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Traqueoesophageal fistula patients fed through percutaneous endoscopic gastrostomy/gastrojejunostomy: nutritional status and clinical outcome

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Abstract

Background: **tracheoesophageal fistula (TEF) may result from cancer or mechanical ventilation. Endoscopic Gastrostomy or Gastrojejunostomy (PEG/PEG-J) is used for nutritional support.**

Objective: **in TEF-patients, evaluating nutritional status when PEG is performed, safety of PEG/PEG-J and clinical outcome.**

Methods: **from the files of PEG/PEG-J feed TEF-patients we collected: clinical data, Body Mass Index, albumin, transferrin and cholesterol when gastrostomy was performed, and clinical outcome globally and according with the TEF cause: Group 1: complication of mechanical ventilation, Group 2: cancer.**

Results: **twelve patients, 18-91 years (median: 53), 11 PEG, one PEG-J: six complications of ventilation (neurological diseases), 6 cancers. Mean period from TEF diagnosis until gastrostomy: 2 months in Group 1, 10 months in Group 2. In the day of the gastrostomy, patients presented with malnutrition parameters, most strikingly in the cancer group. Group 1: died a single patient, 3 closed the TEF, resuming oral intake, 2 are still PEG-feed. All cancer patients died (7 months after gastrostomy). One needed a jejunal extension to create a PEG-J. No more complications.**

Conclusion: **PEG/PEG-J was safe in TEF-patients, but cancer patients underwent gastrostomy too late. In TEF-patients, PEG/PEG-J should be considered in a regular basis, earlier in the disease evolution, before established malnutrition.**

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Key words: *Tracheoesophageal fistula. Nutrition. Gastrostomy. Gastrojejunostomy. PEG.*

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PACIENTES CON FÍSTULA TRAQUEOESOFÁGICA ALIMENTADOS POR GASTROSTOMÍA ENDOSCÓPICA O GASTROYEYUNOSTOMÍA: ESTADO NUTRICIONAL EN EL MOMENTO DE LA GASTROSTOMÍA Y EVOLUCIÓN CLÍNICA

Resumen

Introducción: **las fístulas traqueoesofágicas (FTE) pueden surgir en un cáncer de esófago/pulmón o pueden ser secundarias a intubación endotraqueal prolongada. La Gastrostomía Percutánea Endoscópica o la Gastroyeyunostomía (PEG/PEG-J) son útiles para el soporte nutricional. Intentamos evaluar: estado nutricional cuando los pacientes son referenciados/sometidos a gastrostomía, evolución clínica y seguridad de la PEG/PEG-J en la FTE.**

Materiales y métodos: **pacientes con FTE alimentados por PEG/PEG-J: características clínicas, índice de masa corporal, albúmina, transferrina, colesterol, evaluados en el día de la gastrostomía, y según la causa de la FTE: Grupo 1: complicación de la ventilación mecánica; Grupo 2: cáncer esofágico o respiratorio.**

Resultados: **doce pacientes, mediana de edad 53 años (18-91), 11 PEG, 1 PEG-J: 6 complicaciones de la ventilación mecánica; 6 cánceres. Periodo de referencia entre el diagnóstico de TEF y la gastrostomía: 2 meses en el Grupo 1, 10 meses en el Grupo 2. En el momento de la gastrostomía la mayoría estaban desnutridos, en particular el Grupo 2. En el Grupo 1 solo falleció un paciente, 3 regresaron a la alimentación oral después de cerrar la FTE, 2 mantienen la gastrostomía. Todos los pacientes oncológicos murieron (mediana: 7 meses después la PEG). Uno requirió una extensión yeyunal para PEG-J. Sin otras complicaciones.**

Conclusión: **en nuestra experiencia, la PEG/PEG - J fue un método seguro en pacientes con FTE de causa oncológica u otra, pero los pacientes con cáncer son sometidos a gastrostomía muy tarde. En los pacientes con FTE la PEG/PEG -J se debe considerar antes de que se produzca la malnutrición.**

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Palabras clave: *Fístula traqueoesofágica. Nutrición. Gastrostomía. Gastroyeyunostomía. GEP.*

Introduction

Tracheoesophageal fistula (TEF) is an abnormal communication between the lumen of the airway and esophagus. Most often it occurs at the trachea level or at the level of the left main bronchus, being rare at the right main bronchus.

Cancer is the main cause of acquired TEF. The invasion of the tracheobronchial tree by esophageal cancer causes up to 77% of malignant TEF.[1] Cancer of the lung and trachea may also lead TEF, although less frequently. Burt et al. reported a TEF incidence of 4.5% in cancer of the esophagus and 0.3% in lung cancer[2].

With the rising number of patients submitted to intubation and mechanical ventilation, there is an increased incidence of iatrogenic injuries related to tracheal intubation and tracheotomy. TEF is one of the complications, although rare (less than 1% incidence)[3]. It may result from mechanical trauma during the procedure or from vascular injury caused by the pressure to the cuff, with ischemic necrosis of the posterior wall of the trachea. Repeated intubation, manipulation of cuff pressure, higher pressure values (greater than 20-30 cm water)[4], excessive movement of the head of the patient and concomitant nasogastric tube may contribute to the development of TEF[5-7].

The most common symptom which indicates the presence of a fistula is cough, particularly triggered by swallowing or by supine position[8]. Other symptoms include dyspnea, choking, aspiration of food into the airway, recurrent pneumonia and gastric distension.

Several techniques[1,9] may be used for TEF diagnosis, but the therapeutic approach of cancer associated fistulas is complex, and needs a multidisciplinary team including Pulmonology, Gastroenterology, Oncology, Surgery and Nutrition[1]. The goals of TEF treatment include restoring the patency of the tracheal/esophageal lumen, preventing the passage of food into the lungs, treating respiratory infection and ensuring adequate nutrition and hydration[10]. The international guidelines[10] suggest simultaneous placement of two prosthesis, in the airway and into the esophagus. Following placement of the prosthesis, patients frequently have difficult to preserve an appropriate nutritional status using only oral feeding[10]. Percutaneous Endoscopic Gastrostomy (PEG) is the gold standard for long-term enteral nutrition and may be the best option for these patients[11]. The gastrostomy procedure may be simultaneous with the placement of prosthesis[12] or may be performed at another occasion. Guidelines do not advise gastrostomy of terminally ill patients with or life expectancy less than 1-2 months but, in selected cases, the PEG may be a useful palliative option[11,13]. To further reduce the risk of aspiration, a jejunostomy may be created from a PEG using a jejunal extension tube, producing a gastrojejunostomy or PEG-J[11].

Nutritional assessment of PEG-patients with TEF is often difficult, and the usual nutrition assessment tools may be inadequate for these patients. Enteral Nutrition Teams often must rely in anthropometric and laboratory data. For the present study we choose simple parameters, widely used for nutritional assessment and prognosis: serum albumin, serum transferrin, total serum cholesterol[14-16] and Body Mass Index (BMI)[17-18]. Total serum cholesterol below 160 mg/dl is an important poor prognostic marker[14-15,19-21].

The aim of the present study was the retrospective evaluation of TEF patients undergoing prolonged Enteral Nutrition through an endoscopic gastrostomy or gastrojejunostomy, regarding nutritional status when patients are referred to our team and the PEG procedure is performed, the clinical outcome, and safety of this approach used for nutritional support.

Material and methods

From the clinical files of the Enteral Nutrition Team (GENE) of our hospital, we selected adult patients (age ≥ 18 years) with TEF and under enteral feeding through a gastrostomy or gastrojejunostomy, with complete clinical data and complete nutritional evaluation when gastrostomy was performed. Patients with incomplete data were excluded. This retrospective evaluation was approved by the Ethics Committee of our hospital.

Clinical data included: age, gender, and etiology of TEF and moment of diagnosis, moment of placement of the enteral access, progression and survival after placement. Anthropometric and laboratory data assessed in the eve or in morning of gastrostomy, before the procedure, including BMI, serum albumin, serum transferrin and total serum cholesterol. NRS 2002 was performed as standart hospital procedure.

BMI was calculated by the Quételet equation[22-23] and in patients where it was impossible to use this formula, BMI has been estimated using the regression equations of Powell-Tuck & Hennessy[24-25]. BMI in the range 18.5-24.9 kg/m^2 was considered eutrophic.[17] For laboratory parameters we used the reference values: serum albumin 3.5-5.0 g/dl, transferrin 200-360 mg/dl and total cholesterol 160-190 mg/dl[14-15,19-21]. Patients were analyzed globally and then by groups, according to the etiology of TEF: Group 1: Complications of intubation/ventilation, Group 2: esophageal/tracheobronchial cancer.

Results

Clinical and Nutritional Global Analysis

We included 12 patients: 10 men and 2 women aged 18-91 years (mean: 52±22, median: 53). Eleven patients had gastrostomy and 1 had gastrojejunostomy. Patients included: (i) 6 patients with TEF caused by of esophageal/tracheobronchial cancer (5 of them had esophageal/tracheal prosthesis); (ii) six patients with "benign" TEF resulting from intubation/ventilation

(none with prosthesis) who suffered strokes or traumatic brain injury (TBI). Time gap between diagnosis and gastrostomy ranged 1-28 months (mean: 7±11.8).

All patients displayed NRS 2002 ≥ 3. The anthropometric and laboratory parameters collected just before the gastrostomy procedure were indicative of poor nutritional status: mean BMI 18.7 kg/m^2 (low in 7 patients); mean albumin 3.0 g/dl and mean transferrin 148.1 mg/dl (both low in 9 patients); mean cholesterol 138mg/dl (<160 mg/dl in 8 patients).

Clinical Global Evolution

Seven patients died during the evolution of the underlying disease. The time gap between the gastrostomy procedure and death ranged 1-25 months (median survival of these 7 patients: 6.3 months). Three patients resumed oral intake after fistula closure. Two patients remain under enteral feeding, with stable neurological lesions.

Complications of Enteral Nutrition by PEG/PEG-J

In all patients, it was possible to perform the proposed endoscopic gastrostomy and start enteral feeding. A patient with oesophageal/tracheal prosthesis suffered episodes of paroxysmal cough attributed to gastroesophageal reflux. A jejunal extension tube was placed through the PEG, creating a gastrojejunostomy (PEG-J). Changing from gastrostomy to jejunostomy enteral feeding solved the clinical problem. There were no other relevant complications.

Clinical and Nutritional Analysis for Groups

Patients were divided into two groups: Group 1: Complications of intubation/ventilation (n = 6); Group 2: esophageal or bronchopulmonary cancer (n = 6).

Group 1 included 5 men, 1 woman, aged 18-80 years (mean: 44.5±22.1). In 3 patients, stroke was the underlying disease and 3 suffered a TBI. They all had a gastrostomy. Group 2 included 5 males, 1 female, aged 31-91 years (mean: 59±21). Four patients had bronchopulmonary cancer, 2 had esophageal cancer. Five patients had gastrostomy and one had a gastrojejunostomy. The time gap between TEF diagnosis and placement of enteric access was very different: in Group 1 the gap ranged 1-3 months (mean: 2), in Group 2 ranged 1-28 months (mean: 10.3).

The anthropometric and laboratory parameters evaluated in Group 1 were: BMI: 20.1±5.5 kg/m^2; albumin: 3.1±0.9 g/dl; transferrin: 131.5±9.2 mg/dl; cholesterol: 149.7±43.1 mg/dl. Three patients had a BMI <18.5 kg/m^2, 4 patients had low albumin, 3 patients had low transferrin, 3 patients had cholesterol <160 mg/dl.

For Group 2 (cancer) values were: BMI: 17.5±2.6 kg/m^2, albumin: 3.0±0.4 g/dl, transferrin: 154.8±37.8 mg/dl, cholesterol: 129.3±25.2 mg/dl. Four patients had BMI <18.5 kg/m^2, 5 patients had low albumin, all patients had low transferrin, 5 patients had cholesterol <160 mg/dl, values largely suggesting malnutrition.

When analyzing survival after placement of enteral access in patients of Group 1, there was only 1 death (2 months after gastrostomy) caused by TBI complications. From the remaining five, three patients removed the enteric access (13±7.9 months after gastrostomy) after closure of the fistula and resumption of oral intake, 2 are still alive maintaining nutrition through PEG due to permanent neurological damage. In the cancer group (Group 2) all patients died, 1-25 months after gastrostomy (median survival: 7.0 months).

Discussion

Enteral nutrition (EN) through gastrostomy or jejunostomy is the gold standard for long term nutrition of patients who are unable to maintain sufficient oral intake[11] but have efficient digestion and absorption[13]. Patients with TEF often present reduced intake and risk of aspiration, pneumonia and asphyxia, therefore being strong candidates for EN by gastrostomy or jejunostomy. A gastrostomy should be performed as early as possible, avoiding weight loss and malnutrition, when an EN period longer than 3-4 weeks is probable[11]. In this group of TEF patients, gastrostomy can be completed with a jejunal extension, forming a gastrojejunostomy or PEG-J, if there are signs of aspiration of gastric contents.

When evaluating the time gap between TEF diagnosis and gastrostomy in patients with "benign" TEF (Group 1), we found a mean gap of 2 months, a little more than the 3-4 weeks desirable, possibly due to some hesitation in a clinically complex setting.

In Group 2 cancer patients, the average gap was 10 months, clearly excessive and maybe responsible for deterioration of nutritional status. These patients are particularly susceptible to malnutrition with the combined effects of reduced intake, cancer disease and cancer therapy[26-27]. Even allowing some oral intake, prosthesis placement is frequently insufficient to ensure the necessary nutritional intake. The gastrostomy nutritional support should be introduced earlier in these cancer patients.

The analysis of the anthropometric and laboratorial parameters revealed that patients with TEF had a poor nutritional status at the time of gastrostomy, most of them with low BMI and low laboratory values. BMI was the parameter that showed greatest dissonance between the two groups: Group 1 displayed an average BMI within the normal range (20.1 kg/m^2) and Group 2 shown a low average value (17.5 kg/m^2). The laboratory data showed low albumin and transferrin in both groups. Mean values were lower in Group 2 and this

Group 2 had more patients with low proteins. Total cholesterol was low in both groups, being considerably below 160 mg/dl and Group 2 had more patients with low cholesterol. Serum proteins, albumin and transferrin, are negative acute phase proteins, reflecting not only the nutritional status but also the inflammatory activity. However, when evaluated together, BMI and laboratory data are useful clinical indicators of nutritional status and prognosis.

Malnutrition in cancer patients affects the response to treatment and is associated with an increased number and severity of complications, leading to increased morbidity and mortality[28-29]. This reinforces the need for early gastrostomy and nutritional support in these cancer patients. It is known the poor prognosis of cancer patients with TEF, even with modern cancer treatment[39]. In our study, there was also a short survival after gastrostomy, with an average of 7 months in Group 2 and no surviving patients. Conversely, in Group 1 only 1 death occurred. Although patients in Group 2 are cancer patients with poor prognosis and reduced life expectancy, the time gap between TEF diagnosis and gastrostomy may have increased the evolution of malnutrition and may have decreased the survival of cancer patients. As mentioned, patients in Group 2 showed worse BMI and laboratory parameters at the time of gastrostomy. However, despite the cancer and the delayed onset of gastrostomy feeding, the use of a PEG for enteral nutritional support allowed survival of these patients from 1 month to more than 2 years, clearly justifying this feeding option.

In our experience, PEG with or without jejunal extension has proved to be a safe and effective option for nutritional support, either as palliation in patients with cancer or with permanent neurological injuries, or until the recovery of swallowing in the remaining patients. To ensure the maintenance of an adequate nutritional status, enteral nutritional support by gastrostomy or jejunostomy should be initiated early, before the decline of nutritional status, as occurred in some of our patients.

PEG or jejunostomy should be systematically considered in patients with non-malignant causes of TEF. Although gastrostomy is not advised in terminal patients or with life expectancy less than 1-2 months, our experience supports the notion that, in selected cases, the PEG may be a useful option for nutritional support in patients with TEF caused by esophageal or lung cancer.

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