review. Patients who underwent combination induction chemotherapy were excluded. The treatment choices were made per the clinical practice guidelines. In all cases, radiation therapy strategies were developed to treat the tumors with volumetric modulated arc therapy once daily at a total dose of 70 Gy/35 fractions at 2 Gy per fraction.

Chemotherapy plans for all patients were designed to include three courses of CDDP (100 mg/m^2) treatment every 3 weeks. As needed, the CDDP dose was reduced as per the side effects noted, including Grade 4 cytopenia or Grade 3 or higher abnormal laboratory findings (criteria for adverse events) in the previous course.

Gastrostomy and Selection of Nutritional Intervention Methods

As per the policy at our hospital that was in effect at the time of the study, all patients treated during the study period underwent pPEG except those for whom gastrostomy was not a viable option (e.g., patients who underwent total gastrectomy or those who were ineligible for anatomical reasons) and those who refused to undergo gastrostomy. Patients who could not or refused to undergo gastrostomy were treated without prophylactic gastrostomy; those who did not undergo prophylactic gastrostomy are hereinafter referred to as the nPEG group. The patients underwent oral feeding exclusively while they could and were started on gastrostomy tube feeding when the oral intake amount could no longer cover their nutritional needs. In the nPEG group, the patients who were not sufficiently capable of oral ingestion underwent nasogastric tube insertion. In both groups, patients who had uncontrolled nausea or vomiting or were ineligible for enteral tube feeding underwent total parenteral nutrition (TPN) via a central vein. The target calorie intake was calculated by multiplying the basal energy expenditure, as determined using the Harris–Benedict equation, by active and stress factors. The active factor values used were 1.2 to 1.3 depending on the patient's condition, and the stress factor values used were 1.1 to 1.2 based on a previous report.[6]

Methods and Variables of Analysis

The patients were divided into the pPEG and nPEG groups and compared. The patients in the pPEG group were further subdivided into those who underwent gastrostomy tube feeding during CCRT and those who were fed orally without the use of gastrostomy tubes. Similarly, the patients in the nPEG group were further subdivided into those who were fed orally throughout the treatment period and those who underwent nasogastric feeding or TPN. The weight decrease rate during CCRT, when any parenteral feeding intervention was initiated; the rate of treatment completion; the number of days between the end of treatment and discharge; and levels of gastrostomy tube feeding dependence at the time of and after discharge of these four groups were compared. Patient background factors were also compared with to identify the patients who required nutritional intervention.

Statistical Analysis

SPSS statistics version 26 (SPSS Inc, Chicago, Illinois, United States) was used for statistical analyses with the Chi-square test, Fisher's exact test, and Student's *t*-test. *p*-Values of <0.05 were considered statistically significant.

Results

Patient Background and Methods of Feeding

The patient background data and methods used for feeding are summarized in ►**Table 1**. Of the 69 patients included, 54 and 15 were included in the pPEG and nPEG groups, respectively. In the pPEG group, 8 (14.8%) patients did not use the gastrostomy tube feeding during CCRT. In the nPEG group, 10 (66.6%) patients had oral ingestion as the sole method of feeding throughout the treatment; the remaining 5 (33.3%) patients needed nasogastric feeding and/or TPN. The percentage of patients who needed oral feeding only throughout the treatment was significantly higher in the nPEG group.

The primary tumors were located in the epipharynx in 15 patients, in the oropharynx in 33 patients, and in the hypopharynx in 21 patients. Among the background factors, only the pretreatment albumin levels differed significantly between the pPEG and nPEG groups.

Weight Decrease Rate during CCRT

►**Fig. 1A** presents the results of the comparison of the weight decrease rate during CCRT among the four groups: pPEG (gastrostomy tube feeding and oral feeding only) and nPEG (oral feeding only and nasogastric feeding or TPN) groups.

Table 1 Patient background

	pPEG ($n = 54$)		nPEG ($n = 15$)		
	Gastrostomy tube feeding group	No gastrostomy tube feeding group	Oral ingestion–only group	Nasogastric feeding/ TPN group	*p*-Value (pPEG vs. nPEG)
Number of patients	46	8	10	5	
Sex (M:F)	41:5	7:1	10:0	4:1	1.00
Age (years; mean ± SD)	60.8 ± 10.3	61.3 ± 5.4	64.5 ± 7.4	60.2 ± 14.2	0.44
Site					
Nasopharynx	10	1	2	2	Ref
Oropharynx	22	4	5	2	0.72
Hypopharynx	14	3	3	1	0.69
T stage					
T1	13	1	1	1	Ref
T2	25	5	7	1	0.70
T3	4	2	1	3	0.16
T4	4	0	1	0	1.00
N stage					
N0	8	0	2	1	Ref
N1	10	5	2	0	0.35
N2	26	3	5	4	1.00
N3	2	0	1	0	1.00
Pretreatment BMI (mean ± SD)	22.0 ± 2.4	21.5 ± 2.6	22.9 ± 3.5	22.0 ± 4.5	0.38
Pretreatment albumin level (Alb)					
(g/dL mean ± SD)	4.3 ± 0.3	4.2 ± 0.3	4.0 ± 0.4	4.0 ± 0.7	<0.01
Pretreatment Alb <4.0 g/dL	6	2	5	2	Ref
Pretreatment Alb ≥4.0 g/dL	40	6	5	3	0.01
Feeding method					
Oral ingestion only	0	8	10	0	<0.01
Concomitant nasogastric feeding	0	0	0	3[a]	–
Concomitant PICC	7	0	0	3[a]	0.68

Abbreviations: BMI, body mass index; nPEG, non-prophylactic gastrostomy; PICC, peripherally inserted central catheter; pPEG, prophylactic percutaneous gastrostomy
[a]Including patients on both tube feeding and TPN.

The mean weight decrease rates in the entire pPEG and nPEG groups were 5.0 ± 2.8% and 5.9 ± 3.1%, respectively, and there was no statistically significant difference between them. However, patients whose weight loss fell into Grade 2 (≥10%) accounted for 3.7% of the entire pPEG group and 20% of the entire nPEG group; the percentage in the latter group was slightly higher (►**Fig. 1B**).

Time and Reason for Starting Tube Feeding or Parenteral Nutrition

►**Fig. 2A** presents the time of initiating gastrostomy tube feeding in 46 patients in the pPEG group who needed it during the treatment and that of initiating nasogastric feeding or parenteral nutrition via peripherally inserted central catheter (PICC) in 5 patients in the nPEG group who underwent during the treatment. The mean number of days before the initiation of gastrostomy tube feeding after CCRT was 23.1 ± 13.9 days, and that before the initiation of nasogastric feeding or parenteral nutrition via PICC in the nPEG group was 33.6 ± 13.8 days; thus, gastrostomy tube feeding in the pPEG group was initiated approximately 10 days earlier (►**Fig. 2A**).

The reasons for the initiation of gastrotomy tube feeding included inadequate oral food intake attributable to decreased appetite because of reduced taste sensation and malaise in 29 (63%) patients and other reasons, such as dysphagia and aspiration pneumonia, in a relatively small number of patients (►**Fig. 2B**).

Treatment Completion Rate

All patients underwent radiation treatment as planned without interruption. A total of 64 patients (92.8%)

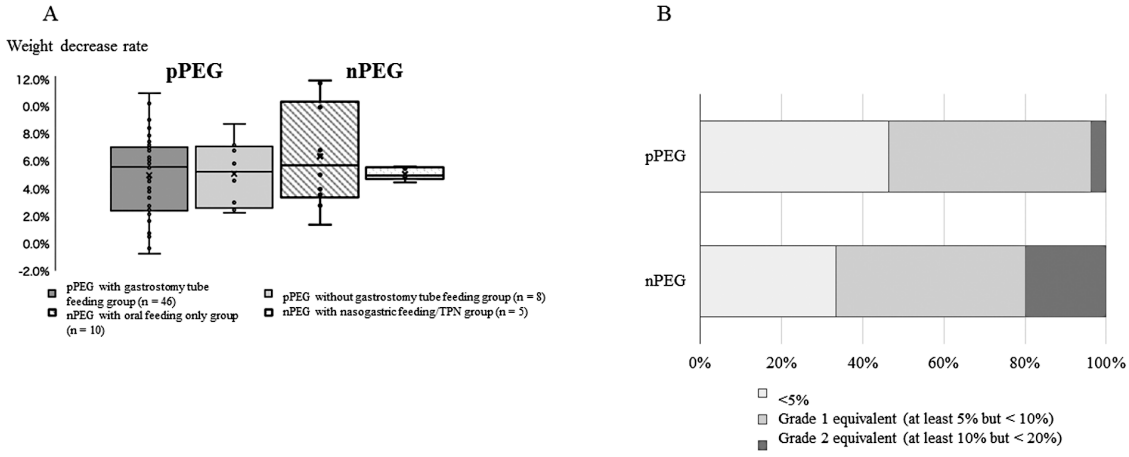

Fig. 1 (A) Rates of weight loss during treatment. Comparisons were made among four groups: the pPEG (with gastrostomy tube feeding and with oral feeding only) and nPEG (with oral feeding only and with nasogastric feeding or TPN) groups. No statistically significant differences were found between the four groups. (**B**) The comparison of proportions of patients whose weight losses fell into different grades between the pPEG and nPEG groups. Patients experiencing ≥10% weight loss accounted for a larger percentage of patients in the nPEG group.

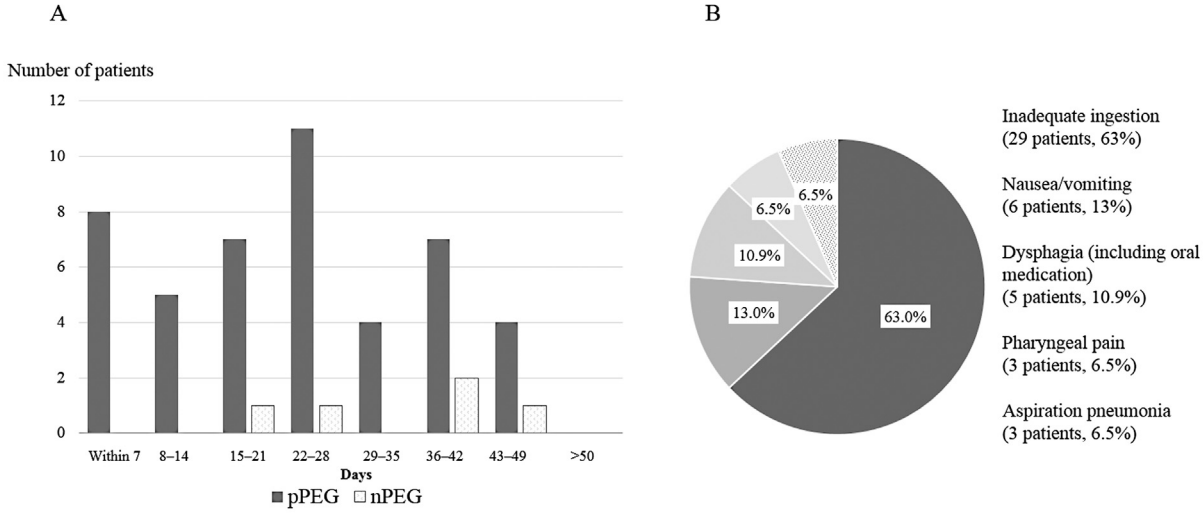

Fig. 2 Time and reason for starting tube feeding or parenteral nutrition. (**A**) The comparison performed when nonoral feeding was initiated between the pPEG and nPEG groups. The initiation of nonoral feeding was done earlier in the pPEG group than in the nPEG group. (**B**) Reason for starting gastrostomy tube feeding. Inadequate oral ingestion was the reason for the initiation of gastrostomy tube feeding in more than half of the patients.

completed chemotherapy with CDDP doses of ≥200 mg/m^2, including 31 patients (44.9%) who could receive CDDP at a dose of 300 mg/m^2. Total doses of CDDP and rates of treatment completion in four groups of patients divided according to whether or not they underwent gastrostomy and nonoral feeding are shown in ►**Fig. 3**. The total dosage in the pPEG group was larger; however, the difference was not statistically significant.

Number of Days between the End of Treatment and Discharge

The number of days between the end of treatment and discharge was compared among the pPEG subgroups (with and without gastrostomy tube feeding) and the nPEG subgroups (with oral feeding only and with nasogastric feeding or TPN intervention; ►**Fig. 4**). The median durations between the end of treatment and discharge in the respective subgroups were 10, 9.5, 11, and 29 days, which showed that patients in the nPEG subgroups stayed longer in the hospital after the treatment. Particularly, patients who underwent tube feeding or TPN in the nPEG group required more time before discharge from the hospital ($p < 0.05$).

Methods of Feeding during and after Discharge

Methods of feeding at the time of and 6 months after discharge in the pPEG group are shown diagrammatically (►**Fig. 5**). At the time of discharge, 27 patients (50.0%) were dependent entirely on gastrostomy tube feeding, and 8 more patients were fed through both oral ingestion and gastrostomy tube feeding; thus, a total of 35 patients (64.8%) were on gastrostomy tube feeding at the time of discharge. Six months after discharge, seven patients (13.0%) were on

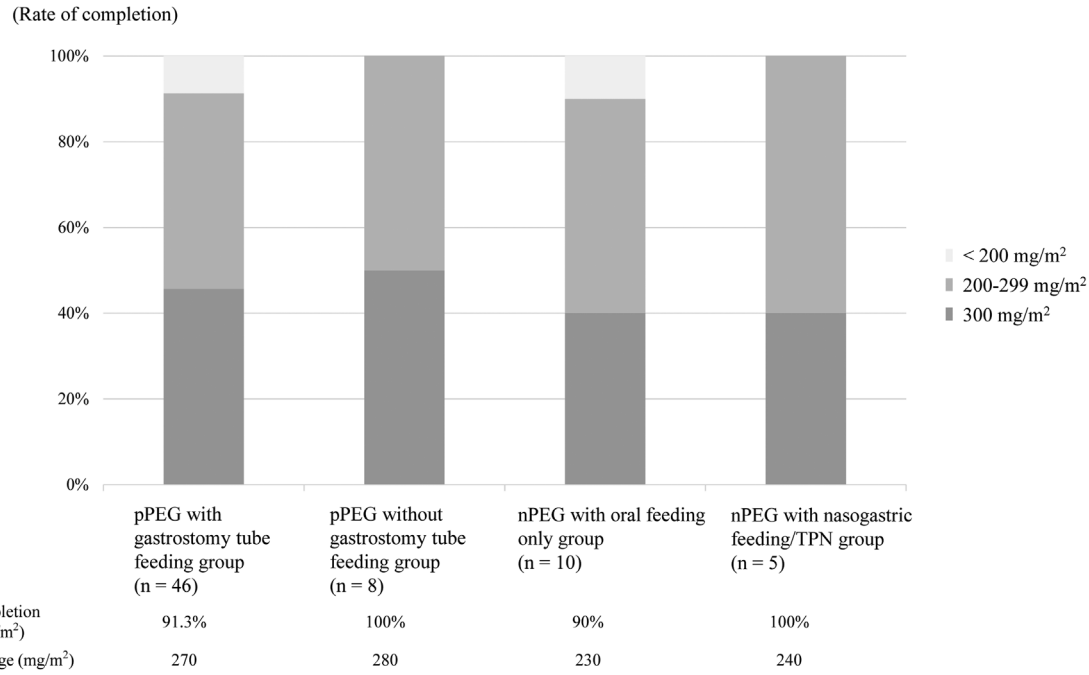

Fig. 3 Rates of treatment completion and total dosages of CDDP. Comparisons were made between four groups: pPEG (with gastrostomy tube feeding and with oral feeding only) and nPEG (with oral feeding only and with nasogastric feeding or TPN) groups. Treatment completion was defined as $\geq$200 mg/m^2; $\geq$90% of patients completed the treatment in all groups.

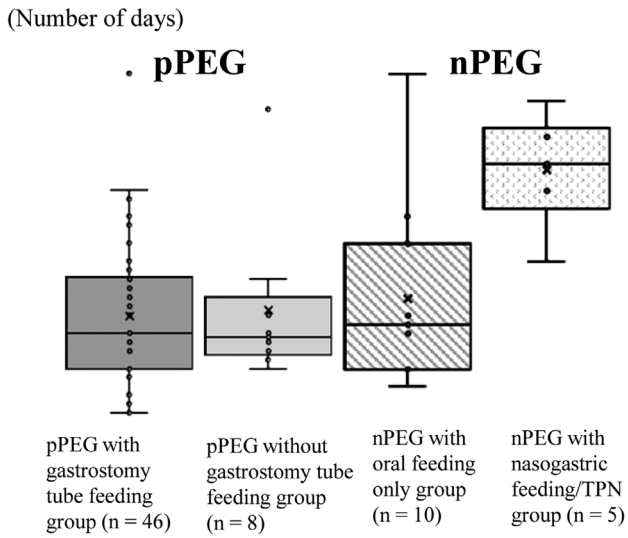

Fig. 4 Number of days between the end of treatment and discharge. Comparisons were made between four groups: the pPEG (with gastrostomy tube feeding and with oral feeding only) and nPEG (with oral feeding only and with nasogastric feeding or TPN) groups. The number of days between the end of treatment and discharge in patients who underwent nasogastric feeding or TPN in the nPEG group was significantly larger than that in any other group ($p < 0.05$).

gastrostomy tube feeding, including three patients who were incapable of oral feeding and four patients who were on both oral feeding and gastrostomy tube feeding. All patients who were incapable of oral feeding had dysphagia due to local or cervical lymph nodes that remained after the treatment.

In the nPEG group, all patients needed oral feeding only at the time of discharge, except for one patient (6.7%) who needed tube feeding. The patient who needed tube feeding at the time of discharge remained on tube feeding for 6 months after discharge.

Exploration of Risk Factors for (Parenteral) Nutritional Intervention

Finally, risk factors for nutritional intervention were explored after patients were divided into the nutritional intervention group (consisting of patients on gastrostomy tube feeding in the pPEG group and patients on nasogastric feeding or TPN in the nPEG group) and the no-nutritional intervention group (patients on oral feeding only in the pPEG and nPEG groups) (►**Table 2**). In this study, we analyzed age, sex, primary tumor site, T/N stage, pretreatment BMI, and

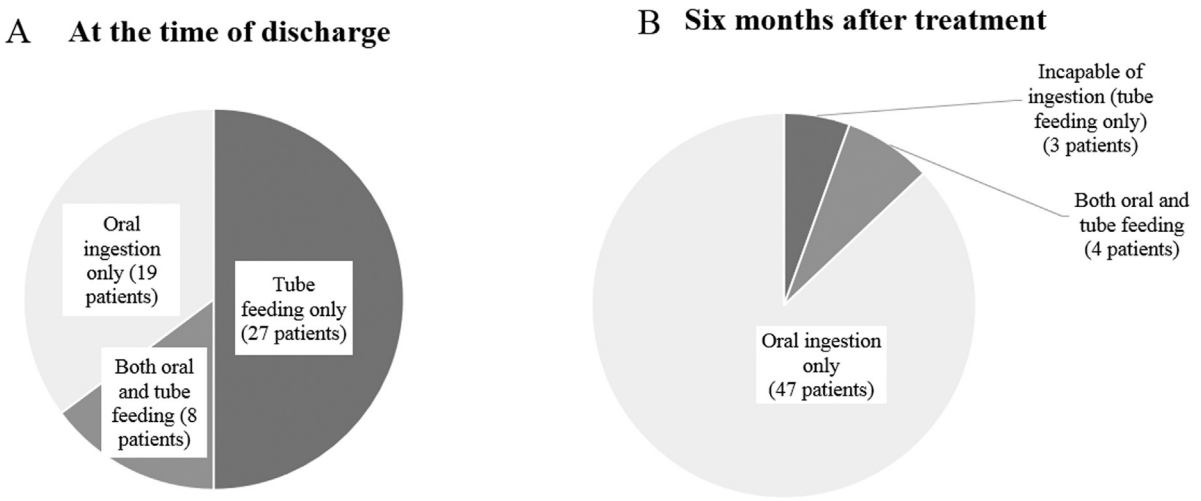

Fig. 5 (A) Feeding methods at the time of discharge. During discharge, 27 patients (50%) were dependent entirely on gastrostomy tube feeding. (B) Feeding methods in the pPEG group 6 months after discharge. Six months after discharge, 7 patients (13%) were on gastrostomy tube feeding, including 3 patients (5.6%) who were fully dependent on this feeding method.

Table 2 Exploration of risk factors for nutritional intervention (parenteral)

	Nutritional intervention (pPEG gastrostomy tube feeding + nPEG tube feeding/TPN)	No nutritional intervention (pPEG/nPEG oral ingestion only)	*p*-Value
Number of patients	51	18	
Sex (M:F)	45:6	17:1	0.67
Age (years; mean ± SD)	60.7 ± 10.5	63.1 ± 6.6	0.39
Site			
Nasopharynx	12	3	Ref
Oropharynx	24	9	0.73
Hypopharynx	15	6	0.71
T stage			
T1	14	2	Ref
T2	26	12	0.19
T3	7	3	0.34
T4	4	1	1.00
N stage			
N0	9	2	Ref
N1	10	7	0.25
N2	30	8	1.00
N3	2	1	0.55
Pretreatment BMI			
Mean ± SD	22.0 ± 2.6	22.3 ± 3.1	0.74
Pretreatment Alb			
Mean ± SD (g/dL)	4.3 ± 0.4	4.1 ± 0.4	0.07
Pretreatment Alb <4.0 g/dL	8	7	Ref
Pretreatment Alb ≥4.0 g/dL	43	11	0.05

albumin level; however, none of them were found to be significant predictors.

Discussion

Prophylactic gastrostomy before CCRT for head and neck cancer is useful for nutritional management in some cases; however, the appropriateness of prophylactic gastrostomy remains controversial considering the risk of gastrostomy tube dependence after the treatment.

We conducted a retrospective review of medical records to compare 54 patients with pharyngeal cancer who underwent pPEG before CCRT using high-dose CDDP at our department who were treated at the same time without gastrostomy because the procedure was not a viable or preferred option. In terms of the possible merits of pPEG, the comparison revealed that fewer patients experienced $\geq$10% body weight loss, nutritional interventions were initiated relatively earlier, and the number of days between the end of treatment and discharge was lesser in the pPEG group. Regarding the dependency on gastrostomy tube that is generally considered a demerit of this treatment, approximately 13% of patients were on gastrostomy tube feeding at 6 months after discharge.

Merits of Prophylactic Gastrostomy

The main points of discussion in previous articles reporting the merits of prophylactic gastrostomy in CCRT for head and neck cancer were as follows: (1) smaller weight decreases during the treatment, (2) decreased incidence rates of aspiration pneumonia, and (3) shorter lengths of hospitalization and decreased unscheduled visits.[7–16]

Previously reported rates of weight decreases during the treatment were 4.3 to 10% in the pPEG group and 5.2 to 19% in the control group (e.g., nPEG and reactive PEG), differing somewhat largely among different reports. In this study, the weight decrease rate in the pPEG group (5.0% $\pm$ 2.8%) was lower than that in the pPEG group (5.9% $\pm$ 3.1%); however, the difference was not statistically significant. Moreover, patients experiencing $\geq$10% weight loss were more common in the nPEG group (►**Fig. 1B**), demonstrating the possibility of decreasing the incidence of such severe weight decreases through earlier aggressive nutritional interventions with pPEG (►**Fig. 2A**). A previous report focusing on albumin decrements during treatment demonstrated that the albumin decrement in the patients who did not undergo prophylactic gastrostomy and underwent nutritional interventions (e.g., tube feeding and TPN) was greater[16]; in the present study, the mean albumin decrease rates in the pPEG and nPEG groups were 19.5% $\pm$ 8.6% and 15.5% $\pm$ 10.1%, respectively, showing no statistically significant difference. In terms of the length of hospital stay, the number of days from the end of treatment to discharge in the pPEG group was smaller, which supports a previously reported merit of pPEG.

Demerits of Prophylactic Gastrostomy

Major demerits of prophylactic gastrostomy described in previous reports include the following: (1) possible complications associated with gastrostomy and (2) decreased swallowing function (including gastrostomy tube dependence).[7–16] Negative opinions concerning pPEG are also based on the fact that some patients can complete their treatment after gastrostomy without undergoing gastrostomy tube feeding.

Complications associated with gastrostomy have been reported to occur in 5 to 10% of cases and include mild ones, such as infection and pain at the gastrostomy site.[10,12,16] Among the cases included in this study, blood oozing on the body surface after gastrostomy occurred in six (16.7%) patients; this bleeding was arrested by compression with a Y-gauze in five patients and by additional suturing around the gastrostomy site in the remaining one patient. Other complications were pain around the gastrostomy site due to infection in three (5.6%) patients, one of which was treated using systemic antibiotics, and early gastrostomy tube replacement for tube incompatibility in one (1.9%) patient.

Decreased swallowing function, which was reflected by the use of gastrostomy tube feeding or the gastrostomy maintained after the end of treatment, was noted in approximately 0 to 24% of patients 6 to 12 months after the end of treatment.[7–14,16] Many articles reporting the incidence rates of approximately 20% appear to constitute a basis for seeing gastrostomy dependence as a problem after pPEG. However, reports have documented that decreased swallowing function occurred in 11 to 65% of cases in the reactive PEG group consisting of patients who commenced treatment without undergoing gastrostomy and then underwent gastrostomy during the treatment, highlighting the fact that withdrawal from gastrostomy tube feeding can be difficult in some cases.[9,11–13] Therefore, a prophylactic gastrostomy is not necessarily responsible for gastrostomy dependence, and gastrostomy may become necessary even after treatment in patients who develop dysphagia during treatment.

Among patients included in this study, 13% of patients in the pPEG group were on gastrostomy tube feeding at 6 months, while one of five patients (20%) in the nPEG group who required tube feeding or TPN intervention remained on tube feeding for at least 6 months after treatment (this patient eventually underwent surgical enterostomy). Particularly, in three patients in the nPEG group who were on tube feeding, tube feeding was initially initiated for aspiration pneumonia, and pneumonia occurred after discharge in two patients. Given that treatment-requiring pneumonia occurred after discharge in only 4 of 54 patients (7.4%) in the pPEG group, the posttreatment swallowing function was possibly minimal among patients in the nPEG group who required a nasogastric tube; however, the number of cases is too small to make a precise comparison.

Furthermore, when gastrostomy dependence is used as an indicator of decreased swallowing function after treatment, the percentage of patients dependent on gastric tube feeding may vary according to the definition of gastrostomy dependence used. For example, we evaluate the therapeutic effectiveness of CCRT based on results of imaging examinations (CT and FDG-PET) 2 to 3 months after the end of treatment and consider the removal of the gastrostomy tube if the lesion is resolved and the gastrostomy tube is not in use. However, while all patients in the pPEG group (except those with

Table 3 Overview of previous articles on prophylactic gastrostomy

Author and year	Study design	Number of patients	Primary tumor location	Treatment modality	Chemotherapy specifics	Selection of basic feeding methods
Chen et al[7]	Retrospective	120	Epi/oro/hypopharynx, larynx, unknown primary	CCRT	CDDP monotherapy (details unknown)	Determined at the discretion of attending physician based on the primary tumor location and patient's condition and request
Silander et al[8]	Prospective	134	Epi/oro/hypopharynx, oral cavity, unknown primary	RT, CCRT, surgery + postoperative (C)RT	CDDP + 5-FU (2 cycles)	Determined in a random fashion
Williams et al[9]	Retrospective	104	Oropharynx	CCRT cases including induction chemotherapy (38%), surgery + postoperative CCRT (13%)	CDDP (high dose; 3 cycles), CBDCA	Determined by attending physician based on patient's condition
Olsen et al[10]	Retrospective	445	Epi/oro/hypopharynx, larynx, oral cavity	CCRT	CDDP (high dose; 3 cycles), CBDCA + 5-FU, cetuximab	Center A: tube feeding as needed Center B: pPEG was recommended
Lewis et al[11]	Retrospective	109	Oropharynx, larynx, oral cavity	CCRT	CDDP (high dose; 3 cycles)	Determined by attending physician based on patient's condition
Baschnagel et al[12]	Retrospective	193	Oro/hypopharynx, larynx, oral cavity, unknown primary	CCRT	CDDP (protocol unknown), CBDCA, cetuximab	Determined at the discretion of patient and attending physician
Kramer et al[13]	Retrospective	86	Epi/oro-pharynx, larynx, oral cavity	CCRT, surgery + postoperative CCRT (38%)	CDDP (high dose; 3 cycles, weekly)	Determined at the discretion of patient and attending physician
Pohar et al[14]	Retrospective	104	Larynx, hypopharynx, other unspecified	CCRT	CBDCA + paclitaxel weekly (52 patients), CDDP weekly (14 patients), many others	Determined by attending physician in an integrated fashion based on various factors such as the primary tumor location and patient's condition and request
Brown et al[15]	Prospective	130	Epi/oro/hypopharynx, oral cavity, unknown primary	CCRT, surgery + postoperative CCRT (12%)	CDDP (high dose; 3 cycles, weekly), Cetuximab (breakdown unknown)	Patients in the high-risk group were recommended to undergo pPEG. nPEG could be chosen at the discretion of attending physician and patient
Kano et al[16]	Retrospective	326	Oro/hypopharynx, larynx	CCRT cases including induction chemotherapy (22.3%)	CDDP (high dose; 3 cycles, weekly), CDDP arterial infusion, CBDCA, cetuximab	pPEG was recommended in principle, nPEG could be chosen at the discretion of attending physician
This study	Retrospective	69	Epi/oro/hypopharynx	CCRT	CDDP (high dose; 3 cycles)	pPEG except for patients for whom it was not a viable or preferred option

Abbreviation: CCRT, concurrent chemoradiotherapy; CDDP, cisplatin, CBDCA: carboplatin; pPEG, prophylactic percutaneous gastrostomy.

recurrent and residual tumors) were capable of oral feeding 6 months after the treatment, the gastrostomy tube was not removed in 15 patients. In clinical practice, it is debatable whether patients capable of oral ingestion but use gastrostomy secondarily should be included in the category of gastrostomy-dependent patients.

Problems with Previous Reports on Prophylactic Gastrostomy in CCRT for Head and Neck Cancer

Currently, the National Comprehensive Cancer Network guidelines recommend pPEG only for patients who meet certain criteria, such as marked weight loss before treatment, dysphagia, and aspiration, and not for all patients in the nutritional management section.[1] Such a recommendation is based on previous pPEG-related reports; however, the consistency among the findings described in these reports is questionable. We summarized 10 studies that were reported in or after 2010 and compared pPEG and other feeding means in ≥80 patients in ►**Table 3**.[7–16] Most studies (including ours) were retrospective in nature. As for the selection of feeding methods, pPEG was chosen as a general rule in a relatively small number of studies (including ours), and the choices were made subjectively by physicians when they decided whether to perform pPEG in the majority of studies. In terms of cancer treatments, most patients included underwent chemoradiotherapy; however, some patients who underwent induction chemotherapy or postoperative CCRT were also included, and even patients with primary oral cancer, for which chemoradiotherapy is not the first-choice treatment, were included in several studies. All the chemotherapy regimens used were CDDP-based; however, weekly and triweekly dosing schedules were used in a mixed manner or carboplatin and cetuximab regimens were used in some studies. Therefore, comparisons among the findings reported in these articles appeared to be arduous due to differences in patient background.

The expected merits of suppressing weight loss are reduced side effects of CCRT and the completion of chemotherapy; however, the doses of anticancer agents and rates of treatment completion were described in four articles, which constitute only less than half of the articles analyzed, partly because chemotherapy regimens used in these studies were not uniform.[9,11,13,16] In those articles, the completion rate in patients who did not undergo prophylactic gastrostomy or underwent reactive PEG was 66.7 to 81.7%, which was slightly lower than the 80.1 to 96% found in patients who underwent pPEG; one cannot rule out the possibility that the effectiveness of nutrition therapy was not evaluated accurately because the treatment intensity was too low.

In this study, rates of chemotherapy completion did not differ significantly between the pPEG group and the nPEG group; however, they were similar to the rates reported in previous reports (92.6% in the pPEG group and 93.3% in the nPEG group). These data indicate that similar outcomes of aggressive nutritional management can be achieved in patients who did (or could) not undergo gastrostomy.

Indications for Prophylactic Gastrostomy

Finally, 8 out of 54 patients (14.8%) who underwent gastrostomy did not require gastrostomy tube feeding throughout our study period. At least, for these cases, we have to say that prophylactic gastrostomy was unnecessary. Moreover, only a minority of patients in the nPEG group (5 out of 15 patients; 33.3%) underwent tube feeding or TPN. Therefore, we cannot rule out the possibility that some patients in the pPEG group who underwent gastrostomy tube feeding actually did not require gastrostomy. In this study, we mainly analyzed background factors to find predictors for identifying patients who are going to require feeding routes other than oral ingestion but could not identify risk factors (►**Table 2**). Previously reported factors associated with a high risk of requiring gastrostomy tube feeding include performance status 2, certain primary sites (supraglottic/oropharynx/hypopharynx), ≥T3 stage, N3 stage, the use of CDDP as chemotherapy, a total CDDP dose of ≥200 mg/m^2, and BMI of <25 kg/m^2.[16,17] We intend to review the case records again and identify patients with a low need for gastrostomy tube feeding to consider initiating the treatment without prophylactic gastrostomy.

Conclusions

In this study, we conducted a retrospective medical record review to compare 54 patients with pharyngeal cancer who underwent pPEG before CCRT using high-dose CDDP in our department. We included patients with pharyngeal cancer who were treated around the same time without undergoing gastrostomy because they could not or chose not to undergo the procedure.

As possible merits of pPEG, the comparison revealed that fewer patients experienced ≥10% body weight loss, nutritional interventions were initiated relatively earlier, and the number of days between the end of treatment and discharge was smaller in the pPEG group. Regarding the so-called gastrostomy tube dependence that was considered to be a demerit after treatment, approximately 13% of patients were still on gastrostomy tube feeding 6 months after discharge.

Simple comparisons with previous studies seemed to be difficult because the selection criteria for patients undergoing gastrostomy, patient background, and treatment specifics were not uniform.

No significant factors to predict the necessity of intervention through nonoral feeding routes were identified in this study, and this is a possible subject for future studies.

Informed Consent

This study was approved by Shinshu University Ethical Committee and informed consent was obtained in the form of opt-out on the web site.

Conflict of Interest

None declared.

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