

ORIGINAL RESEARCH

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Comparison of alternative nutrition practices in intensive care patients in terms of mortality and malnutrition**Yahya Atayan¹, Aysegul Ertinmaz Ozkan², Gokhan Aksakal², Ali Ramazan Benli²,
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Abstract

It is important to ensure proper nutrition to prevent malnutrition, mortality and the development of metabolic disorders in followed up patients in the intensive care unit. In case the patients gastrointestinal tract starts functioning, enteral feeding should be started in the early period. Patients should be given parenteral support when the gastrointestinal tract does not work. In this study, we compared the mortality, malnutrition and metabolic parameters of patients who received nutritional support via nasogastric catheter, percutaneous endoscopic gastrostomy and total parenteral nutrition. We retrospectively analyzed 117 patients' data with no oral intake in the intensive care unit. Patients were divided into 3 groups according to nutritional practices. Group 1 included 62 patients with PEG, group 2 included 28 patients with NG and group 3 had 27 patients with TPN support. In the comparison of mortality between groups, there was a significant decrease in PEG fed patients ($p < 0.001$). There was also a significant decrease in mortality of NG group when compared to TPN group ($p < 0.01$, Table 2). In malnutrition comparison, serum albumin levels were significantly higher in PEG fed patients than in other groups (Table 3, $p < 0.03$). There were significant improvements in metabolic parameters in the PEG group patients. We suggest that nutritional support should be provided to serious patients in intensive care unit as soon as possible in order to reduce morbidity, mortality and malnutrition, and we think that PEG procedure is safer and more effective nutritional practice than other procedures.

Keywords: Nasogastric catheter, percutaneous endoscopic gastrostomy and total parenteral nutrition**Introduction**

It is important to ensure proper nutrition to prevent malnutrition, mortality and the development of metabolic disorders in followed up patients in intensive care. Enteral feeding should be started in an early period in the patients in order to protect the gastrointestinal tract, and the nasogastric catheter (NG) is one of the first procedures to be selected. However, it has some side effects such as acute sinusitis, pharyngeal irritation and aspiration risk [1]. One of the easiest ways of feeding patients, who are not fed orally, enterally is to feed them through percutaneous endoscopic gastrostomy (PEG) [2]. PEG has two main indications; one is to provide enteral feeding and the other is gastrointestinal decompression [3]. In cases where nutritional support is not possible for non-functional gastrointestinal tract or when enteral feeding can not

be administered, the total parenteral nutrition (TPN) option for parenteral nutrition should be considered. In this study, we compared the mortality, malnutrition and metabolic parameters of the patients who were fed with NG, PEG and TPN procedures in the early period.

Material and Methods

Between January 2015 and January 2018, data of 117 patients who received nutritional support in a short period of time during their hospitalization due to lack of oral nutrition in intensive care units, were retrospectively evaluated. The patients were divided into 3 groups according to their nutritional practices. Within the first 10 days in intensive care unit, study groups were formed which included 62 patients with PEG as group 1, 28 patients with NG as group 2 and 27 patients with TPN support as group 3. Calorie needs of patients were calculated (average 2000-2700 kilocalories / day) for nutritional purposes according to their weight, and nutritional support was provided. In order to examine mortality rates, malnutrition and metabolic status, serum albumin, urea,

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creatinine, hemoglobin, AST, ALT, hospitalization periods and hospitalization costs of the groups, were compared.

Results

Of the 117 patients included in the study, 54 (46.2%) were male and 63 (53.8%) were female. No significant difference between patient groups was found in terms of age and gender (Table 1). In the first 3 months, 13 (11.1%) of the patients fed with PEG were dead and 49 (41.9%) patients were discharged. 18 patients (12.2%) fed with TPN died in the first 3 months. 5 (4.2%) patients were administered PEG before discharge and 3 had oral feeding. 15 (12.8%) of NG fed patients were dead in first 3 months and 10 patients (8.5%) were administered PEG and 2 (1.7%) patients were orally fed before being discharged. When the groups were compared in terms of mortality, there was a significant decrease in PEG fed patients ($p < 0.001$), and also there was a significant decrease in NG fed patients among NG and TPN groups ($p < 0.01$, Table 2). Serum albumin levels were significantly higher in patients fed with PEG compared to NG and TPN groups when investigated in terms of malnutrition (Table 3, $p < 0.03$). The discharge rates were significantly higher in patients with PEG. When compared with respect to metabolic parameters of patients, urea, creatine, hemoglobin, AST, ALT values were found to be significantly

improved in PEG group (Table 3). Even though the hospitalization duration was longer in PEG patients, there was no significant difference in cost of hospitalization of PEG patients with other groups (Table 3).

Table 1. Groups and patient distribution

Groups	Age Median (min-max)	Male n (%)	Female n (%)	Total n (%)
PEG	78 (20-96)	32 (27.3)	30 (25.6)	62 (53)
TPN	77 (53-94)	13 (11.1)	15 (12.8)	28 (24)
NG	76 (51-93)	9 (7.7)	18 (15.3)	27(23)
Total		54 (46.1)	63 (53.9)	117 (100)

Results are expressed as number of patients and percent

Table 2. Mortality comparison of groups

Patients groups	Deathn(%)	Discharged n(%)	Total n(%)	P value
PEG	13 (20.9)	49 (79.1)	62 (100)	<0.001*
NG	15 (55.5)	12 (44.5)	27 (100)	<0.01**
TPN	18 (64.2)	10 (35.8)	28 (100)	

Results are expressed as number of patients and percent

*P < 0.05 versus group PEG, TPN and NG; **P < 0.05 versus group NG and TPN

Table 3. Comparison of groups in terms of malnutrition and metabolic parameters

Variables	Age Median (min-max)	TPN Median (min-max)	NG Median (min-max)	P value<
Albumin(gr/dl)	2.9 (1.7-4.2)	2.3 (2-3.1)	2.5 (2.2-3.7)	0.03
AST(U/L)	25 (10-1314)	37.5 (11-799)	32 (13-139)	0.04
ALT(U/L)	19 (5-716)	21.5 (4-681)	22 (6-82)	0.5
Urea (mg/dL)	57 (13-307)	135 (37-337)	98 (17-281)	0.001*
Creatine(mg/dL)	0.6 (0.2-4)	2 (0.2-6.9)	1.5 (0.1-3.7)	0.001*
Hgb (gr/dL)	11 (7.4-14)	9.5 (7.2-12.8)	10.3 (8.2-13.9)	0.03*
Wbc (1000/uL)	10.8 (4.65-42.3)	14.4 (2.4-38.4)	11.7 (1.8-36.7)	0.2
Cost (TL)	16.577 (2659-211494)	15.615 (439-89009)	11.771 (439-211494)	0.9
Hospitalization Period (day)	25 (4-160)	20 (4-63)	16 (4-74)	0.3

Mean, minimum and maximum results of metabolic parameters were given

*P < 0.05 versus group PEG, TPN and NG;

Discussion

One of the most important points of intensive care treatment protocols is the provision of nutritional support and prevention of malnutrition and infection. In studies conducted in developed countries, malnutrition was found to be 50% in the patients who were hospitalized and then treated [4]. If the gastrointestinal tract is working in critical cases, nutrition should be given primarily by using enteral administration [5]. If oral intake is not possible, nutrition should be given by means of gastrostomy or jejunostomy tubes placed using nasogastric catheter endoscopic or surgical techniques [6]. PEG is an acceptable method in terms of comfort which can be applied at patient's bedside and does not require general anesthesia in patients requiring long-term enteral nutrition who cannot take food orally. Because of the low risk of aspiration,

the PEG is accepted to be superior to other enteral feeding pathways [7]. It was introduced in 1980 by Gauderer and in 1981 by Ponsky [8,9]. PEG can be performed by different methods. The Pull-PEG method has been widely used in recent years and is the most preferred method [10]. PEG should be administered in patients who have; no swallowing reflexes, inadequate swallowing, no NG tube tolerance, cases planned for more than 4 weeks of feeding, neurological diseases, tumoral diseases located in the head and neck region, pharyngeal-esophageal obstructions, head-neck trauma and severe debilities [11]. The definite contraindications for PEG are patients with gastric resection, severe ascites, hepatomegaly, obesity and coagulation disorders [12].

Patients with an obstacle to enteral feeding should be given parenteral nutrition. Although the patient's clinical outcome is

positively affected when used appropriately, improper use results in increased infectious complications, metabolic abnormalities and increased medical costs. In the absence of contraindication, PEG has been reported to be the exclusive method for nutritional support in trauma patients. Although PEG is a minimally invasive method, it has a complication rate of 8% [13]. In the study of Mc Carter TL et al., it was found that administering PEG in patients reduced both time and cost of hospitalization [14]. In our study, the duration of hospitalization of patients who underwent PEG procedure was not shorter than other procedures, but there wasn't any additional costs compared to other procedures (Table 3).

In a large series of studies by Stockeld D et al. (229 cases), mortality and morbidity were examined, and the success of PEG was found to be 97.0% [15]. In a study conducted by Gençosmanoğlu et al., 30-day mortality was reported as 8.0% and an overall mortality rate was reported as 32.0% [16]. Erdil A et al., reported 30-day mortality as 26.8% and late mortality as 15.7% [17]. In our study, the mortality rate between PEG, NG and TPN patient groups was 20.9%, 55.5% and 64.2% respectively. There was a significant difference between the PEG group and the other groups in terms of mortality (Table 2, $p < 0.001$). In the study of Hamidon BB et al., the safety, efficacy, nutritional status and treatment adequacy of PEG and NG procedures were compared, and nutrition with PEG was found to be more effective than NG in the treatment of dysphagia in stroke patients [18]. Similarly, in our study, the risk of malnutrition was found to be significantly lower in the PEG group. The number of patients who were discharged from intensive care unit was found to be significantly higher in the PEG group ($P < 0.001$, table 2). There was no significant difference in terms of discharge and malnutrition between the TPN and NG groups (Table 3).

As a result, PEG is a safe and effective process in patients with planned nutritional support because it does not require general anesthesia, can be applied at the bedside if necessary, has low morbidity, mortality and malnutrition risk. Therefore, in the treatment of critically ill patients, PEG-mediated feeding can reduce the mortality, malnutrition and metabolic disorders.

Competing interests

The authors declare that they have no competing interest.

Financial Disclosure

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Ethical approval

Ethics committee approval was not taken due to retrospective study.

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