

Original Article

Evaluation of nutritional status before and after PEG placement in patients with motor neuron disease

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ABSTRACT: Background: Patients affected by amyotrophic lateral sclerosis (ALS, also known as motor neuron disease, MND) develop neurological dysphagia, which compromises their feeding capacity, hydration, and nutritional status. Since 1995, the use of percutaneous endoscopic gastrostomy (PEG) - or jejunal PEG in patients with diaphragmatic hypomobility - to treat dysphagia has become increasingly common, with a positive impact on patients' clinical condition. Recent opinion suggests that PEG should be performed before the vital capacity falls below 50% of predicted. **Materials and methods:** From January 2000 to December 2006, 36 patients affected by ALS were referred to us by our colleagues of the Neuroscience Department. The patients met the requirements for PEG placement of the American Academy of Neurology and they all accepted PEG. In all patients the "pull" method for PEG placement was used with a tube made of polyurethane (diameter 20 Fr). The pack system consisted of polymeric diets (25-35 Kcal/kg/day), which were modified if the patient continued to take food orally. Patients underwent nutritional status measurement before and after PEG placement (body mass index, anthropometry, chemical blood analyses). **Results and conclusions:** There were no deaths in our series, but we registered 3 cases of wound infection at the bumper. All patients showed considerable improvement in general condition and nutritional status, confirmed by nutritional status parameters. All these aspects confirm the appropriateness of our choice to perform PEG early in patients suffering from ALS/MND, as this led to an improvement of quality of life and prolonged survival. (*Nutritional Therapy & Metabolism* 2008; 26: 137-40)

KEY WORDS: Amyotrophic lateral sclerosis, Nutritional status, PEG

INTRODUCTION

Amyotrophic lateral sclerosis (ALS) or motor neuron disease (MND) is a progressive and degenerative disease due to a degeneration of primarily upper and lower motor neurons, leading to a progressive loss of spinal, bulbar and cortical motor neurons and consequently muscle wasting, dysphagia, dysarthria and respiratory insufficiency (1). Charcot, the 19th century pioneer of neurology, first defined the syndrome that could be gathered under the umbrella of ALS before laying the groundwork for current approaches to clinical diagnosis (2, 3). About 10% of patients are misdiagnosed (4); in fact, difficulties arise when patients present with only upper or lower motor neuron signs. ALS is usually fatal

within about 4 years of its onset because of respiratory failure (5).

The management of patients affected by ALS is multidisciplinary and it aims to prolong survival and maintain quality of life using neuroprotective treatment with riluzole (6), symptomatic therapy for hypersalivation, bronchial secretion, pseudobulbar emotional lability, cramps, spasticity, depression, pain, and venous thrombosis, non-invasive and invasive ventilation for respiratory impairment, and enteral nutrition for dysphagia. Since 1995, the use of percutaneous endoscopic gastrostomy (PEG) to treat dysphagia has become increasingly widespread. PEG serves to maintain enteral nutrition, an important way to establish weight and improve quality of life. The timing of this standard proce-

ture is based on symptoms, nutritional status, and respiratory failure. Recent opinions suggest that PEG should be performed before vital capacity (VC) falls below 50% of predicted (7). Other interventions included modifying the consistency of food by blending it, the chin-tuck maneuver (flexing the neck forward when swallowing to protect the airways), or the use of a nasogastric tube, but these are temporary measures while PEG is more suitable.

MATERIALS AND METHODS

From January 2000 to December 2006, 36 patients affected by ALS were referred to us for PEG by our colleagues of the Neuroscience Department. Diagnosis of motor neuron disease was based on the ALS parameters published by the American Academy of Neurology (8). The aim of these practice parameters was the determination of new standards for the management of ALS patients, taking into consideration symptoms, nutrition, palliative care, respiratory distress and ethical issues. The study patients included 27 women and 9 men with a mean age of 58 years. The time of onset of symptoms was in the range of 7-15 months previously. The care plan was made by a multidisciplinary team composed of neurologists, pulmonologists, psychologists, and surgeons. All patients had respiratory weakness causing various levels of dyspnea, and 30 patients had a VC >50% of predicted, so they did not receive non-invasive ventilation, such as continuous positive pressure (cPAP). Twenty-seven patients showed dysphagia, while for 9 patients PEG was a preventive procedure. All patients underwent nutritional status assessment including dietary history, body mass index (BMI), anthropometry, chemical blood analyses, and hydration status, before and 3 and 6 months after PEG placement. We estimated weight loss, BMI, albumin, transferrin, prealbumin, and lymphocytes. Malnutrition was divided into 3 types: mild malnutrition (weight loss 5-10%, albumin 3.5-3 g/dL, transferrin 200-150 mg/dL, lymphocytes 1500-1200/mm³, prealbumin 18-22 mg/dL) was present in 6 patients; moderate malnutrition (weight loss 11-20%, albumin 2.9-2.5 g/dL, transferrin 149-100 mg/dL, lym-

phocytes 1199-800/mm³, prealbumin 10-17 mg/dL) in 21 patients, and severe malnutrition (weight loss >20%, albumin <2.5 g/dL, transferrin <100 mg/dL, lymphocytes <800/mm³, prealbumin <10 mg/dL) in 9 patients (Tab. I). Before PEG placement, patients were encouraged to eat smaller and frequent meals, and received vitamin and mineral supplements. The 9 "preventive procedures" (in patients with enteral feeding without severe dysphagia) were performed to prevent clinical malnutrition and aspiration due to the severe respiratory insufficiency. Patients and carers were informed of the benefits and risks of the procedure, of the possibility to continue oral feeding as long as possible, and of the fact that deferring PEG until a severe disease stage might increase the risk of the procedure. In all patients PEG had been placed by the "pull" technique with a polyurethane tube (diameter 20 Fr). PEG was carried out in the endoscopy room with mild sedation and pulse oximeter monitoring. After introduction of the endoscope and preliminary exploration, the walls of the stomach were distended and transillumination was obtained at the epigastrium. After local anesthesia the abdominal wall was punctured until the needle was seen penetrating the stomach. The wire was passed through the mouth and the pull technique was adopted. Following abdominal extraction, the endoscope was always reintroduced to control correct PEG positioning and absence of bleeding. During the procedure 6 patients with VC <50% showed mild desaturation, which was treated with oxygen therapy for 1 day.

The pack system consisted of polymeric diets (25-35 Kcal/kg/day) and the protein intake was 1.2-1.5 g AA/kg/day. None of the patients showed renal, hepatic, cardiac or respiratory failure requiring diet modifications. The immediate benefits of PEG were adequate nutritional intake, weight stabilization, and an alternative route for ALS drugs.

RESULTS AND CONCLUSIONS

In the 9 patients presenting mild malnutrition, we report the disappearance of malnutrition, and in the remaining patients we report an improvement of the nutritional status as attested by weight, BMI and anthropo-

TABLE I - GRADE OF MALNUTRITION IN PATIENTS

Malnutrition	Patients	Weight loss (n.v. <5%)	BMI (>20)	Lymphocytes (>1500)	Transferrin (>200)	Albumin (>3.5)	Prealbumin (>22)
Mild	6 pts	5-10%	17-18.4	1200-1500	150-200	3.5-3	18-22
Moderate	21 pts	11-20%	16-16.9	800-1199	100-149	2.9-2.5	10-17
Severe	9 pts	>20%	<16	<800	<100	<2.5	<10

metric increases. No deaths occurred during or following PEG placement. Wound infection occurred in 3 patients and was treated by antibiotics. All patients showed considerable improvement of nutritional status and general condition.

The past 2 decades have seen important advances in the treatment of dysphagia in patients with motor neuron disease; however, it remains a devastating, inexorably progressive, and ultimately fatal disease (9). The primary aim is to improve the quality of life of patient with ALS using symptomatic therapies, respiratory support and nutritional interventions. Patients with dysphagia are at risk of suboptimal calorie and fluid intake. The conventional approach to enteral access in the past was the use of nasogastric, nasojejunal or surgically placed gastrostomy tubes. PEG was introduced in 1980 as an alternative to laparotomy for gastrostomy placement. It can be performed in 10 to 20 minutes, requires minimal, if any, sedation rather than general anesthesia, can be accomplished at the bedside if necessary, has low morbidity, and is successful in over 95% of patients (10-12). The timing of PEG should be considered in the context of pulmonary status; in fact, it should be done before the forced VC falls to 50% of predicted and not in the preterminal phase because of the increased risk of the procedure (13). The most widely used PEG technique is the "pull" method introduced by Gauderer and Ponsky in 1979 and described in 1980 (10). The gastrostomy tube can also be pushed rather than pulled into place by a "push" method that has comparable results. Percutaneous radiologic gastrostomy (PRG) has also

been described without endoscopy but using radiologic guidance (14), but is associated with a higher risk of complications (especially local wound infection, reported in 23-27% of cases) (15, 16). This technique has been most commonly described in cases of head and neck cancer when there are strictures of the pharyngoesophageal tract (17, 18). ALS patients rarely have pharyngoesophageal strictures, so PEG remains our preferred method. In the present study it was performed in 98% of patients (2% underwent a surgical gastrostomy because of the presence of upper airway stenosis).

Two studies suggest that insertion of PEG may prolong survival. Patients with PEG lived an average of 1 to 4 months longer than patients who refused it or who were deemed ineligible for PEG. The survival advantage was greatest in patients with a VC >50% at the time of PEG insertion (7, 19). The importance of all these aspects has led us to establish that PEG is the most satisfactory treatment for dysphagia in patients with ALS.

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