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Experience of percutaneous endoscopic gastrostomy in cardiac patients

Sinan Ömeroğlu,[1] Selçuk Gülmez,[2] Emir Çapkınoğlu,[3] Hakan Mustafa Köksal,[1] Mustafa Fevzi Celayir,[1] Helin El Kılıç,[4] Aziz Serkan Senger,[2] Orhan Uzun,[2] Erdal Polat,[2] Mustafa Duman[2]

[1]Department of General Surgery, University of Health Sciences Sisli Hamidiye Etfal Research and Training Hospital, Istanbul, Türkiye
[2]Department of Gastroenterological Surgery, University of Health Sciences Kosuyolu High Specialization Education and Research Hospital, Istanbul, Türkiye
[3]Department of General Surgery, Acibadem Healthcare Group, Istanbul, Türkiye
[4]Department of Cardiovascular Surgery, University of Health Sciences Sisli Hamidiye Etfal Research and Training Hospital, Istanbul, Türkiye

ABSTRACT

Introduction: In this study, we aimed to present our experience and findings in high-risk cardiac patients who were inserted percutaneous endoscopic gastrostomy (PEG) tube due to inability to take oral food, prolonged intravenous/nasogastric nutrition, or require long-term enteral feeding.

Materials and Methods: A total of 64 patients were examined retrospectively who had PEG tube insertion between 2012 and 2020 in the intensive care unit or clinic by the gastrointestinal surgeon. All patients underwent cardiac surgery before feeding tube insertion. The necessity and short-term results for PEG were evaluated in this patient group.

Results: A total of 64 patients underwent upper gastrointestinal endoscopy for insertion of a PEG tube. The procedure was successful in all patients and no complications were observed in the follow-up. Twenty-five (39.1%) of 64 patients were women. The mean age of the patients was 67.04 (±11.44) years. The number of patients for diabetes mellitus, hypertension, atrial fibrillation, cerebrovascular disease, chronic kidney disease, and chronic obstructive/restrictive pulmonary disease was 36 (56.3%), 53 (82.8%), 21 (32.8%), 19 (29.7%), 21 (32.8%), and 15 (23.4%), respectively. The mean hospital stay of the patients after cardiac surgery was 37.81 (±12.81) days, and the mean feeding from PEG tubes was 13.34 (±4.93) days.

Conclusion: Patients with high-risk factors who have undergone cardiac surgery are more likely to need a PEG tube. This patient group should be evaluated well in the pre-operative period. Upper gastrointestinal endoscopy should be performed in patients with gastrointestinal symptoms. Furthermore, information should be given about the PEG tube that may be required in the post-operative period.

Keywords: Cardiac surgery, enteral nutrition, percutaneous endoscopic gastrostomy

Introduction

Nutrition is one of the most important needs of hospitalized patients, especially followed in the intensive care unit (ICU), and nutritional support is an important component of recovery. Enteral nutrition is superior to parenteral nutrition and should be preferred. To protect the

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Correspondence: Sinan Ömeroğlu, M.D., Sağlık Bilimleri Üniversitesi Şişli Hamidiye Etfal Eğitim ve Araştırma Hastanesi, Genel Cerrahi Kliniği, İstanbul, Türkiye
e-mail: dr_sinanomeroglu@hotmail.com

gastrointestinal system mucosa and maintain the normal flora in patients, it is aimed to start enteral nutrition as soon as possible.[1] In patients who cannot take oral food, enteral nutrition is provided by a nasogastric/nasojejunal tube or a gastrostomy tube. Gastrostomy is the first choice in patients with a functional gastrointestinal system, poor oral intake, and require long-term nutritional support. Feeding tubes can be placed percutaneously or surgically. Percutaneous endoscopic gastrostomy (PEG) is a minimally invasive procedure with no difference in morbidity or mortality comparing surgical gastrostomy but less expensive and saves time. It was first applied in 1980 as an alternative to surgical gastrostomy.[2]

Enteral nutrition is very important for recovery in patients who have undergone cardiac surgery, have cerebrovascular disease, have prolonged intubation or tracheostomy. Reflux and aspiration pneumonia are common during oral feeding in the ICUs.[3] Furthermore, post-operative neurological complications may be expected after cardiac surgery in which case the PEG tube may be necessary because of oropharyngeal dysphagia. For these patients, enteral nutrition can be provided with PEG tube when needed.[4,5] In addition, intravenously administered drugs can be switched to the enteral route with gastrostomy tube in chronic patients.

We examined our experiences in patients who underwent cardiac surgery and who used PEG tube for enteral nutrition during prolonged hospitalization due to their comorbidities and perioperative findings.

Materials and Methods

Patients and Methods

All patients who underwent adult open-heart surgery between 2012 and 2020 were examined. Sixty-eight patients needed enteral nutrition support; four patients who underwent surgical gastrostomy were excluded from the study. PEG was not suitable in these patients because of the previous abdominal surgery or gastric surgery. Sixty-four patients were determined who needed enteral nutrition due to multiple comorbidities, the presence of neurological complications, and prolonged hospitalization during clinical follow-up. It was determined by the Nutrition Support Team that all patients needed nutritional support. The timing and absolute indication for PEG were determined by neurologists, gastroenterologists, cardiac surgeons, and intensive care teams. Patients who did not undergo cardiac surgery, patients with indications other than the specified team protocol, and patients who had a previous PEG were excluded from the study. All PEG insertion procedures were performed using a routine 24F tube (Standard PEG Kit Pull, 24Fr w/ENFit, EndoVive™ Boston Scientific) with a pull technique. Pre-operative characteristics, intraoperative variables, and post-operative outcomes were determined and evaluated in the database.

Ethical Approval

This retrospective study was approved by the ethical committee of Sisli Hamidiye Etfal Research and Training Hospital (Date: February 22, 2022, Issue number: 3405). Informed consent was obtained from the relatives of each patient before the procedures after explaining the interventions, risks, and benefits as a policy of the health system in the country. The study was conducted in line with the ethical principles of the Declaration of Helsinki.

Statistical Analysis

Statistical analysis was performed with the SPSS version 24.0 program (SPSS Inc. Chicago IL, USA). The frequencies and percentages were determined for categorical variables. The mean, standard deviation, median, minimum, and maximum values were determined for continuous variables. The distribution of continuous variables was tested with the Kolmogorov–Smirnov test. The Mann–Whitney U test was used for the variables that did not fulfill the assumption of normal distribution, and the Student's t test was used for the variables with normal distribution.

Results

A total of 64 patients who underwent cardiac surgery and had a PEG tube inserted for postoperative nutritional needs were analyzed. Twenty-five (39.1%) patients were women. The mean age of the patients was 67.04 (±11.44) years. The number of patients for diabetes mellitus, hypertension, atrial fibrillation, cerebrovascular disease, chronic kidney disease, and severe lung disease such as chronic obstructive/restrictive pulmonary disease was 36 (56.3%), 53 (82.8%), 21 (32.8%), 19 (29.7%), 21 (32.8%) and 15 (23.4%), respectively (Table 1). The comorbidity factors mentioned above were seen individually or together. All these comorbidity factors mentioned were considered as predisposing factors in the prolongation of hospital stay. Early action was taken when the necessary conditions for

Table 1. Demographic data and comorbidities of the patients

Age (mean, years)	67.04	±SD (±11.44)
	n	**%**
Sex		
Male	39	60.9
Female	25	39.1
Hypertension	53	82.8
Diabetes mellitus	36	56.3
Cerebrovascular disease	19	29.7
Atrial fibrillation	21	32.8
CPD	15	23.4
CKD	21	32.8

CPD: Chronic pulmonary disease; CKD: Chronic kidney disease.

Table 2. Perioperative data

	n	**%**
AVR+MVR	8	12.5
Bentall procedure	5	7.8
CABG	35	54.7
David procedure	3	4.7
CABG+Carotid intervention	7	10.9
MVR	3	4.7
MVR+Ablation	3	4.7
	Mean	**SD**
Cardiopulmonary bypass time (minute)	98.91	±27.03
Nutrition time from PEG (day)	13.34	±4.93
Length of stay (day)	26.81	±7.81

AVR: Aortic valve replacement; MVR: Mitral valve replacement; CABG: Coronary artery bypass graft.

PEG were provided, especially in patients with the previous or perioperative cerebrovascular disease.

Eight (12.5%) of the patients had aortic valve replacement and simultaneous mitral valve replacement (MVR). 5 (7.8%) patients had the Bentall procedure. Three (4.7%) patients had the David procedure. Thirty-five (54.7%) patients underwent coronary artery bypass graft (CABG) surgery for chronic ischemic heart disease. Additional carotid surgery or stenting was performed in 7 (10.9%) different patients who underwent CABG. Three (4.7%) patients underwent isolated MVR. Additional ablation was applied for the treatment of rhythm disturbances in 3 (4.7%) mitral valve patients. The greatest effect in preserving cranial functions in open-heart surgery is the good management of the cardiopulmonary bypass process (CBP). In this context, prolonged CBP durations are closely related to mortality and morbidity. In our patient group, the mean CBP time was 98.91 (±27.03) min. The mean hospital stay of the patients after cardiac surgery was 37.81 (±12.81) days, and the mean feeding from PEG tubes was 13.34 (±4.93) days. The average length of stay of the patients was 26.81 (±7.81) days (Table 2).

Discussion

Clinical nutrition is becoming increasingly important because malnutrition is associated with postoperative complications, mortality, and long hospital stays.[6] When a well-nourished patient undergoes elective surgery, there is no nutritional support for a few days. However, when the hospital stay is prolonged or post-operative complications develop, there is a decrease in nutritional status and patients need nutritional support. In the post-operative period, oral-enteral intake should be started as soon as possible. If the patient is not taking oral food, short-term nutrition is provided by nasogastric or nasojejunal tube, and long-term nutrition is provided by gastrostomy or jejunostomy tube.[7]

Cardiac operative mortality is gradually decreasing, but post-operative morbidity remains a common condition and seen in 4.3–36% of cardiac surgery patients.[8] Risk factors for major perioperative cardiac complications are ischemic heart disease, decreased functional status, heart failure, cardiomyopathy, severe valvular heart disease, significant arrhythmias, chronic renal failure, history of cerebrovascular accident, diabetes mellitus, chronic pulmonary dysfunction, obesity, and anemia.[9] Post-operative complications in cardiac surgery include atrial fibrillation, prolonged ventilation, reoperation for bleeding, stroke, renal failure, and pneumonia, which prolong hospital stay. Among these, stroke, renal failure, and pneumonia are associated with poor long-term survival.[10] Beller et al. reported the most common major complication associated with PEG indication as prolonged ventilation and neurogenic dysphagia. They reported that 1.9% of patients undergoing cardiac surgery needed PEG.[11]

The need for PEG has increased over time. Most patients requiring PEG have major post-operative complications.

While increasing patient comorbidity and operative complexity may increase PEG rates, positive improvements in surgical techniques and perioperative care may decrease PEG rates.[11]

PEG has positive effects on the rehabilitation of patients who develop post-operative complications by providing nutrition, hydration, and enteral drug intake. Beller et al.[11] showed a 1-year mortality rate of 50.4% in patients with high comorbid factors and post-operative complications, but long-term survival was paralleled by general cardiac surgery in patients who passed the initial rehabilitative period. Therefore, the PEG tube to be placed at the optimal time will have a positive effect on patient survival and shorten the hospital stay.

Cardiopulmonary bypass (CPB), remains the most common cardiac surgery, was first used by John H. Gibbon in 1953, but its routine use took place in 1955 by John Kirklin and C Walton Lillehei.[12,13] Cardiac, neurologic, and pulmonary dysfunction can be seen in the post-operative period in the patient who underwent CPB.[14-16] Raffa et al. found that patients underwent cardiac surgery had 4.3% neurological deficits.[17] In another study, pulmonary complications after CPB were reported between 3 and 7%.[18] All of these are factors that cause morbidity after cardiac surgery and prolong hospital stay and recovery. In our study, like the literature, most of the patients had undergone CPB surgery. Our group consisted of patients with more than two risk factors and undergoing operations that required relatively long CPB times.

PEG is a minimally invasive and safe method with an acceptable complication rate. In one study, the prevalence of 30-day mortality of PEG was 5.5%.[19] PEG tube placement may cause minor or major complications. Major complications include aspiration pneumonia, hemorrhage, buried bumper syndrome, perforation of bowel, necrotizing fasciitis, metastatic seeding, and minor complications include wound infection, tube leakage to abdominal cavity, stoma leakage, inadvertent PEG removal, tube blockage, pneumoperitoneum, gastric outlet obstruction, and peritonitis.[20] No complications associated with PEG were observed in any of the patients we examined. None of our patients had contraindications for PEG are serious coagulation disorders, hemodynamic instability, sepsis, severe ascites, peritonitis, abdominal wall infection at the selected site of placement, peritoneal carcinomatosis, interposed organs, history of total gastrectomy, gastric outlet obstruction, and severe gastroparesis.[20] The main purpose of our study was to mention that the use of PEG in comorbid patients with prolonged hospitalization may be safe and may contribute to recovery rather than examining PEG mortality or complications in the cardiac patient group. In addition to safe and acceptable complication rates, PEG is a reversible condition in the patient who may have oral food intake. Naik et al. reported the mean PEG removal time as 4–5 months. In another study, the PEG removal time was 8.4 months and the overall removal rate was 37%.[11,21]

Conclusion

PEG is an easy, relatively inexpensive, and minimally invasive method with low mortality and morbidity rate. PEG may be needed in patients who have had cardiac surgery with advanced age, multiple comorbid factors, surgical difficulties, and perioperative morbidities. In the pre-operative period, patients and their relatives should be informed that PEG may be required in patients with predictable risk factors and a high risk of developing complications. Pre-operative endoscopy can be planned for patients who have dyspeptic complaints, are in the risk group for gastrointestinal malignancy, or have a history of the previous gastrointestinal surgery.

Disclosures

Ethichs Committee Approval: Sisli Hamidiye Etfal Research and Training Hospital (Date: February 2, 2022, Number: 3405).

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