

Palliative nasogastric tube placement for patients with advanced esophageal cancer with nearly total obstruction: Consider the feasibility and acceptability considerations

CHIH WEI YANG (✉ youngwayleon@gmail.com)

Tri-service general hospital, National defense medical center <https://orcid.org/0000-0001-9282-811X>

I-Hsuan Huang

Tri-service general hospital , National defense medical center

Wei-Kuo Chang

Tri-service general hospital , National defense medical center

Research article

Keywords: oesophageal cancer, palliative care, end-of-life care, supportive care, nasogastric tube, enteral nutrition

Posted Date: December 23rd, 2019

DOI: <https://doi.org/10.21203/rs.2.19524/v1>

License: © ⓘ This work is licensed under a Creative Commons Attribution 4.0 International License.

[Read Full License](#)

Abstract

Background: Nasogastric tube (NGT) feeding was reasonable choice for patients with advanced esophageal cancer with a short-life expectancy. Bedside blind NGT placement beyond the nearly total obstruction lesion usually fail and is challenging. Each individual patient might have different cancer stage, tumor location and size, natural course of the disease, technique feasibility, and tolerability of NGT placement. This study evaluates the benefits and limitations of palliative NGT placements for advanced esophageal cancer during their last months of life.

Method: Retrospective observation study was performed. We implemented three techniques of palliative NGT placement, compared the advantages and limitations, and evaluated the clinical outcomes in patients advanced esophageal cancer with nearly total obstruction. The present study was performed in at a *tertiary care teaching hospital*, Taiwan. Patients (n =32) received palliative care, failure of bedside blind NGT placement, and/or NPO (Nil per os) treatment were included. Patients were divided into different palliative NGT placements: guidewire method (n = 6), the drag method (n = 6), push method (n = 10).

Results: Success rate of palliative NGT placement was observed in the guidewire method (75%), drag method, (100%), and push method (93%). Compared the palliative NGT groups to NPO group, NGT groups had significantly increased in enteral caloric intake ($p < 0.05$), serum albumin level ($p < 0.01$), decreased the length of hospital stay ($p = 0.01$), but increased the survival time ($p = 0.01$).

Conclusion: Patients who tolerated the NGT placement will able to receive desired caloric intake, decrease length of hospital stay, and increase the overall survival time.

Introduction

Many patients with oesophageal cancer are diagnosed already at an advanced stage with a short life expectancy.[1] Patients usually experience progressive dysphagia, malnutrition, and poor quality of life.[2, 3] Therapeutic modalities for patients with inoperable, unresectable, or recurrent oesophageal cancer include oesophageal stent placement, balloon dilatation, surgical gastrectomy or jejunostomy, and percutaneous endoscopic gastrostomy.[1, 4] Previous treatments usually focused on symptoms relief, but mostly resulted in increased risk of procedure-related complications, such as bleeding, perforation, or migration.[1, 5]

NGT feeding can be used to administer desired medications, enteral caloric intake, and decrease the need of intravenous fluids and hospital admission. It is a reasonable choice for advanced oesophageal cancer patients who have a short life expectancy.[6] Unfortunately, it is difficult to pass the long segment, irregular, and near total obstructive oesophageal lumen using NGT, making it susceptible to bending, kinking, and coiling.[7, 8] Moreover, bedside blind NGT placement is challenging and usually has a high failure rate.

To our knowledge, few publications have evaluated the techniques of NGT placement for patients with advanced oesophageal cancer having near total obstruction.[7–9] The feasibility of the technique and tolerance by the patient should also be considered when selecting the method of palliative NGT placement for such patients. This study aimed to compare the advantages and limitations of three different palliative NGT placement methods (guidewire, drag, and push methods), and evaluate the nutritional status, required hospital admission, and clinical outcomes for patients with advanced oesophageal cancer having near total obstruction and failure of bedside NGT placement.

Methods

Study design

Between 2003 and 2018, we performed a retrospective observation study in advanced stage oesophageal cancer (n = 65) with near total oesophageal obstruction. Patients (n = 33) were excluded if they received concurrent chemoradiotherapy and oesophageal stent placement or underwent surgical gastrectomy, surgical jejunostomy, or percutaneous endoscopic gastrostomy. Patients who received palliative care, with failure of bedside blind NGT placement and/or nil per os (NPO), were included. Supportive care with fluid hydration and minimal amount of oral liquid diet and water were administered in the NPO group. Thirty-two patients were divided into two groups according to the treatment modality: palliative NGT placement group (n = 22) and NPO group (n = 10). Patients were informed of the details and they provided their informed consent. The present study was approved by the Institutional Review Board of Tri-Service General Hospital, Taiwan (TSGH IRB No. 2-104-05-0300).

Data collection

For each patient, data were collected on age, sex, body mass index, nutritional status (cholesterol and serum albumin at 2 weeks later), tumour characteristics (stage, histology, and location), daily enteral caloric intake and intravenous fluid volume (on the third day prior to the procedure and days 1, 7, and 14 after the start of treatment), procedure-related complications (haemorrhage, perforation), feeding tube-related complications (tube clogging, tube dislodgement), time needed for tube exchange, length of hospital stay, and overall survival time. Oesophageal tumour staging was determined according to the 8th American Joint Committee on Cancer (AJCC) staging system.[10]

Palliative nasogastric tube placement

All patients were monitored for blood pressure, heart rate, and pulse oximetry. Oxygen was administered if the oxygen saturation fell below 90%. The procedure of palliative NGT placement and technique of NGT feeding administration were explained to the patients and their families.

(A) Guidewire method

Before the guidewire method, fine bore NGT (12 French) outer wall was lubricated with xylocaine jelly, and the internal lumen was flushed with water.[11, 12] NGT was loaded with a guidewire (Hydra Jagwire;

Boston Scientific Corporation, Natick, MA, USA). The assembly of NGT with guidewire was passed through the nostril down to the proximal site of the oesophageal obstruction (Fig. 1A). Under fluoroscopic guidance, the soft tip of the guidewire was protruded out the distal opening of NGT and passed through the oesophageal obstruction segment down into the stomach. Then, NGT was slowly advanced along the same route of the guidewire and passed through the oesophageal obstruction down into the stomach. Once the procedure was completed, the guidewire was removed and the final position of the NGT was confirmed by radiography.

(B) Drag method

Before the drag method, 3.0-nylon suture ties were made at the end of the standard bore NGT (14 or 16 French).[13, 14] The assembly of NGT with suture ties was inserted through the nostril down to the proximal site of the oesophageal obstruction (Fig. 1B). Endoscope was inserted through the mouth down to the proximal site of the oesophageal obstruction. A biopsy forceps was then passed via the biopsy channel of the endoscope and grasped the suture firmly. NGT was dragged through the oesophageal obstruction segment down into the stomach. The endoscope was withdrawn slowly out while keeping the NGT in place to prevent NGT retrograde migration. Once the procedure was completed, the endoscope was removed and the final position of the NGT was confirmed by radiography.

(C) Push method

Before the guidewire method, standard bore NGT (14 or 16 French) was flushed with water and then loaded with a stiffening stylet.[6, 14] The assembly of NGT with stylet was inserted through the nostril down to the proximal site of the oesophageal obstruction (Fig. 1C). While keeping the stylet to stiffen the NGT, pressure was applied to the NGT. Under fluoroscopic guidance, NGT was passed through the oesophageal obstruction segment down into the stomach. Once the procedure was completed, the stylet was removed and the final position of the NGT was confirmed by radiography.

Statistical Analysis

SPSS software version 20.0 (IBM, Armonk, NY, USA) was used for all statistical analyses. One-way analysis of variance (ANOVA) was used to analyse the relationships between the four groups. The Student's t-test, the χ^2 -test, and the One-way ANOVA were used to analyse the relationship between the individual NGT groups and the NPO group. Overall survival time was calculated from the date of malignant oesophageal obstruction diagnosis until death or the last follow-up. A value of $p < 0.05$ was considered statistically significant for all analyses.

Results

Baseline characteristics

Thirty-two patients, who presented at an advanced cancer stage in stage III or IV, underwent palliative care (Table 1). Patients ranged in age from 56 to 88 years with a mean of 74.1 years. There were 15 men and

17 women. Twenty-two patients received palliative NGT placement and 10 patients received supportive care under an NPO regimen. Patients with NGT placement were divided into three treatment modalities: the guidewire method, the drag method, and the push method. There were no significant differences in age, sex, body mass index, cancer stage, histology, and location of tumour between the four groups.

Palliative nasogastric tube placement

The medical team discussed the NGT placement with the patients and the caregivers. All of them understood the potential and the limitations of the procedure. All procedures were administered according to the patients' needs. The success rate was recorded in the guidewire method (75%), drag method (100%), and push method (93%) ($p = 0.01$) (Table 2). All patients did not have severe procedure-related complications, such as perforation or bleeding. Patients in the drag method ($n = 1$) and push method ($n = 1$) experienced post-procedural bleeding and stopped after NPO for 12 hours.

Procedure-related complications

Patients in the guidewire method ($n = 6$), drag method ($n = 2$), and push method ($n = 2$) experienced tube clogging ($p = 0.01$). Patients in the guidewire method ($n = 1$), drag method ($n = 5$), and push method ($n = 3$) experienced tube dislodgement ($p = 0.15$). The time to tube exchange was recorded as 74 ± 19 days for the guidewire method, 55 ± 32 days for the drag method, and 39 ± 14 days for the push method ($p = 0.34$).

Nutrition and clinical outcomes

Daily enteral caloric intake and intravenous fluid volume were recorded during 2 weeks after NGT placement. Compared to the NPO group, the NGT group significantly increased enteral caloric intake ($p < 0.05$) (Fig. 2A) on days 1, 7, and 14 after the start of treatment, and decreased intravenous fluid volume on days 7 and 14 after the start of treatment ($p < 0.05$) (Fig. 2B), but there were no significant difference among the three palliative NGT groups. Compared to the NPO group, the NGT group significantly increased daily caloric intake ($p = 0.01$), increased serum albumin level ($p < 0.01$), decreased the length of hospital stay ($p = 0.01$), and increased the mean survival time ($p = 0.01$), but there were no significant differences among the three palliative NGT groups (Table 3).

Discussion

Patients with advanced oesophageal cancer have significant dysphagia, weight loss, and malnutrition.[3, 15, 16] The goal of enteral feeding for patients, mainly in the last period of life, may relieve hunger and thirst, provide oral medications, and preserve nutritional status and daily functional activity.[17]

Each patient with advanced oesophageal might have a different cancer stage, tumour location and size, natural course of the disease, and tolerability of NGT placement.[18, 19] The palliative NGT placement in hospital settings may be affected by the feasibility of technique, financial limitation, or lack of available medical services.[20] The need for palliative NGT placement should not only focus on the success rate, but also understand whether the palliative NGT placement is feasible in the hospital setting, and is acceptable to the patients and families. Our study confirmed that palliative NGT placement, designed for

direct visualization under endoscopy or fluoroscopy and focused on personalized support service, was a useful alternative if the conventional bedside blind NGT placement failed (Table 4).

Guidewire method: Advantages and limitations

The guidewire method for placing NGT required a mouth-to-nose wire transfer after the placement of guidewires.[21, 22] Mouth-to-nose wire transfer caused technical difficulties, consumed more time, and increased patient suffering. Different from the traditional guidewire method, the NGT and the guidewire were passed through the nose down into the oesophagus. Under fluoroscopic guidance, the guidewire was inserted and passed through the obstructive tumour region into the stomach. NGT established “through-and-through” access, which provided one-step NGT placement without the need for cumbersome wire transfer.

However, NGT often dislodged when the advancing through the nearly oesophageal obstruction segment. This could be overcome by utilizing a fully lubricated fine-bore NGT, and advancing the NGT slowly along the obstructing lesion.¹¹ However, since the fine-bore NGT has a tendency to clog, routine flushing with water and adherence to protocol when administering medications are necessary.[23, 24] The guidewire method for NGT placement is simple, safe, one-step and does not require wire transfer; it has lesser procedure-related complications, and yielded a success rate of approximately 75% (Table 2).

Drag method: Advantages and limitations

Upper gastrointestinal endoscopy is the most common procedure performed in patients with oesophageal cancer to obtain tissue samples and diagnose the structural abnormalities.[25, 26] The first endoscopic procedure provides information on the tumour lesion, and ensures that the endoscope can pass beyond the obstructing lesion. The second endoscopy can then easily drag the standard bore NGT through the oesophageal tumour lesion, down to the stomach.

Under direct endoscopic vision, NGT placement is simple, less time consuming, less difficult technique, and requires an experienced endoscopist. We demonstrated that the drag method is a one-step tube placement without the need for wire transfer, established a standard bore NGT feeding route, and yielded the success rate of 100% in patients with advanced oesophageal cancer.

Push method: Advantages and limitations

The oesophageal obstruction segment comprises mucosal oedema, swelling, fibrosis, and tumour mass. [27] A fissure-like obstruction lumen was opened by pressing the tip of the stylet or guidewire stiffened NGT. Under fluoroscopic guidance, the NGT was slowly squeezed and advanced through an irregular and long oesophageal stricture lumen. NGT squeezing through the tumour lesion may cause mucosal damage, resulting in haemorrhage.

Nevertheless, NGT placement with the push methods was a simple, rapid, one-step procedure, without the need the wire transfer, which established a standard bore NGT feeding route and yielded a high success

rate of 93%.

Limitations

First, owing to the retrospective study design and small sample size, the study could not fully detect small increases in success rates, complications, and mortality. The impact on clinical practice needs to be confirmed with larger prospective cohort studies. Second, the study was performed at a single centre, which may have resulted in selection bias and referral bias. This may not be true in other hospitals. Third, the success rate and complications may have been influenced by experience of the operator because palliative NGT placement is an operator-dependent procedure.

Conclusions

Palliative NGT placement can be achieved in most patients with advanced oesophageal cancer and have relatively lower complication rates. However, patient preference, interdisciplinary collaboration, and department infrastructure need to be explored for clinical decision-making. Patients who can tolerate the NGT placement may benefit in terms of administration of desired medications and caloric intake, prevention of unnecessary use of intravenous fluid alimentation, decrease in the length of hospital stay, and increase in the overall survival time. Combining NGT placement with other palliative therapies needs further investigation.

Declarations

Funding

This work was funded by the Tri-Service General Hospital (TSGH-C108-070). The funders had no role in study design, data collection and analysis, decision to publish, or preparation of the manuscript.

Availability of data and materials

All datasets during and/or analyzed during this study are available from the corresponding author on reasonable request.

Ethics approval and consent to participate

The study was approved by the Institutional Review Board of Tri-Service General Hospital, Taiwan.

Consent for publication

This manuscript does not contain any specific individual's data

Competing interests

The authors declare that they have no competing interests.

Author Contributions

WKC contributed to the study design, extracted the data, interpreted of the results critically revised of the manuscript for important content, and supervised the study. CWY contributed to study design, interpreted the results, and critically revised the manuscript for important content. IHH contributed to the analysis plan, interpreted the results and wrote the manuscript. WKC, CWY and IHH are the guaranteed this work and had full access to all the data in the study and take responsibility for the integrity of the data and the accuracy of the data analysis.

References

1. Javle M, Ailawadhi S, Yang GY, Nwogu CE, Schiff MD, Nava HR: **Palliation of malignant dysphagia in esophageal cancer: a literature-based review.** *J Support Oncol* 2006, **4**(8):365-373, 379.
2. Anandavadivelan P, Lagergren P: **Cachexia in patients with oesophageal cancer.** *Nat Rev Clin Oncol* 2016, **13**(3):185-198.
3. Miyata H, Yano M, Yasuda T, Yamasaki M, Murakami K, Makino T, Nishiki K, Sugimura K, Motoori M, Shiraishi O *et al*: **Randomized study of the clinical effects of omega-3 fatty acid-containing enteral nutrition support during neoadjuvant chemotherapy on chemotherapy-related toxicity in patients with esophageal cancer.** *Nutrition* 2017, **33**:204-210.
4. Lagergren J, Smyth E, Cunningham D, Lagergren P: **Oesophageal cancer.** *Lancet* 2017, **390**(10110):2383-2396.
5. Baron TH: **Expandable metal stents for the treatment of cancerous obstruction of the gastrointestinal tract.** *N Engl J Med* 2001, **344**(22):1681-1687.
6. Yang CW, Lin HH, Hsieh TY, Chang WK: **Palliative enteral feeding for patients with malignant esophageal obstruction: a retrospective study.** *BMC Palliat Care* 2015, **14**:58.
7. Lin CH, Liu NJ, Lee CS, Tang JH, Wei KL, Yang C, Sung KF, Cheng CL, Chiu CT, Chen PC: **Nasogastric feeding tube placement in patients with esophageal cancer: application of ultrathin transnasal endoscopy.** *Gastrointest Endosc* 2006, **64**(1):104-107.
8. Shastri YM, Shirodkar M, Mallath MK: **Endoscopic feeding tube placement in patients with cancer: a prospective clinical audit of 2055 procedures in 1866 patients.** *Aliment Pharmacol Ther* 2008, **27**(8):649-658.
9. Shukla NK, Goel AK, Seenu V, Nanda R, Deo SV, Kriplani AK: **Endoscopically guided placement of nasogastric tubes in patients with esophageal carcinoma with absolute dysphagia: report of a 3-year experience.** *J Surg Oncol* 1994, **56**(4):217-220.
10. Rice TW, Ishwaran H, Blackstone EH, Hofstetter WL, Kelsen DP, Apperson-Hansen C, Worldwide Esophageal Cancer Collaboration I: **Recommendations for clinical staging (cTNM) of cancer of the esophagus and esophagogastric junction for the 8th edition AJCC/UICC staging manuals.** *Dis Esophagus* 2016, **29**(8):913-919.
11. Kwauk ST, Miles D, Pinilla J, Arnold C: **A simple method for endoscopic placement of a nasoduodenal feeding tube.** *Surg Endosc* 1996, **10**(6):680-683.

12. Stayner JL, Bhatnagar A, McGinn AN, Fang JC: **Feeding tube placement: errors and complications.** *Nutr Clin Pract* 2012, **27**(6):738-748.
13. Chang WK, McClave SA, Chao YC: **Simplify the technique of nasoenteric feeding tube placement with a modified suture tie.** *J Clin Gastroenterol* 2005, **39**(1):47-49.
14. Byrne KR, Fang JC: **Endoscopic placement of enteral feeding catheters.** *Curr Opin Gastroenterol* 2006, **22**(5):546-550.
15. Besharat S, Jabbari A, Semnani S, Keshtkar A, Marjani J: **Inoperable esophageal cancer and outcome of palliative care.** *World J Gastroenterol* 2008, **14**(23):3725-3728.
16. Miyata H, Yano M, Yasuda T, Hamano R, Yamasaki M, Hou E, Motoori M, Shiraishi O, Tanaka K, Mori M *et al*: **Randomized study of clinical effect of enteral nutrition support during neoadjuvant chemotherapy on chemotherapy-related toxicity in patients with esophageal cancer.** *Clin Nutr* 2012, **31**(3):330-336.
17. Arends J, Bachmann P, Baracos V, Barthelemy N, Bertz H, Bozzetti F, Fearon K, Hutterer E, Isenring E, Kaasa S *et al*: **ESPEN guidelines on nutrition in cancer patients.** *Clin Nutr* 2017, **36**(1):11-48.
18. Chen F, Fang J, Wang H, Song T, Zhu W, Wu M, Wu Y: **Effects of nutritional support on short-term clinical outcomes and immune response in unresectable locally advanced oesophageal squamous cell carcinoma.** *Eur J Cancer Care (Engl)* 2018, **27**(2):e12818.
19. Bozzetti F: **Nutritional support in patients with oesophageal cancer.** *Support Care Cancer* 2010, **18** Suppl 2:S41-50.
20. Molassiotis A, Roberts S, Cheng HL, To HKF, Ko PS, Lam W, Lam YF, Abbott J, Kiefer D, Sanmugarajah J *et al*: **Partnering with families to promote nutrition in cancer care: feasibility and acceptability of the PlcNIC intervention.** *BMC Palliat Care* 2018, **17**(1):50.
21. Rafferty GP, Tham TC: **Endoscopic placement of enteral feeding tubes.** *World J Gastrointest Endosc* 2010, **2**(5):155-164.
22. Bosco JJ, Barkun AN, Isenberg GA, Nguyen CC, Petersen BT, Silverman WB, Slivka A, Taitelbaum G, Ginsberg GG, Committee ATA: **Endoscopic enteral nutritional access devices.** *Gastrointest Endosc* 2002, **56**(6):796-802.
23. Hayes KD, Hayes DD: **Best practices for unclogging feeding tubes in adults.** *Nursing* 2018, **48**(6):66.
24. Garrison CM: **Enteral Feeding Tube Clogging: What Are the Causes and What Are the Answers? A Bench Top Analysis.** *Nutr Clin Pract* 2018, **33**(1):147-150.
25. Krishnamurthy C, Hilden K, Peterson KA, Mattek N, Adler DG, Fang JC: **Endoscopic findings in patients presenting with dysphagia: analysis of a national endoscopy database.** *Dysphagia* 2012, **27**(1):101-105.
26. Johnston BT: **Oesophageal dysphagia: a stepwise approach to diagnosis and management.** *Lancet Gastroenterol Hepatol* 2017, **2**(8):604-609.
27. Whitworth PW, Richardson RL, Larson GM: **Balloon dilatation of anastomotic strictures.** *Arch Surg* 1988, **123**(6):759-762.

Tables

Table 1. Baseline characteristics

Variables	Modified nasogastric tube placement (n = 22)			NPO (n = 10)	P Value
	Guidewire method (n=6)	Drag Method (n=6)	Push method (n=10)		
Procedure times (n)	8	11	14	-	
Age (years)	77.0 ± 7.6	73.5 ± 20.5	69.8 ± 13.8	76.7 ± 10.7	0.54
Sex (M/F)	4/2	4/2	3/7	4/6	0.98
Body mass index (kg/m ²)	19.3 ± 3.70	20.4 ± 0.90	18.7 ± 2.88	18.4 ± 4.32	0.72
Cancer stage					0.17
III	3	1	3	1	
IV	3	5	7	9	
Histology					0.90
Adenocarcinoma	1	1	1	0	
Squamous carcinoma	5	5	9	10	
Location of tumor					0.77
Upper	1	0	1	2	
Mid	3	4	4	4	
Lower	2	2	5	4	

NPO, nil per os

Table 2. Complications associated with palliative nasogastric tube placement

Variables	Guidewire method	Drag method	Push method	P Value
Procedures	8	11	14	-
Success rate	6 (75%)	11 (100%)	13 (93%)	0.16
Perforation	0 (0%)	0 (0%)	0 (0%)	-
Hemorrhage	0 (0%)	1 (9%)	1 (7%)	0.69
Tube clogging	6 (75%)	2 (18%)	2 (14%)	0.01
Tube dislodgement	1 (13%)	5 (45%)	3 (21%)	0.23
Time to exchange (day)	74 ± 19	55 ± 32	39 ± 14	0.34

NPO, nil per os

Table 3. Nutrition and clinical outcome

Variables	Guidewire method	Drag method	Push method	NPO	P Value
Procedures	8	11	14	10	
Calorie intake (kcal/day)	1383 ± 686	1145 ± 543	1268 ± 472	338 ± 298	0.01
Albumin (gm/dl)	3.0 ± 0.5	2.9 ± 0.6	2.8 ± 0.3	2.0 ± 0.4	< 0.01
Cholesterol (mg/dl)	161 ± 15	155 ± 42	152 ± 67	134 ± 23	0.11
Hospital stay (day)	12 ± 9	14 ± 18	11 ± 21	33 ± 18	0.01
Survival time (day)	89 ± 24	56 ± 42	98 ± 35	28 ± 15	0.01

NPO, nil per os

4. Advantages and limitations of palliative nasogastric tube (NGT) placement

	Advantages	Limitations
wire method	Low risk esophageal perforation One step NG tube placement	Fluoroscopic guidance Low success rate Small bore NG tube Usually dislodge for long esophageal stricture
endoscopic method	Direct endoscopic vision High success rate Low risk esophageal perforation	Endoscopically-assisted procedure Usually after a diagnostic endoscopy Small or large bore NG tube
push method	High success rate One step NG tube placement	Fluoroscopic guidance Risk of esophageal perforation Small or large bore NG tube

Nasogastric tube

Figures

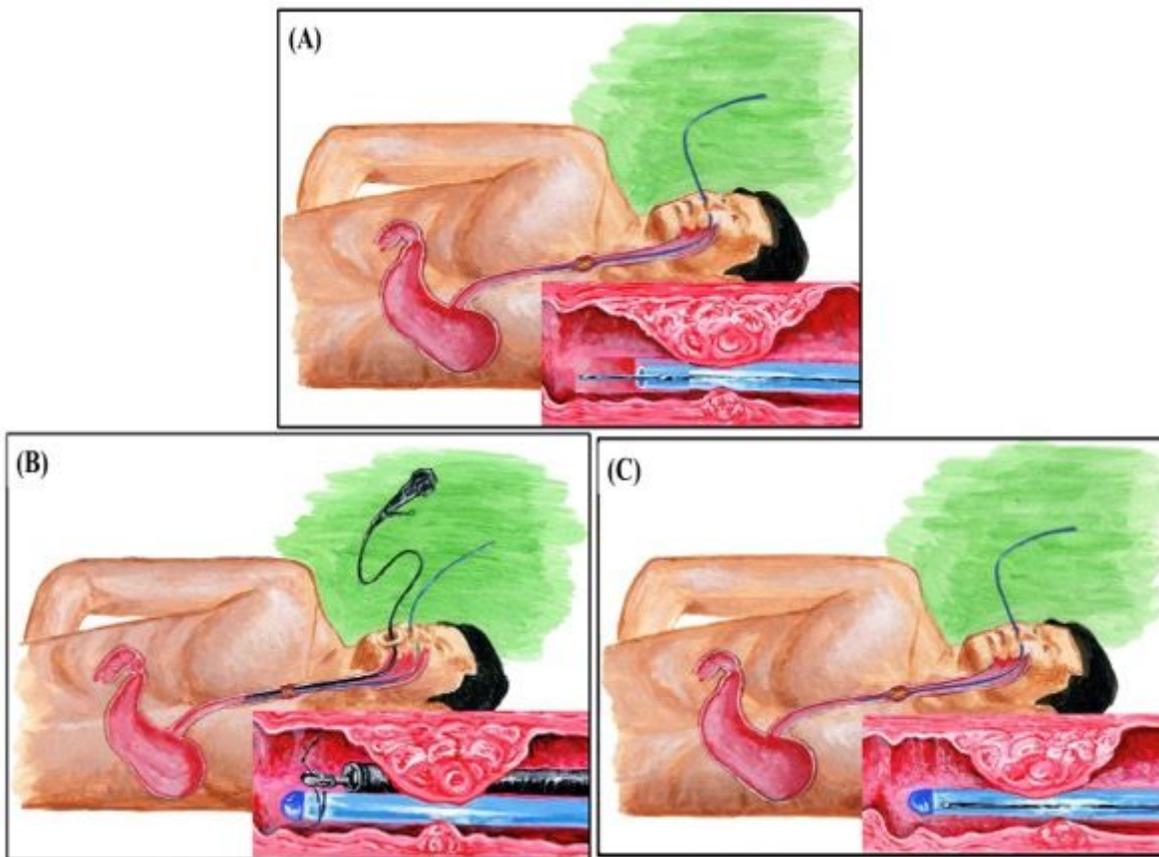


Figure 1

Palliative nasogastric tube placement for patients with advanced oesophageal cancer by guidewire method (A), drag method (B), and push method (C).

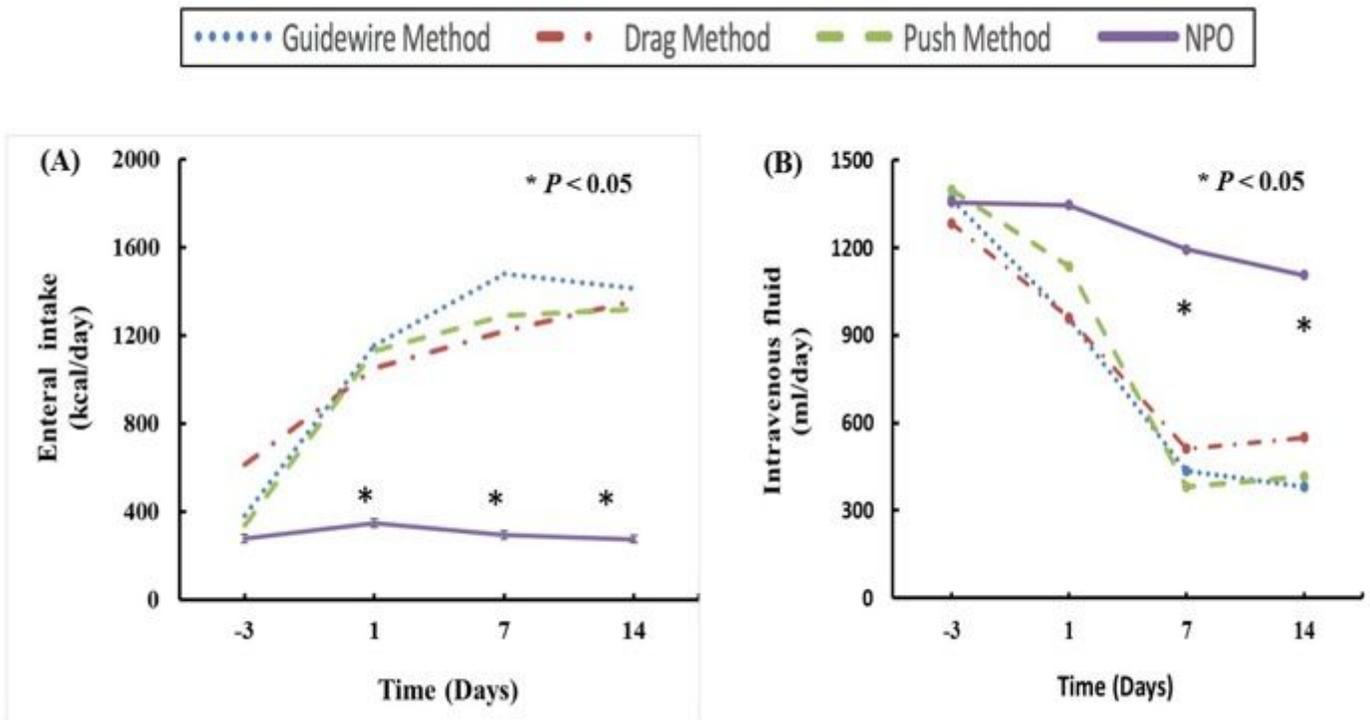


Figure 2

Daily enteral caloric intake (A) and intravenous fluid volume administration (B) of patients with advanced oesophageal cancer for 14 days after palliative nasogastric tube placement.