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Prophylactic Percutaneous Endoscopic Gastrostomy (PEG) - The Importance of Nutritonal Support in Patients with Head and Neck Cancers (HNCs) or Neurogenic Dysphagia (ND)

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Rezumat

Gastrostoma percutanată endoscopică profilactică (PEG) - Importanța suportului nutrițional în managementul pacienților cu neoplazii cervico-faciale (HNC) și al pacienților cu disfagie neurologică (ND)

Scopul lucrării: Evaluarea rolului gastrostomei percutanate endoscopice în suportul nutrițional al pacienților cu neoplazii cervico-faciale, precum şi în cazul pacienților cu disfagie neurologică.
Material şi metodă: Un grup de 23 de pacienți cu neoplazii cervico-faciale a beneficiat de montarea unei gastrostome pe cale endoscopică. Am analizat durata procedurii, incidentele peri-procedurale și cauzele acestora, timpul scurs până la reluarea alimentării şi până la externare, analgezia post-intervențională, complicațiile precoce și tardive, evoluția pacienților după tratament chirurgical radical cu gastrostoma menținută pe loc. În paralel am urmărit un grup de 10 pacienți cu disfagie neurologică la care montarea de PEG a avut drept scop îmbunătațirea statusului nutrițional și prevenirea riscului de pneumonie de aspirație specific acestui tip de pacienți.
Rezultate: Toate intervențiile au fost efectuate sub sedare cu Midazolam şi au avut o durată medie de aproximativ 7 minute. Analgezia post-operatorie a fost minimă. Alimentarea a debutat la aproximativ 2-4 ore post-intervențional, iar pacienții au fost externați la 12-24 ore după procedură. Nu au existat complicații precoce, iar din cele tardive menționăm 2 cazuri de infecții peristomale tratate conservator cu succes. După tratamentul chirurgical cu viză oncologică am întâlnit 2 cazuri (8.69%) de fistulă faringo-cutanată care au fost rezolvate cu tratament conservator si menținerea alimentării pe gastrostomă. Am comparat rezultatele obținute cu un grup de 27 de pacienți cu neoplazii cervico-faciale alimentați prin intermediul sondelor nazo-gastrice precum si cu un grup de 20 de pacienți cu gastrostome realizate pe cale chirurgicală. În grupul pacienților neurologici afecțiunile degenerative ca boala de neuron motor (3 cazuri - 30%) si scleroza multiplă (2 cazuri - 20%) au constituit o majoritate. Am întâlnit un caz de infecție peristomală si un caz de impermeabilitate a tubului de gastrostomă rezolvat prin înlocuirea acestuia. Am evaluat statusul nutrițional al acestor pacienți prin controlul greutății atât înainte cât și după montarea gastrostomei. A fost înregistrată o creștere în greutate cu o valoare medie de 3.1 kg (1.2 - 7).
Concluzii: Gastrostoma percutanată endoscopică reprezintă o procedură minim invazivă care necesită un timp scăzut de execuție și nu prezintă complicații majore. Realimentarea poate începe rapid iar gastrostoma este bine tolerată de către pacienți. Gastrostoma are un rol important în tratamentul conservativ al fistulelor faringo-cutanate. Pentru pacienții neurologici gastrostoma percutanată endoscopică reprezintă o alternativă eficientă pentru menținerea statusului nutrițional și are un rol important în evitarea pneumoniei de aspirație specifică acestui tip de pacienți.

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Cuvinte cheie: gastrostoma percutanată endoscopică profilactică, neoplazii cervico-faciale, suport nutriţional, disfagie neurologică

Abstract

Backround: We evaluated the effectiveness and safety of prophylactic PEG performed for the enteral nutrition support during the oncological treatment of patients with HNCs and as a part of the management of neurological patients experiencing neurogenic dysphagia.

Methods: In 2013 we followed up on a group of 23 HNC patients subjected to prophylactic PEG. We assessed the duration of the procedure, intraprocedural incidents and their causes, time to tube-refeeding and discharge after intervention, postinterventional analgesia, early and late complications, toleration, costs and postoperative course of these patients after radical surgery maintaining PEG in place. In parallel we followed up on a group of 10 neurological patients who have undergone a PEG placement to improve the nutrional status and to prevent recurrent chest infections due to ND related silent aspiration.

Results: The procedures were performed under sedation with Midazolam and the mean duration was about 7 minutes. Postoperative analgesia was minimal. Refeeding through the tube was initiated 2-4h hours later and the patients were discharged 12-24h after the procedure. Early complications were not observed and later we noted 2 cases of peristomal infections, succesfully managed conservatively. After oncologic surgery we noted 2 (8.69%) pharyngocutaneous fistulas. Conservative care obliterated the fistulas at 6 weeks, maintaining the feeding tube in place. We also compared the results with a group of 27 patients fed through the naso-gastric tube and a group of 20 cases with open gastrotomy-tube prophylactically inserted. The 10 neurological patients had varied conditions but degenerative diseases like motor neuron disease (3 cases – 30%) and multiple sclerosis (2 cases -20%) took the lead. We encountered one case of peristomal infection and one case of tube blockage resolved by replacement. We evaluated the nutritional status by controling the weight of these patients before and after PEG placement. A mean weight gain of 3.1 kg (range 1.2 – 7) was documented.

Conclusions: PEG is a simple minimmaly invasive procedure performed safely under sedation. It takes a very short time and is virtually free of major complications. The requirements of analgesics are minimal. The refeeding is started early and the tube is well tolerated by the patient. PEG has an important role in the conservative healing of pharyngocutaneous fistula. PEG is the procedure of choice for the neurological patients. It prevents weight loss and aspiration pneumonia in pacients with neurogenic dysphagia with a low rate of complications.

Key words: prophylactic percutaneous endoscopic gastrostomy, head and neck cancers, nutritional support, neurogenic dysfagia

Introduction

At the time of diagnosis most of the patients with head and neck cancers (HNCs) are at an advanced stage of the disease (1). On the other hand the risk of malnutrition for patients with HNCs is a common feature during all the phases of illness and the prevalence of this condition is estimated between 40-80% (1,2). As compared to any other type of cancer, HNCs patients are more likely to associate nutrition compromise including reduction of muscle and fat mass and organ functions deficits (1,2). Malnutrition represents an indepedent negative factor which is associated with poor outcomes including an increased symptomatology, poor response to cancer treatment, recurrence of the disease, poor quality of life, therefore it acts as a morbidity- and mortality magnifier (1,2,3). The pretreatement weight-loss was considered to be the most independent predictor factor of survival (3,4)

In neoplasms of the head and neck there are several factors causing malnutrition, the most important being related to: the tumor (chewing and swallowing are restricted by the anatomic location of the tumor/trismus/odynophagia/aspiration; tumor-induced metabolic dysfunctions) and the treatment options (surgery, radiotherapy or chemotherapy) (1,3). The surgery alters the anatomy of the region causing a temporarily or permanently restriction of the oral intake (3). The side effects of the chemotherapy and radiation therapy lead to the decrease of the nutrient intake, and translate into several associated conditions: pain, nausea and vomiting, mucositis, fibrosis, salivary gland dysfunctions, dysgeusia, xerostomia, soft tissue necrosis, dental disease, infections, trismus (1,2,3,4,5). In addition these anticancer therapies increase the metabolic needs and physical stress of the patients and exacerbate the malnutrition (1,3). General cancer-related changes include reduction of the absorption from the gastrointestinal tract, hormone-induced metabolic changes and lipolysis or proteolysis magnify the malnutrition (1,3,5). The low socio-economic status or the older age of the patients in addition to the frequent use of alcohol and tobacco contribute to nutrition deficiency (1,3,4,5).

A reduced food intake combined with an abnormal metabolism with severe metabolic changes explains why malnutrition in HNCs is not completely reversed by conventional nutritional support (5). Despite of this, usage of the nutritional supplementation before, during or after HNCs patients' treatment varies from 60% to 100%, qualifying it as a strong recommendation (6). There is no alignment in the literature on well-defined criteria regarding non-volitional nutrition, but on the other hand the use of gastrostomy tubes increased in comparison with the usage of nasogastric tubes without any good scientific bases (6,7). Endoscopic G-tube insertion represents an useful method to ensure the enteral feeding and the nutritional support for the patients who are unable to swallow, however the indication of the prophylactic G-tube insertion varies upon expert opinions (6,8,9).

Neurogenic dysphagia is a common symptom in patients with neurological disorders. It may result from lesions at any levels of the central or peripheral nervous system, muscle and

neuromuscular junction disorders (neuroaxis). Based on its onset, dysphagia can be classified in acute, subacute and insidious. A sudden onset of dysphagia, linked with other neurological signs and symptoms, could have a vascular etiology, like stroke. A subacute or insidious onset of neurogenic dysphagia is usually associated with myasthenia, amyotrophic lateral sclerosis, Parkinson disease, tumors. (10)

Regardless of the etiology, the food intake of these patients is impaired and they are at risk for dehydration, malnutrition or aspiration pneumonia. They are patients with a functional gastrointestinal tract who need long term feeding support and the indicated method to obtain this is the percutaneous endoscopic gastrostomy.

Material and Methods

2013 data from the General Surgery Department and from ENT Department of the Colțea Clinical Hospital (Bucharest, Romania) and from Neurology Department of the Clinical Emergency Hospital was reviewed retrospectively. We followed up on a group of 23 patients subjected to prophylactic Percutaneous Endoscopic Gastrostomy (PEG) before undergoing surgical resection for HNCs. We assessed the duration of the procedure, intraprocedural incidents and their causes, time to tube-refeeding and discharge after intervention, postinterventional analgesia, early and late complications, toleration, costs and postoperative course of these patients after radical surgery maintaining PEG in place. We compared the results with a group of 27 patients fed through the naso-gastric tube and a group of 20 cases with open gastrostomy-tube prophylactically inserted. In parallel we followed up on a group of 10 neurological patients with ND and PEG and we assesed their nutrional status and complication rate before and after PEG placement.

Results

The primary site of malignancy was: hypopharynx – 6 cases (26%), larynx – 16 cases (70%) and oropharynx in 1 case (4%), most of the cases affecting the tongue and oral cavity being referred to Oro-Maxillo-Facial specialists. Out of the 23 patients, 16 patients required postoperative radiotherapy and 14 patients of them additionaly required postoperative chemotheraphy. The mean age of the patients was 59 years at the time of diagnosis (range 41-69). The PEG tube placements were performed via the well-known pull-through technique (*Fig. 1*). The procedures were performed under sedation with Midazolam along with local anesthesia (Lidocaine) at the site of tube placement. We used a standard upper endoscope and a PEG kit containing the following: the PEG tube, a guidewire, a snare, a syringe of 5-10 mL, Lidocaine, a needle (20 or 22 gauge), a sterile drape, needle/catheter assembly, surgical blade attached to a scalpel, gauze, lubricant, povidone-iodine solution. The patients were positioned in the supine position with the head elevated at an angle of 30-40 degree in order to decrease the risk of aspiration. An esophagogastroduodenoscopy was initially performed in order to rule out an obstruction in the gastric outlet and duodenum. The procedure was performed by one endoscopist and a physician's assistant and the average duration was about 7 minutes.

In two cases it was difficult to transiluminate the anterior wall of the stomach due to the postoperative adhesions and the obesity. Ketonal 100-300 mg intravenous was used for the first

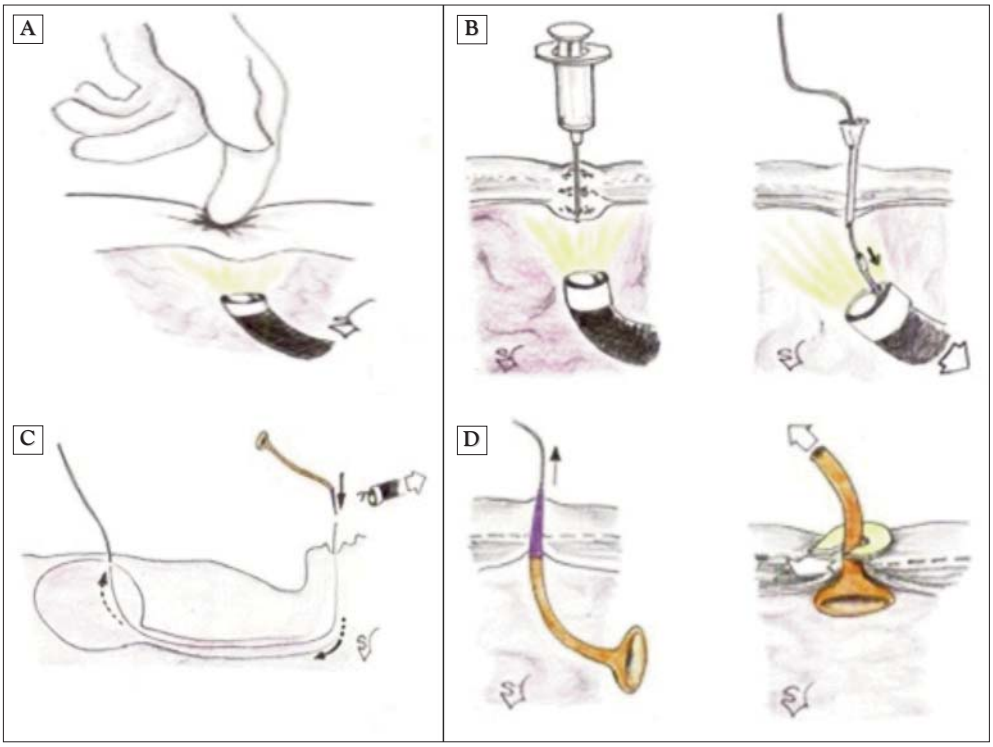

Figure 1. *Schema of PEG placement, pull-through technique (A-D demonstrate the steps of the procedure)*
(drawer Dr. Stefan Voiculescu)

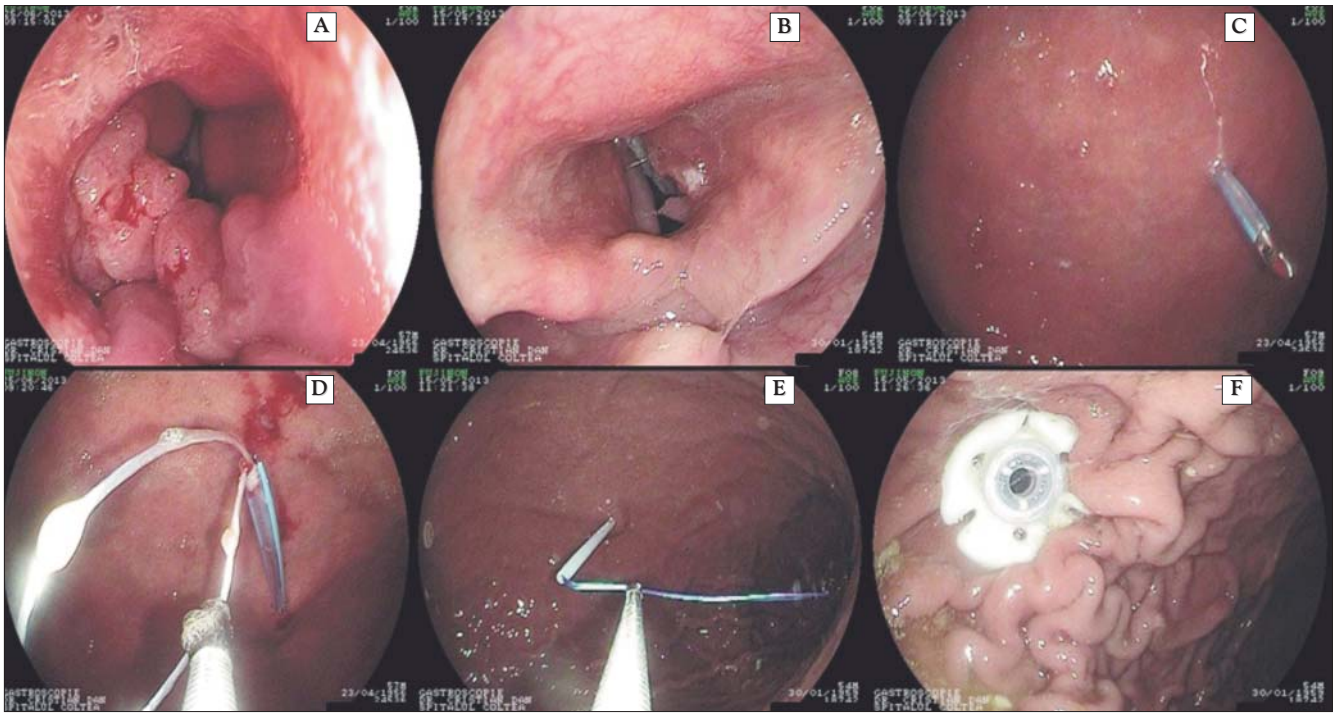

Figure 2. *Endoscopic view: **(A,B)** - visualisation of tumour; **(C,D,E,F)**: PEG placement, pull-through technique (Image belongs to Coltea Surgical Department)*

24 hours postintervention as postoperative analgesia. Refeeding through the tube was initiated 2-4 hours hours later and the patients were discharged 12-24 hours after the procedure. Early complications were not observed and later we noted 2 cases of peristomal infections, succesfully managed conservatively. No PEG related death was noted. Mean time for keeping PEG tubes in place was 142 days (range 7-263).

The 27 patients fed through the NGT had a mean time of 33 days (range 9- 55) of keeping their feeding tube in place. By comparing the results with the group of patients fed through the nasogastric tube, after oncologic surgery we noted 2 (8.69%) pharyngocutaneous fistulas in PEG group as opposed to 26% in the other. Conservative care obliterated the fistulas at 6 weeks, maintaining the PEG in place (*Fig. 3*). There are

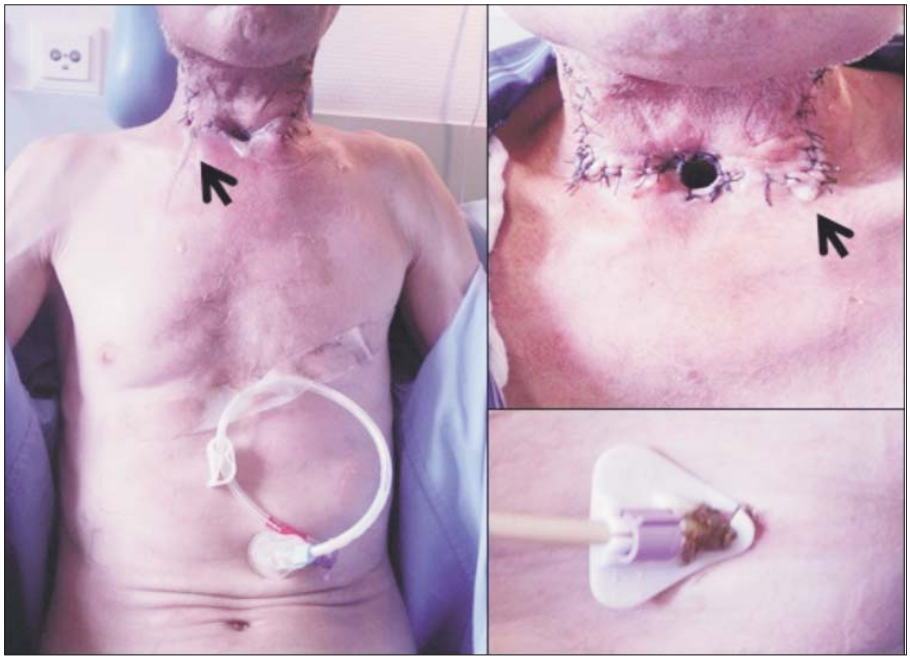

Figure 3. *Patient fed through PEG. Arrow: pharyngocutaneous fistula. (Image belongs to Colțea ENT Department)*

Table 1. *Comparison PEG versus NGT*

PEG vs NGT	PEG (n=23)	NGT (n=27)
Anesthesia	Midazolam	-
Mean duration (min)	7	1
Postop. analgesia	Ketonal +	-
Refeeding	2-4h	2-4h
Hospital length prolonged with	12-24h	0
Procedural costs	PEG >	NGT <

no significant differencies between PEG and NGT regarding the time to refeeding and hospital stay. As compared to NGT, PEG insertion requires anaesthetic drugs and the mean duration of the procedure or the incurred costs are higher (*Table 1*). For feeding tubes that were kept in place for more than 30 days, the frequence and the gravity of feeding- related complications are higher in the NGT group, while the patient acceptance is lower than in the PEG group (*Table 2*).

All the 20 patients with open gastrostomy insertion were in advanced stage of their disease therefore 19 of them maintained their feeding tube in place permanently. The endoscopic approach was not feasible due to the development of the tumor in the oesophagus. The procedures were performed under local or general anaesthesia and the mean duration was 30 mins. The open technique required more analgesia than the other two groups, the refeeding was started later and the hospital stay was prolonged. The rate and the severity of complications related to the procedure were higher, therefore the overall costs were increased (*Table 3, Fig. 4*).

The 10 neurological patients had varied conditions including motor neurone disease – 3 patients (30%), multiple sclerosis – 2 patients (20%), some of many years duration, central nervous system tumors – 2 patients (20%), stroke – 1 patient (10%), head trauma – 1 patient (10%) and Parkinson disease – 1 patient (10%). PEG was indicated because of dysphagia and chest infection, choking or coughing after food intake, decreased consciousness or weight loss. The procedure steps, duration and peri-placement management were similar with the HNC group. No imediate complications were recorded. One patient developed an infection at the insertion site managed with antibiotic treatment and one patient needed a PEG tube replacement due to tube blockage. Mean duration of PEG feeding was 134 days (range 7 – 320). Changes in weight loss were recorded and a mean weight gain of 3.1 kg

Table 2. *Comparison between PEG's and NGT's kept in place for more than 30 days*

30 days	PEG	NGT
	Complication of feeding	
Tube dislodgement	0	6 (22.2%)
Stomal leak	1 (4.34%)	0
Wound infection	2 (8.69%)	0
GERD	0	14 (51.85%)
Aspiration pneumonia	0	2 (7.40%)
Mucosal reaction/infection	0	5 (18.51)
Patient acceptance and rating		
Excellent	3 (13%)	1 (3.7%)
Good	8 (34.8%)	4 (14.8%)
Fair	8 (34.8%)	10 (37%)
Poor	4 (17.4%)	12 (44.5%)

Table 3. *G-tube insertion - endoscopic versus open*

PEG vs Surgical	PEG (n=23)	Surgical (n=20)
Surgery room	Optional	Always (Celiotomy)
Anaesthesia	Sedation + local	Local or General
Technical difficulty	+	+
Duration	Min (7)	min-h (average 30')
Postop. Analagesia	+	+++
Refeeding	2-4 hours	24-48 hours
Discharge	12-24 h	>48 h
Toleration in high risk patients	Excelent	Good
Complications	PEG (n=23)	Surgical (n=20)
GERD	0	2(10%)
Stomal leak	1 (4.34%)	5(25%)
Wound infections	2 (8.69%)	13 (65%)
Tube dislodgement	0	2 (10%)
Peritonitis	0	1 (5%)
Pneumonia	0	1(5%)
Costs	+	++

Figure 4. *Open gastrostomy - parietal complications (stomal leak, overgranulation).*
(Image belongs to Coltea Surgical Department)

(range 1.2 – 7) was documented. No chest infections due to silent aspiration were recorded after PEG placement.

Discussions

40% patients with HNCs are already malnourished at the time of diagnosis therefore the outcomes are poor (8). It was reported that patients who received tube feeding at the start of treatment had less weight-loss than those who received tube feeding later but the result was not statistically significant (6,9). Generally nutrition supplementation for these patients is performed through G-tubes inserted endoscopically, open, laparoscopically or by using the NGT. There is a lack of consensus on either the timing or the choice of enteral tube feeding routes and on indications for placing G-tubes or naso-gastric tubes (NGT) for patients with HNCs (6,8,9). In daily practice, the experience of the team who manages the patient represents the most important factor in the choice of the appropiate method (9). Typically the naso-gastric tubes are used for patients who require nutrition support for a short period of time (< 30 days) and the Percutaneous Endoscopic Gastrostomy tubes are inserted for periods of tube feeding lasting more than 30 days, as it is most often the case for HNC patients (radiotherapy usually requires 6-8 weeks) (8,9). A higher tumor T stage may not allow the endoscopic placement of the tube, therefore the open technique could be the appropriate solution for these patients.

There is also no world-wide agreed guide for selecting the patients for whom the prophylactic PEG/NGT insertion should be indicated, the first paper that tries to establish the indications being published only recently (9). For patients undergoing resections of HNCs, the authors pre-operatively assessed the location of the primary tumor, the stage and the diet score. Patients with hypopharyngeal cancers, advanced tumors and low value of diet score have the highest probability of receiving G-tubes (6,9). In order to prevent further weight loss and to decrease the overall morbidity and mortality, prophylactic PEG insertion was used for the patient with HNCs, requiring longer term or more advanced treatment (9,11,12). The need for radio- or chemotherapy increases the duration of the nutritional support thus resulting in a proper indication for using PEG prophylactically (9,12,13,14). As we encountered in our cases as well, the prophylactic feeding gastrostomy tubes placed endoscopically and early feeding are well tolerated by the patients, improves the quality of life and decreases the associated morbidity of the treatment and of the disease (9,12,14). Supplementary feeding through PEG represents a safe route to mitigate incidental swallow or aspiration, prevents dehydration, minimizes weight loss and permits drugs administration. PEG offers a better aesthetical appearance when compared to the NGT patients, therefore the psychological impact is better.

As compared to NGT, there is no significant difference in absolute weight loss and response to treatment at the primary site. We found more complications for NGT kept in place more than 30 days in comparison with PEG, but the overall complication rates in the first 30 days post tube-insertion are similar to the ones published in the literature (7). PEG is associated with higher site-infection rate than NGT. For PEG insertion, there are more complications related to the ,,pull'' method rather than the "push" one but, in reality, the experience of team is essential (7,15). Nutritional support with both tubes is similar but the time period for tube-feeding represents the main advantage for using PEG (7). If the nutritional intake seems to be inadequate for the next 2-3 weeks or these patients needs more than 4 weeks of enteral tube feeding, G-tube insertion is considered to be an acceptable method (6,16,17). On the other hand the cost of PEG-kit and the cost of tube insertion is greater than NGT (7). NGT negatively impacts the physical appearance and the quality of life, the reactive-treatment mucosal reaction and the number of tube dislodgements are higher, as we encountered in our cases as well (7). The patients with tumors of the nasopharynx or with hypopharyngeal cancers are more likely to receive a G-tube, which contradicts with our findings in which the most frequent primary site of the tumor was the larynx (6).

As compared to NGT, PEG placement could be considere'd a "minimal access, maximally invasive procedure", therefore there are several complications or disadvantages related to PEG cited in the literature: pain, nausea, diarrhea, loss of pleasure from eating and drinking, lack of control over eating and drinking, cellulitis, peritonitis, gastrointestinal bleed, buried bumper, overgrannulation, placement failure, gastroesophageal reflux disease (GERD), blockages, increased hospital visits (1,3,6,15,16,17,18). In our series the parietal complications were the most frequent. No published study demonstrated the clear superiority of PEG over NGT, except for the cases which require longer duration of enteral feeding (7,15,18).

Gastrostomy tubes placed by open methods were considered the safest approach for enteric access until the introduction of PEG, which became the preferred method due to its minimally invasive nature (19,20,21,22). Prior upper abdominal surgery, hepatomegaly, dilated transverse colon or obesity may not allow the transillumination of the stomach and the subsequent endoscopic G-tube placement, thus resulting in a proper indication for open gastrostomy. As compared to the endoscopic or laparoscopic technique, the insertion time is longer and feeding initiation is delayed in the open technique (19,20,21,22). On the other hand the frequency of complications related to open technique, especially for the procedure performed under local anaesthesia, is similar or lower than PEG in articles published in the literature (6,19,20). In our opinion, our higher rate of complications encountered with the open technique are due to the fact that in some cases we used Pezzer tubes of large diameter (34-36 Fr) brought out through the middle incision, thus resulting in a large defect of the anterior abdominal wall and of the stomach. Except the cases with medical contraindications of endoscopic G-tube placement, we performed the feeding open gastrostomy technique for the patients with a lower economic status and with limited access to the commercially prepared solutions for enteral nutrition. This is the reason why the tubes used had greater diameter in order to allow the common mashed food to pass into the stomach. We also observed that the rate of complications,

especially the stomal leakage and wound dehiscence, are lower when we brought out the tube through a paramedian transrectus incision rather through the same middle incision (22).

PEG is a simple minimmaly invasive procedure performed safely under sedation. It takes a very short time and is virtually free of major complications for the experienced teams (no deaths directly attributable to the procedure). The requirements of analgesics are minimal. The refeeding is started early and the tube is well tolerated by the patient. PEG offers a greater mobility for the patient, better aesthetic appearance and an improved subjective quality of life. The patients are quickly discharged and the overall cost is low. PEG has an important role in conservative healing of pharyngocutaneous fistula by supporting the wound healing or the immune function and by increasing the tolerance to the medical or surgical therapies (9,11,22). Therefore prophylactically PEG probably decreases the frequency of these fistulas (9,11,13,14,22).

Regarding the neurological group the aim of neurogenic dysphagia management trough PEG placement is to maintain adequate food and fluid intake, correct nutritional deficiencies and to prevent pulmonary aspiration (23). The nutritional status improved for all the patients after PEG placement. PEG feeding prevents weight loss with a decrease in the time taken to feed this patients, all the daily calorie requirements can be given in an easy manner. PEG placement can bring certain benefits for patients with a decreased level of consciousness who are unlikely to recover or are in a persistent vegetative state.

Some studies report the risk of aspiration pneumonia even after PEG placement, but although the risk exists the frequency of chest infection is lower in patients with PEG. (24) In our group PEG was very effective for silent aspiration prevention.

Because of the long term feeding needed for the neurological patients NGT feeding or open gastrostomy do not represent a valid choice. Some patients can recover the ability to swallow and in this case PEG can be easily removed.

Conclusions

As a summary, despite the broad experience on using G-tubes in HNCs, the indications for insertion are not well defined. Any route of nutritional support through G-tubes is efficient in reducing weight loss during treatment and the choice depends on patient preference and local expertise (6). Each gastrostomy technique offers its own advantages or disadvantages, feasibility or safety. Expanded studies are required in order to create a protocol for selecting the proper G-tube insertion technique, customizable for each patient.

PEG is the procedure of choice for the neurological patients. It is safe, simple and easy to accept for the patients and care-givers. PEG offers a good nutritional support for neurological patients with neurogenic dysphagia with a low rate of complications.

Authors' contribution

All authors contributed equally to the manuscript.

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