

## **Nutrition-Related Mortality after Surgical Gastrostomy**

Elvan Yılmaz Akyüz<sup>1\*</sup>, Cebrail Akyüz<sup>2</sup>

<sup>1</sup>Department of Nutrition and Dietetics, Faculty of Health Sciences, University of Health Sciences, Istanbul, Turkey

<sup>2</sup>Gastroenterologic Surgeries, Haydarpaşa Numune Training and Research Hospital, Istanbul, Turkey

### **Original Research Article**

**\*Corresponding author**

*Elvan Yılmaz Akyüz*

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**Abstract:** In this study, in the cases when the endoscopic route was failed or contraindicated, nutrition-related mortality after surgical gastrostomy was investigated. In this study, patients who underwent surgical gastrostomy with mini-laparotomy under local anesthesia for nutrition in a tertiary hospital were retrospectively investigated. The demographic data, surgical gastrostomy indications, ASA scores, complications, and nutrition-related mortality after gastrostomy were evaluated in 71 patients included in the study. The mean age of the patients is  $64.9 \pm 16.7$  years. Thirteen (18.3%) patients had ASA III and 58 (81.7%) had ASA IV scores. The target calorie and protein intake were reached within  $3.36 \pm 0.46$  days according to the tolerance of the patients. Complications occurred in 16 patients (22.4%) after surgical gastrostomy and 15 patients (19.6%) developed mortality within the first month. In 5 of these patients (33.3%), aspiration pneumonia due to nutrition was detected as mortality reason. Most of the deaths in the first thirty days after surgical gastrostomy have been found to be preventable if nutritional therapy principles are considered. Aspiration pneumonia has a high mortality rate after surgical gastrostomy and effective nutritional training should be given to those who will take care of patient after discharge, as well as to determine and apply correct treatment in the hospital.

**Keywords:** Surgical gastrostomy, tube feeding, enteral nutrition, aspiration pneumonia, mortality.

## **INTRODUCTION**

In patients with a functional gastrointestinal system and who are not fed through oral route, enteral nutrition is preferred because it is more physiologic. During the care and treatment of critical patients, enteral nutrition is important to meet energy needs, to protect the gastrointestinal system flora and to prevent translocation [1]. In patients where oral enteral or nasoenteric routes are not available, nutritional gastrostomy is one of the options [2]. Percutaneous endoscopic gastrostomy (PEG) is the easiest and most widely used technique available [3,4]. Surgically placed gastrostomy tubes have a longer procedural time, longer postoperative recovery time, higher malignancy and higher complication rate compared with PEG [5,6]. The most common indications for gastrostomy are cerebrovascular diseases, motor neuron diseases, head / neck cancer and trauma [7-9]. In this study, in the cases when the endoscopic route was failed or contraindicated, the nutrition-related mortality after surgical gastrostomy under local anesthesia was investigated.

## **MATERIALS AND METHODS**

This study was conducted with approval from the local ethics committee of the hospital (HNEAH, KAEK, 2018/5743). Between January 2011 and December 2017, in Haydarpaşa Numune Training and Research Hospital, the data of 86 patients who underwent surgical gastrostomy (Stamm Gastrostomy) with mini-laparotomy under local anesthesia for enteral feeding were examined. All patients received low molecular weight heparin and antibiotic treatment for prophylaxis. Fifteen patients who underwent additional surgical intervention for adhesiolysis, organ resection and iatrogenic injury were excluded. All of the patients were treated with contrast medium prior to being fed and the tube location was observed and possible leaks were assessed. A total of 71 patients were included in the study. Standard feeding solution was initiated from gastrostomy at the post-operative 24<sup>th</sup> hour with the 20 hours continuous infusion method as 20 cc / h. Before discharge, practical training was given by a nutrition support nurse about nutritional treatment for those who will take care of patients. Patients' demographic data, surgical gastrostomy indications, ASA scores, complications and nutrition-related mortality status in

the first thirty days after surgical gastrostomy were evaluated.

Statistical analysis of the study was conducted using SPSS version 16.0 (SPSS for Windows, 2008, SPSS Inc., Chicago, Illinois, USA). Descriptive statistics are used for continuous variables (mean, standard deviation, minimum, maximum, percentage distribution).

**RESULTS**

Seventy-one patients underwent surgical gastrostomy. The mean age of the patients was 64.9 ± 16.7 (range: 27-98 years), 50 (70.4%) were males and 21 (29.9%) were females. Fifty-eight (81.7%) patients with ASA IV score in a serious risk group were identified. Obstructive tumors (head-neck tumors [51.2%, n = 21], esophageal tumors [36.6%, n = 15] and metastatic tumors [12.1%, n = 5]) were forming 57.7% (n=41) of the surgical gastrostomy indications. Other indications were neuromuscular diseases (Multiple sclerosis [n = 7, 9.9%], Amyotrophic Lateral Sclerosis [n = 5, 7.0%], Duchenne Muscular Dystrophy [n = 1, 1.4%]), cerebral hemorrhage and stroke (n = 12, 16.9%), hypoxic encephalopathy (n = 3, 4.2%) and trauma (n = 2, 2.8%). The characteristics of the patients are given in Table 1.

Mean operative time was calculated as 32 ± 11.9 minutes. At 24<sup>th</sup> hours after surgery, the patient was started to be fed from the tube and the target dose of nutrition was reached within 3.36 ± 0.46 days according to the tolerance of the patients. Common causes of morbidity were surgical site infection (n = 5, 7.0%) and peristomal leakage (n = 4, 5.6%) (Table 2). Three patients had minor bleeding (4.2%) and two patients had evisceration (2.8%) and were treated conservatively. It was found that one patient's tube (1.4%) was displaced on the 13<sup>th</sup> postoperative day, one patient's tube (1.4%) was replaced on the 19<sup>th</sup> postoperative day because it was completely blocked.

In the first 30 days following surgery, mortality was seen in 15 patients (19.6%). The causes of mortality are shown in Table 3. Five patients (33.3%) who had mortality with aspiration pneumonia underwent surgical gastrostomy due to neuromuscular disease in 4 patients and cerebral hemorrhage in 1 patient. No aspiration-related pneumonia was seen in any patient during hospitalization after surgical gastrostomy. It was determined that 3 of the 5 patients with mortality were not positioned properly and the other 2 had fast bolus nutrition. It was determined that the patients died in the intensive care unit after admission to the hospital due to aspiration pneumonia.

**Table-1: Characteristics of 71 patients**

Patient Characteristics	Total N (%)
Gender	
Female	21 (% 29.9)
Male	50 (% 70.4)
Age, average year (± SD)	64.9 ± 16.7
ASA Score	
ASA III	13 (% 18.3)
ASA IV	58 (% 81.7)
Indications	
Obstructive tumors	41 (% 57.7)
Neuromuscular diseases (DMD, ALS, MS)	13 (% 18.3)
Cerebral hemorrhage and Stroke	12 (% 16.9)
Hypoxic encephalopathy	3 (% 4.2)
Trauma	2 (% 2.8)
Major comorbid diseases	
Hypertension	26 (% 36.6)
Diabetes mellitus	13 (% 18.3)
Coronary artery disease	11 (% 15.5)
KOA	7 (% 9.8)
Epilepsy	2 (% 2.8)
Others (hyperthyroidism, hypothyroidism)	2 (% 2.8)

SD: Standart Deviation, ASA: American Society of Anesthesiologists, DMD: Duchenne Muscular Dystrophy, ALS: Amyotrophic Lateral Sclerosis, MS: Multiple Sclerosis, KOAH: Chronic obstructive pulmonary disease

**Table-2: The complications of patients**

Complications	Total N (%)
Surgical site infection	5 (% 7.0)
Peristomal leakage	4 (% 5.6)
Minor bleeding	3 (% 4.2)
Tube displacement	1 (% 1.4)
Tube obstruction	1 (% 1.4)
Evisceration	2 (% 2.8)
Total	16 (% 22.4)

**Table-3: The causes of mortality in the first 30 days after surgical gastrostomy**

Factors	Total N (%)
Aspiration pneumonia	5 (% 7.0)
Pulmonary embolism	3 (% 4.2)
Isolated respiratory failure	3 (% 4.2)
Myocardial infarction	2 (% 2.8)
Unknown	1 (% 1.4)
Total	15 (% 19.6)

## DISCUSSION

Many recent studies have shown that percutaneous, radiological, or surgical gastrostomy is effective and safe for long-term enteral feeding [10-12]. Surgical gastrostomy-related mortality rates (2.5-22%) are in acceptable level even though high morbidity (4-74%) and cost [6, 11, 13]. Most of the studies on surgical gastrostomy are retrospective and formed from heterogeneous patient groups. Therefore, the care and follow-up of patients are not standard. The mortality rate in our study was 19.6% (n=15) is compatible with the literature and quite high.

Although post-PEG aspiration pneumonia varies from 1.6% to 22.1% in the literature, there is no information about the postoperative gastrostomy frequency after surgery [14,15]. This may be considered as the main reason for the popularity of PEG in the last 30 years and not selecting the surgery unless it is mandatory. Patient-based anatomic and physiologic pathologies such as loss of anatomical integrity of the upper and lower esophageal sphincters, increase in transient lower esophageal sphincter loosening, and depression of the pharyngoglottal adduction reflex have been emphasized as the causes of aspiration in the investigated patient groups [16,17].

Aspiration is an important clinical problem especially in patients who are fed with gastric tube. It can cause mortality by the increase in hospitalization duration and costs, long-term antibiotic use and pneumonia. It is important to pay attention to many factors including the nutritional method that will lead to the development of aspiration pneumonia, the patient's factors, and the size of the feeding tube [18]. Even surgical or percutaneous endoscopic jejunostomy can be preferred for the patients with severe aspiration pneumonia risk [19].

According to our study results, most post-gastrostomy deaths are dependent on individual and can be prevented when it was cautioned. Approximately one-third of the first thirty-day mortality is resulted from aspiration and subsequent pneumonia because of non-compliance with the tubal feeding rules. In order to prevent aspiration pneumonia with high mortality rate, it is important to pay attention to the rate of injection of the nutrition, to confirm the tube placement and position, to adjust the bedhead gradient, to measure the residual volume, to evaluate the abdominal distension, to provide effective nutritional training and follow-up to individuals who will provide care to patients after discharge [20-22].

As in many studies in the literature, because our study is based on retrospective data the patient profile and diseases are heterogeneous and the preference of surgical gastrostomy in the limited patient group with failed PEG constituted the limitations of this study. These also make it difficult to compare patient outcomes.

## CONCLUSION

In conclusion, it can be observed that aspiration developed after gastrostomy tube feeding and consequent mortality due to pneumonia can be prevented by effective and continuous nutrition trainings.

## Conflict of Interest

No financial support was provided from any individual or institution for the study.

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