



Trabajo Original

Nutrición artificial

Gastrostomy vs nasogastric tube feeding in patients with head and neck cancer during radiotherapy alone or combined chemoradiotherapy

Gastrostomía o sonda nasogástrica en pacientes con cáncer de cabeza y cuello durante la radioterapia o tratamiento combinado con quimiorradioterapia

Ainara Soria¹, Elisa Santacruz², Belén Vega-Piñero², María Gión¹, Javier Molina¹, María Villamayor¹, Raquel Mateo², Javier Riveiro², Lia Nattero² and José I. Botella-Carretero^{2,3}

Departments of ¹Clinical Oncology, and ²Endocrinology and Nutrition. Hospital Universitario Ramón y Cajal. Instituto Ramón y Cajal para la Investigación Sanitaria (IRyCIS). Madrid, Spain. ³Centro de Investigación Biomédica en Red de Fisiopatología de la Obesidad y Nutrición (CIBERObn). Hospital Universitario Ramón y Cajal. Instituto Ramón y Cajal para la Investigación Sanitaria (IRyCIS). Madrid, Spain

Abstract

Introduction: Patients with head and neck cancer (HNC) submitted to radiotherapy alone or combined chemoradiotherapy present a high prevalence of malnutrition at baseline. Prophylactic use of gastrostomy has been suggested for these patients for delivering enteral nutrition. On the other hand, other authors have failed to demonstrate the effectiveness of this measure over nasogastric tube feeding.

Material and methods: We studied 40 patients with HNC with moderate or severe malnutrition who were offered either prophylactic percutaneous gastrostomy before starting oncologic treatment or close follow-up with nutritional counseling with the placement of a nasogastric tube when necessary.

Results: There were no significant changes throughout the study period in weight ($p = 0.338$), body mass index (BMI) ($p = 0.314$) or serum proteins ($p = 0.729$), and these changes showed no differences between the gastrostomy vs nasogastric tube feeding groups. The amount of delivered energy was above the estimated energy needs with both gastrostomy and nasogastric tube feeding, but there were no differences in the total energy provided by enteral nutrition between groups. Patients in the gastrostomy group received enteral nutrition support for a longer period of time ($p = 0.007$).

Conclusions: Both gastrostomy and nasogastric tube feeding are effective methods of delivering enteral nutrition in patients with HNC submitted to radiotherapy alone or combined chemoradiotherapy, with no differences between them in terms of avoiding further nutritional deterioration.

Key words:

Head and neck cancer. Malnutrition. Enteral nutrition. Gastrostomy. Nasogastric tube. Chemoradiotherapy.

Resumen

Introducción: los pacientes con cáncer de cabeza y cuello (CCC) que reciben radioterapia o tratamiento combinado con radioterapia y quimioterapia presentan una elevada prevalencia de desnutrición. El uso profiláctico de la gastrostomía se ha sugerido para el soporte nutricional enteral en estos pacientes. Sin embargo, otros autores no han demostrado un beneficio claro de esta medida frente al uso de la sonda nasogástrica.

Material y métodos: se realizó el estudio en cuarenta pacientes con CCC con desnutrición moderada o grave, a los cuales se les ofreció la gastrostomía percutánea antes de empezar el tratamiento oncológico o bien seguimiento estrecho mediante consejo nutricional y la colocación de una sonda nasogástrica en el momento necesario.

Resultados: no se encontraron cambios significativos en cuanto a peso, ($p = 0,338$), índice de masa corporal ($p = 0,314$) o proteínas séricas ($p = 0,729$) durante el seguimiento, y estos cambios tampoco fueron diferentes entre los pacientes con gastrostomía o con sonda nasogástrica. Las calorías recibidas fueron superiores a los requerimientos estimados en ambos grupos, pero no existieron diferencias entre ellos. Los pacientes con gastrostomía recibieron nutrición enteral durante más tiempo ($p = 0,007$).

Conclusiones: tanto la gastrostomía como la sonda nasogástrica son eficaces para el soporte nutricional enteral en pacientes con CCC que reciben radioterapia o tratamiento combinado con quimioterapia y radioterapia, sin mostrar diferencias en la evolución nutricional entre ambas.

Palabras clave:

Cáncer de cabeza y cuello. Desnutrición. Nutrición enteral. Gastrostomía. Sonda nasogástrica. Quimiorradioterapia.

Received: 20/10/2016
Accepted: 18/01/2017

Soria A, Santacruz E, Vega-Piñero B, Gión M, Molina J, Villamayor M, Mateo R, Riveiro J, Nattero L, Botella-Carretero JI. Gastrostomy vs nasogastric tube feeding in patients with head and neck cancer during radiotherapy alone or combined chemoradiotherapy. Nutr Hosp 2017;34:512-516

DOI: <http://dx.doi.org/10.20960/nh.680>

Correspondence:

José I. Botella-Carretero. Department of Endocrinology and Nutrition and Centro de Investigación Biomédica en Red de Fisiopatología de la Obesidad y Nutrición (CIBERObn). Hospital Universitario Ramón y Cajal (IRyCIS). Ctra. de Colmenar, km 9,1. 28034 Madrid, Spain
e-mail: joseignacio.botella@salud.madrid.org

INTRODUCTION

The incidence of malnutrition in cancer patients has been reported to range from about 15% to 80%. Malnutrition contributes to an increased risk of toxicity, infection, and healthcare costs, as well as decreased treatment response, compliance, quality of life, and ultimately patient survival (1-3). Besides, most of the radiotherapy-related toxicities are closely associated with nutritional problems (4).

Given the deteriorating side effects of radiotherapy combined or not with chemotherapy, several trials in patients undergoing radiotherapy for head and neck cancer (HNC) showed that the nutritional intervention positively influenced weight, nutritional status, and quality of life compared to usual care (5-10). Furthermore, it has been suggested that prophylactic use of gastrostomy could be important for patients with HNC submitted to radiotherapy, combined or not with chemotherapy, with a high risk of developing mucositis and severe malnutrition (11). On the other hand, other authors have failed to demonstrate the effectiveness of prophylactic gastrostomy (12).

Early nutritional screening is a very important measure in order to identify patients with malnutrition and/or important gastrointestinal symptoms. The latter may interfere with normal eating behavior and pose the patient in a high risk of malnutrition (13), having also a higher mortality risk (14). Nutritional intervention is a very important component of the care of these patients and has to be implemented in early stages and in an individualized way, including a dietician counseling (15-17). Implementing such a protocol at our clinical setting has shown that 87% of the patients were able to meet their nutritional needs through the oral route with the use of an adapted diet and oral nutritional supplements, ameliorating protein-energy malnutrition (18).

In this study we aimed to evaluate the effects of enteral nutrition either through prophylactic gastrostomy or close follow-up with oral nutritional supplements and delayed placement of nasogastric tube in malnourished patients with HNC submitted to radiotherapy alone or combined chemoradiotherapy.

PATIENTS AND METHODS

We studied 40 patients with HNC attending the Department of Oncology with moderate or severe malnutrition before starting oncologic treatment. The protocol at our institution included the following steps, as previously reported (18): every patient with HNC attending the Department of Oncology was evaluated at baseline, and then twice a week after completion of treatment by members of the Department of Endocrinology and Nutrition. An auto-administered version of the Subjective Global Assessment (SGA) was applied to every patient at baseline (13). Patients with B or C rating (those with moderate or severe malnutrition) were offered either prophylactic percutaneous gastrostomy before starting oncologic treatment or close follow-up with nutritional counseling and oral nutritional supplements, with the placement of a nasogastric tube if necessary. The indication for the latter was

the presence of severe dysphagia with a < 65% of daily intake of the total estimated daily calorie needs, even after appropriate nutritional counseling, adapted diets and oral nutritional supplements, in the follow-up. Therefore, this study was not randomized, and patients took part in the decision after explaining to them the pros and cons of each procedure. Patients with severe liver or renal failure were excluded. The Ethics Committee of the Hospital Ramón y Cajal approved the study, and informed consent was obtained from the participants.

Anthropometric parameters were measured, body mass index (BMI) was calculated, and the percentage of weight loss was also recorded. Serum albumin was measured by nephelometry. Normal ranges were 3.3-5.2 g/l, as reported by the Central Laboratory of our institution. Estimated daily calorie needs were calculated by the Harris-Benedict equation and multiplied by a factor of 1.2. The type of enteral nutrition employed in these cases was a standard polymeric or hyperproteic product as needed. Patients were followed-up until discontinuation of nutritional support.

Results are expressed as mean \pm standard deviation (SD) unless otherwise stated. The Kolmogorov-Smirnov statistic was applied to continuous variables to assess normality. Logarithmic or square root transformations were applied as needed to ensure a normal distribution of the variables. Comparisons between groups were performed using the independent Student's t test or the Mann-Whitney U test, and using the χ^2 test for discontinuous variables, as needed. The analysis of baseline and final variables was performed by the paired Student's t test, the Wilcoxon test, or the General Linear Model (GLM) repeated measures tool for the inclusion of between factors or covariates. Analyses were performed using SPSS 17 (SPSS Inc., Chicago, Illinois). $p < 0.05$ was considered as statistically significant.

RESULTS

Of the 40 included patients, seven were women and 33 were men. They had the following tumors: larynx ($n = 14$), oropharynx ($n = 8$), oral cavity ($n = 8$), cervical lymph node squamous metastasis with unknown primary cancer ($n = 4$), cavum ($n = 4$), and hypopharynx ($n = 2$). Enteral nutrition was delivered through nasogastric tube in 29 patients and percutaneous gastrostomy, in eleven patients. Baseline characteristics were similar in both groups (Table I).

When comparing patients on radiotherapy alone *vs* those with combined chemoradiotherapy (Table II), similar baseline characteristics were observed, except for the percentage of patients in stage IV, which was higher in the combined chemoradiotherapy group ($p = 0.001$).

During follow-up, there were no significant changes throughout the study period in weight ($p = 0.338$), BMI ($p = 0.314$) or serum proteins ($p = 0.729$), and these changes showed no differences between the gastrostomy and nasogastric tube feeding groups (Fig. 1). The amount of delivered energy was above the estimated energy expenditure with both gastrostomy and nasogastric tube feeding, but there were no differences in the total energy provid-

Table I. Clinical and biochemical characteristics of included patients at baseline (n = 40)

	Nasogastric tube (n = 29)			Gastrostomy (n = 11)		
Males, n (%)	23 (79.3)			10 (90.9)		
Tumor stage IV, n (%)	22 (78.6)			10 (90.9)		
Primary radical therapy, n (%)	13 (44.8)			8 (72.7)		
Combined chemoradiotherapy, n (%)	24 (82.8)			8 (72.7)		
Age (years)	63	±	14	59	±	11
Weight (kg)	62	±	10	60	±	11
Body mass index (kg/m ²)	22.5	±	3.4	22.0	±	4.9
Weight loss before starting treatment (%)	10.2	±	8.5	9.2	±	12.2
Total serum proteins (g/dl)	7.0	±	0.9	7.1	±	1.1
Serum albumin (g/dl)	3.8	±	0.5	3.4	±	0.6
Estimated energy needs (kcal/day)	1,553	±	250	1,499	±	277

Data are means ± SD or n (%). There were no statistical differences between groups after independent Student's t test, or the Mann-Whitney U test, or χ^2 test as needed.

Table II. Baseline characteristics of patients according to type of therapy (n = 40)

	Combined chemoradiotherapy (n = 32)			Radiotherapy alone (n = 8)		
Males, n (%)	28 (87.5)			5 (62.5)		
Tumor stage IV, n (%)	29 (90.6)			3 (42.9)*		
Primary radical therapy, n (%)	14 (43.8)			5 (62.5)		
Age (years)	61	±	13	66	±	14
Weight (kg)	62	±	11	60	±	9
Body mass index (kg/m ²)	22.0	±	3.8	23.3	±	3.5
Weight loss before starting treatment (%)	9.9	±	10.2	9.8	±	6.5
Total serum proteins (g/dl)	7.1	±	0.9	7.0	±	1.4
Serum albumin (g/dl)	4.0	±	0.4	3.3	±	0.2
Estimated energy needs (kcal/day)	1,547	±	264	1,498	±	230

Data are means ± SD or n (%). *p < 0.005 between groups after independent Student's t test, or the Mann-Whitney U test, or χ^2 test as needed.

ed by enteral nutrition between groups (Fig. 2). Patients in the gastrostomy group received enteral nutrition support for a longer period of time (p = 0.007) (Fig. 2).

There were two deaths in the gastrostomy group and one in the nasogastric tube feeding group (p = 0.178). The remaining patients were able to restore the oral route, and enteral nutrition was discontinued at the end of follow-up. No severe complications were reported associated to enteral feeding, and no infections after gastrostomy placement were encountered either.

DISCUSSION

Patients with HNC submitted to treatment with radiotherapy alone or combined chemoradiotherapy usually present a high prevalence of malnutrition at baseline as assessed by previous studies (10,19,20). Several symptoms such as anorexia, dyspha-

gia, mouth sores, and others are significant predictors of reduced dietary intake and weight loss in these patients (21-26), and we have previously found a high prevalence of these digestive symptoms in our patients before starting nutritional support (18).

Nutritional intervention and nutritional counseling have shown to be effective in ameliorating malnutrition in patients with HNC treated with radiotherapy, showing that this intervention was more effective than oral intake *ad libitum* (7). Other authors have shown that early and intensive individualized dietary counselling by a dietician produces clinically relevant effects in terms of decreasing weight loss and malnutrition (27). We have also previously shown that an individual-basis nutritional intervention with an intensive follow-up was effective in ameliorating further weight loss (18).

On the other hand, prophylactic use of gastrostomy for enteral nutrition has been suggested to be important for patients with HNC submitted to chemoradiotherapy with high risk of developing mucositis and severe malnutrition (11,28). Besides, other authors

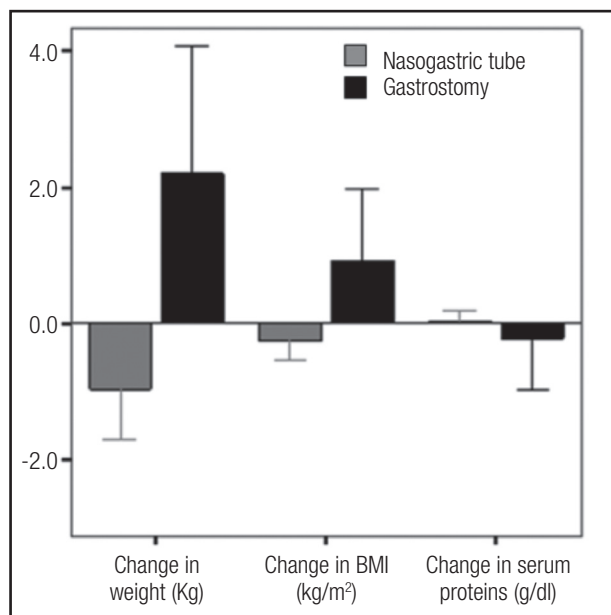


Figure 1. Changes in weight, body mass index (BMI) and serum proteins during follow-up in patients with gastrostomy vs nasogastric tube feeding. Columns show means and error bars show standard error of means.

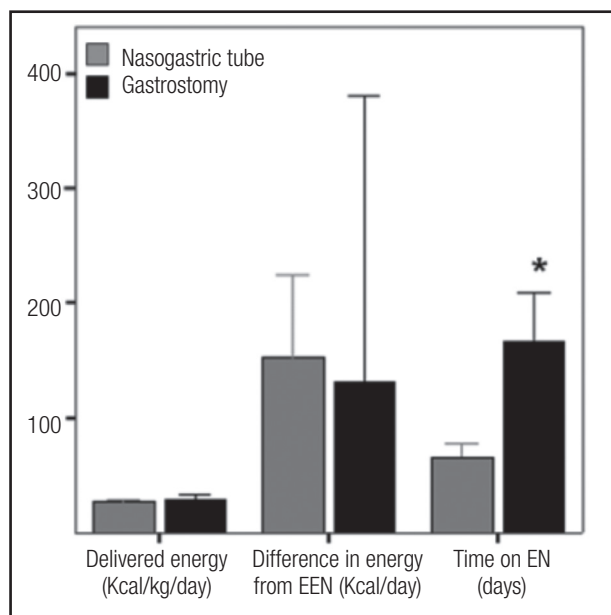


Figure 2. Delivered energy and time interval on enteral nutrition in patients with gastrostomy vs nasogastric tube feeding. Columns show means and error bars show standard error of means (EEN: Estimated energy needs; EN: Enteral nutrition. *p < 0.05 between groups).

have failed to demonstrate the effectiveness of prophylactic gastrostomy (12). These contradictory results may respond to dif-

ferent nutritional status of the included patients and the type of therapy received. In this sense, a study performed in patients with locally advanced HNC undergoing definitive chemoradiotherapy showed that they obtained significant clinical benefit from the early placement of gastrostomy tubes for nutritional supplementation (29). Other study has also shown that adequate enteral nutrition by the insertion of gastrostomy tube can increase the completeness rate of concurrent chemotherapy (30).

Some recent studies have not been able to show a definite advantage for gastrostomy over nutritional counseling with the associated insertion of nasogastric tube when needed: a real clinical practice and prospective study at a tertiary hospital with 95 patients who chose to have a gastrostomy or only nutritional counselling with a therapeutic feeding tube if required showed no significant difference in the rates of delayed treatment, and only a modest less weight loss in patients with gastrostomy (31). Also, a recent network meta-analysis evaluating the comparative effects of prophylactic percutaneous gastrostomy and nasogastric tube feeding in HNC patients receiving radiotherapy or chemoradiotherapy did not show differences in tube-related complications, and both endoscopic percutaneous gastrostomy and nasogastric tube feeding were similar and superior to radiologic gastrostomy in the management of weight loss (32). Therefore, the choice between these methods for delivering enteral nutrition in patients with HNC submitted to radiotherapy alone or chemoradiotherapy needs to be further investigated in more randomized controlled trials.

A limitation of our study is that it was not a randomized one, and patients' *a priori* preferences for gastrostomy or nasogastric tube feeding may have produced some influence in the study results.

In conclusion, either gastrostomy or nasogastric tube feeding are effective methods of delivering enteral nutrition in patients with HNC submitted to radiotherapy alone or combined chemoradiotherapy, with no differences between them in terms of avoiding further nutritional deterioration.

ACKNOWLEDGEMENTS

CIBERobn is an initiative of the Instituto de Salud Carlos III (ISCIII).

REFERENCES

- Rivadeneira DE, Evoy D, Fahey TJ 3rd, Lieberman MD, Daly JM. Nutritional support of the cancer patient. *CA Cancer J Clin* 1998;48(2):69-80.
- Nitenberg G, Raynard B. Nutritional support of the cancer patient: Issues and dilemmas. *Crit Rev Oncol Hematol* 2000;34(3):137-68.
- August DA, Huhmann MB. A.S.P.E.N. clinical guidelines: Nutrition support therapy during adult anticancer treatment and in hematopoietic cell transplantation. *JPEN J Parenter Enteral Nutr* 2009;33(5):472-500.
- Capra S, Ferguson M, Ried K. Cancer: Impact of nutrition intervention outcome - Nutrition issues for patients. *Nutrition* 2001;17(9):769-72.
- Isenring EA, Capra S, Bauer JD. Nutrition intervention is beneficial in oncology outpatients receiving radiotherapy to the gastrointestinal or head and neck area. *Br J Cancer* 2004;91(3):447-52.
- Ravasco P, Monteiro-Grillo I, Camilo ME. Does nutrition influence quality of life in cancer patients undergoing radiotherapy? *Radiother Oncol* 2003;67(2):213-20.

7. Ravasco P, Monteiro-Grillo I, Marques Vidal P, Camilo ME. Impact of nutrition on outcome: A prospective randomized controlled trial in patients with head and neck cancer undergoing radiotherapy. *Head Neck* 2005;27(8):659-68.
8. Ravasco P, Monteiro-Grillo I, Vidal PM, Camilo ME. Dietary counseling improves patient outcomes: A prospective, randomized, controlled trial in colorectal cancer patients undergoing radiotherapy. *J Clin Oncol* 2005;23(7):1431-8.
9. Isenring EA, Bauer JD, Capra S. Nutrition support using the American Dietetic Association medical nutrition therapy protocol for radiation oncology patients improves dietary intake compared with standard practice. *J Am Diet Assoc* 2007;107(3):404-12.
10. Unsal D, Montes B, Akmansu M, Uner A, Oguz M, Pak Y. Evaluation of nutritional status in cancer patients receiving radiotherapy: A prospective study. *Am J Clin Oncol* 2006;29(2):183-8.
11. Hughes BG, Jain VK, Brown T, Spurgin AL, Hartnett G, Keller J, et al. Decreased hospital stay and significant cost savings after routine use of prophylactic gastrostomy for high-risk patients with head and neck cancer receiving chemoradiotherapy at a tertiary cancer institution. *Head Neck* 2013;35(3):436-42.
12. Silander E, Jacobsson I, Berteus-Forslund H, Hammerlid E. Energy intake and sources of nutritional support in patients with head and neck cancer—a randomised longitudinal study. *Eur J Clin Nutr* 2013;67(1):47-52.
13. Koom WS, Ahn SD, Song SY, Lee CG, Moon SH, Chie EK, et al. Nutritional status of patients treated with radiotherapy as determined by subjective global assessment. *Radiat Oncol J* 2012;30(3):132-9.
14. Chang PH, Yeh KY, Huang JS, Lai CH, Wu TH, Lan YJ, et al. Pretreatment performance status and nutrition are associated with early mortality of locally advanced head and neck cancer patients undergoing concurrent chemoradiation. *Eur Arch Otorhinolaryngol* 2013;270(6):1909-15.
15. Gee AC, Kiraly L, McCarthy MS, Martindale R. Nutrition support and therapy in patients with head and neck squamous cell carcinomas. *Curr Gastroenterol Rep* 2012;14(4):349-55.
16. Valentini V, Marazzi F, Bossola M, Micciché F, Nardone L, Balducci M, et al. Nutritional counselling and oral nutritional supplements in head and neck cancer patients undergoing chemoradiotherapy. *J Hum Nutr Diet* 2012;25(3):201-8.
17. Kiss NK, Krishnasamy M, Loeliger J, Granados A, Dutu G, Corry J. A dietitian-led clinic for patients receiving (chemo)radiotherapy for head and neck cancer. *Support Care Cancer* 2012;20(9):2111-20.
18. Soria A, Galdón A, Chacín J, Secos J, Hervás A, Vallejo C, et al. Nutritional support in patients with head and neck cancer during radiotherapy alone or combined chemoradiotherapy. *Nutr Ther Metab* 2013;31:123-9.
19. Isenring E, Bauer J, Capra S. The scored Patient-generated Subjective Global Assessment (PG-SGA) and its association with quality of life in ambulatory patients receiving radiotherapy. *Eur J Clin Nutr* 2003;57(2):305-9.
20. Arribas L, Hurtos L, Mila R, Fort E, Peiro I. Predict factors associated with malnutrition from patient generated subjective global assessment (PG-SGA) in head and neck cancer patients. *Nutr Hosp* 2013;28(1):155-63.
21. Epstein JB, Barasch A. Taste disorders in cancer patients: Pathogenesis, and approach to assessment and management. *Oral Oncol* 2010;46(2):77-81.
22. Kubrak C, Olson K, Jha N, Jensen L, McCargar L, Seikaly H, et al. Nutrition impact symptoms: key determinants of reduced dietary intake, weight loss, and reduced functional capacity of patients with head and neck cancer before treatment. *Head Neck* 2010;32(3):290-300.
23. Righini CA, Timi N, Junet P, Bertolo A, Rey E, Atallah I. Assessment of nutritional status at the time of diagnosis in patients treated for head and neck cancer. *Eur Ann Otorhinolaryngol Head Neck Dis* 2013;130(1):8-14.
24. Jager-Wittenaar H, Dijkstra PU, Vissink A, Van Oort RP, Van der Laan BF, Roodenburg JL. Malnutrition in patients treated for oral or oropharyngeal cancer—prevalence and relationship with oral symptoms: An explorative study. *Support Care Cancer* 2011;19(10):1675-83.
25. Jeffery E, Sherriff J, Langdon C. A clinical audit of the nutritional status and need for nutrition support amongst head and neck cancer patients treated with radiotherapy. *Australas Med J* 2012;5(1):8-13.
26. Jager-Wittenaar H, Dijkstra PU, Vissink A, Landjendijk JA, Van der Laan BF, Pruijm J, et al. Changes in nutritional status and dietary intake during and after head and neck cancer treatment. *Head Neck* 2011;33(6):863-70.
27. Van den Berg MG, Rasmussen-Conrad EL, Wei KH, Lintz-Luidens H, Kaanders JH, Merckx MA. Comparison of the effect of individual dietary counselling and of standard nutritional care on weight loss in patients with head and neck cancer undergoing radiotherapy. *Br J Nutr* 2010;104(6):872-7.
28. Nugent B, Parker MJ, McIntyre IA. Nasogastric tube feeding and percutaneous endoscopic gastrostomy tube feeding in patients with head and neck cancer. *J Hum Nutr Diet* 2010;23(3):277-84.
29. Rutter CE, Yovino S, Taylor R, Wolf J, Cullen KJ, Ord R, et al. Impact of early percutaneous endoscopic gastrostomy tube placement on nutritional status and hospitalization in patients with head and neck cancer receiving definitive chemoradiation therapy. *Head Neck* 2011;33(10):1441-7.
30. Atasoy BM, Yonal O, Demirel B, Imeryuz N. The impact of early percutaneous endoscopic gastrostomy placement on treatment completeness and nutritional status in locally advanced head and neck cancer patients receiving chemoradiotherapy. *Eur Arch Otorhinolaryngol* 2012;269(1):275-82.
31. Pramyothin P, Manyanont S, Trakarnsanga A, Petsuksiri J, Ithimakin S. A prospective study comparing prophylactic gastrostomy to nutritional counselling with a therapeutic feeding tube if required in head and neck cancer patients undergoing chemoradiotherapy in Thai real-world practice. *J Hum Nutr Diet* 2016. E-pub ahead of print.
32. Zhang Z, Zhu Y, Ling Y, Zhang L, Wan H. Comparative effects of different enteral feeding methods in head and neck cancer patients receiving radiotherapy or chemoradiotherapy: A network meta-analysis. *Onco Targets Ther* 2016;9:2897-909.