

ORIGINAL ARTICLE

Percutaneous Endoscopic Gastrostomy: Experience at King Abdullah University Hospital, Jordan

Abdullah Al-Rashdan

Department of Internal Medicine

*Corresponding author: A. Al-rashdan: abdullahrashdan@yahoo.com

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Abstract

Background: Percutaneous endoscopic gastrostomy (PEG) tubes are widely used for nutritional support of patients with dysfunctional swallowing of various etiologies and an otherwise intact gastrointestinal tract. The short and long-term outcomes of enteral nutrition using this technique in Jordan are largely unknown.

Objective: We aimed to describe the indications, the rate of successful placement, complication rates, and long term outcome of PEG tubes placed in a variety of patients at King Abdullah University Hospital in Northern Jordan.

Methods: Between the period from April, 2003, until March, 2007, 155 consecutive patients with PEG tubes inserted during this period (using the Ponsky pull technique) were identified from our database. The demographic data, primary and secondary underlying medical conditions, and post-placement complications were analyzed. Phone calls with caregivers were made to gather information about the short and long-term outcomes of using PEG tubes.

Results: Complete data were available for 85/155 (55%) of

the patients reviewed. PEG tubes were successfully placed in 99% of cases, with no procedure-related complications. The most common indication for PEG tube placement was neuromuscular dysphagia documented in 46%, followed by decrease in level of consciousness or coma in 38% of the patients. Post placement major complications were noted in 5% of cases in the form of sepsis, bleeding, and stoma mucosa necrosis. Minor complications such as stoma leak, skin irritation, and gastrointestinal upset were noted in 41% of patients. At four year follow up, the overall mortality was 53%. Twenty-one percent of patients had their tube replaced, 27% recovered normal swallowing function and had their tube removed, while 20% of patients were still dependent on the tube for nutritional support.

Conclusions: PEG tube placement at our institution has an acceptable success rate. Short and long-term outcomes are comparable to published series. Proper selection of patients with expected survival benefit would likely minimize the mortality and the complication rate.

Key words: Percutaneous endoscopic gastrostomy, Mortality rate, Complications.

Introduction

The technique of percutaneous Endoscopic Gastrostomy (PEG) was introduced into clinical practice in 1980 (1). Since then, PEG has become the preferred method for providing long-term enteral nutrition in patients with functional GI tract who can not maintain adequate oral intake. The safety and effectiveness of PEG for providing nutrition and upper gastrointestinal drainage have been widely demonstrated (2-6). In 1991, a total of 81,105 hospitalized Medicare beneficiaries in the US had gastrostomies placed including 59,969 PEG and 21,136 surgical gastrostomies. This number increased to 121,000 gastrostomies in 1995 (7). It had been estimated that up to 10% of nursing home patients in the US have PEG tubes (8). PEG tubes may be used for delivery of hydration and medications and for gastric decompression. The most common indications for feeding gastrostomy tube placement include stroke, dementia, malignancy, and other neurological disorders associated with dysphagia or aspiration (9-12). Absolute contraindications to PEG tube placement include those of standard upper GI endoscopy and inability to transilluminate the anterior abdominal wall and appose the anterior gastric wall (13). We are reporting our experience of PEG tubes placement, including indications, success rate of placement, with short and long term outcomes.

Materials and Methods

This retrospective study was carried out at King Abdullah University Hospital, which serves about two million people in Northern Jordan. Between April, 2003, and March, 2007, PEG tubes were inserted in 155 consecutive patients using Ponsky pull technique at the endoscopy unit. Review of the endoscopy unit records of patients undergoing PEG placement during that period was performed. Baseline demographic data and clinical characteristics of study patients including primary diagnosis and other comorbidities were collected through review of medical charts, in addition to review of electronic medical records to document the various available data including laboratory findings. Phone calls with patients' caregivers, and occasionally personal interviews were performed. Data were recorded using a standard form. Assessment of the short and long term outcomes of PEG tubes was performed. Post-procedure minor and major complications were determined. SPSS (SPSS software, USA) was used

for statistical analysis and administration of the data.

Results

One hundred and fifty-three patients (98.7%) out of 155 who underwent PEG placement attempt were successful. Two patients failed the procedure. One was due to bleeding issues at the time of endoscopy. Inability to transilluminate the anterior abdominal wall prohibited placement in another. Eighty-five patients (55%) were available for evaluation. Their caregivers offered to gather information about the patient's post procedure performance. Total number of PEG tube placement for 85 patients was 117 (median was 2, range 1-4). Of the total, 21% had two or more tubes placed. All patients who underwent PEG tube placement were given prophylactic intravenous antibiotics at least once at the time of procedure.

The median patient's age was 67 years; (range 1-108). Sixty percent of patients were >60 years of age, 57% were male (Figure 1). The most common indication for PEG placement was neuromuscular dysphagia documented in 46% of cases, followed by decrease in level of consciousness or coma in 38%. The primary diagnosis was stroke in for 51% of patients who underwent PEG tube placement. Motor vehicle accident (MVA) trauma was the indication for 15%. Head and neck malignancy accounted for 7% (Table1). Significant co-morbidities such as hypertension were present in 39%, and about 27% of patients had type two diabetes. Fifty-one patients were > 60 years (25 were male). The majority had suffered a stroke (34), and of that group 37% were diabetics.

Twenty-one patients (49%) of those whose serum albumin had been measured showed increased levels subsequently after PEG placement. This constituted 25% of the entire study population. The median increase in serum albumin value was 4 g/L; range 0.6- 23 g/L with an average increase of 6 g/L. This increase was achieved in a median period of 38 days; range 3- 549 days. Thirty-three patients (43%) of those whose hemoglobin was measured had increased hemoglobin levels subsequently after the procedure. The median increase in hemoglobin value was 1.35 g/dL, (range 0.2- 5). This change was achieved in a median period of 38 days, range 5- 559 days. At the time of data collection, 17 patients (20%) were still using the tube as the mainstay of

Table1. Indication for PEG placement

Stroke	43
Motor Vehicle Accident Trauma	13
Head and Neck Malignancy	6
Post-Operative Coma	3
Respiratory Failure	2
Pneumonia	2
Coma	2
Dementia	2
Prolong ICU care with nasal feeding	4
Poor PO intake	8
Total	85

nutrition, while 23 patients (27%) had improved swallowing functions and attained normal oral intake, an indication for removal of the PEG tube. Almost all of the patients who attained normal oral intake achieved that within the first year of PEG tube placement, with median time of 90 days; range 2 – 420 days. Seven patients of the advanced age group (> 65 years) were still using the tube for nutrition, while twelve attained normal swallowing function. Patients who achieved increased albumin totaled 16%

Table 2: Major Complications

Pressure necrosis of stoma mucosa	1
GI hemorrhage	2
Sepsis	2
Total	5

Table 3: Minor Complications

Inadvertent removal	5
Dislodgement	4
Ileus	1
Stoma leak	15
Tube block	3
Tube break	4
Vomiting (GI upset)	7
Fluid aspiration	5
Bile discharge	1
Skin irritation, and itching	14
Total	59

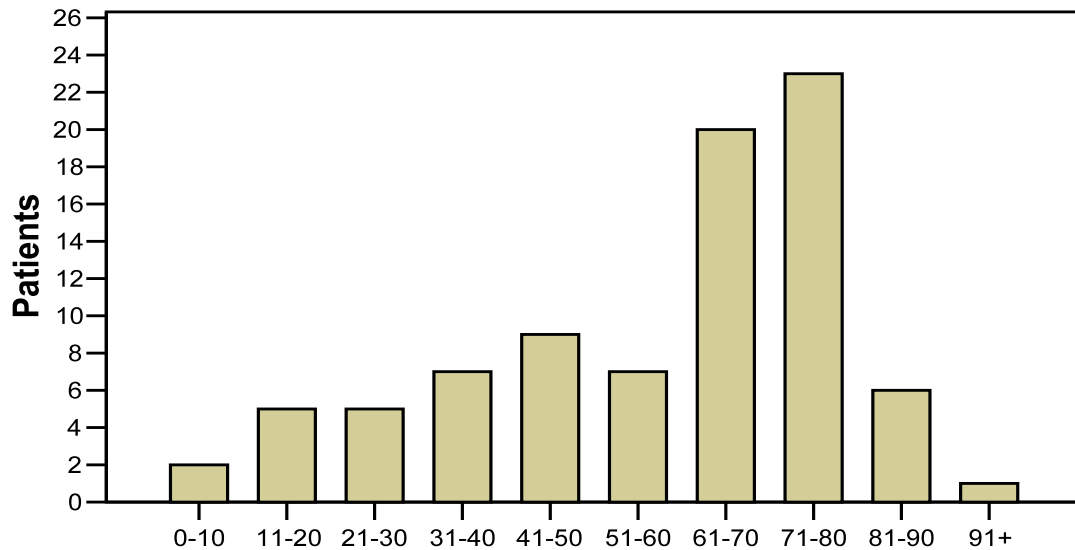


Figure 1. Patient distribution by age.

of those diagnosed with stroke, 33% of those diagnosed with head and neck tumors, and 38% of patients who suffered motor vehicle trauma. On the other hand, patients who achieved increased hemoglobin were 26% of those diagnosed with stroke, 33% who were diagnosed with head and neck tumors, and 46% who had experienced motor vehicle accidents. Seventeen percent of non-diabetic patients in the study had increased serum albumin values, while this was noted in only 4% of diabetic patients. Also it was noted that 31% of non diabetic patients had increased hemoglobin values, versus 6% of diabetic patients. Twenty-two percent of study patients > age 65 had increased serum albumin values, while 31% had increased hemoglobin levels.

Twelve percent of patients required PEG tube placement for <1 week, 62% for more than 1 month, and about 18% required it for >1 year. Sixteen percent of patients diagnosed with stroke had long term use of PEG tube lasting >one year compared to 23% who experienced motor vehicle accident trauma. Duration of placement for patients with head and neck malignancy PEG tube was less than one year due to disease related mortality.

Relatives or caregivers cared for more than half of

the patients at home. About 45% of the patients were hospitalized during the period of PEG tube nutrition. The mean duration of patients' stay at hospital before discharge or death was 61 days, range 2 -730. Most of the patients (62%) that achieved increased albumin values and 52% of patients who achieved increased hemoglobin levels were hospital based tube care. Serum albumin increased in 34% of hospitalized patients, while it increased in only 16% of patients with home care. Of the hospitalized patients, 45% had increased hemoglobin levels, while 34% of home care patients showed a similar increase. The overall mortality for patients with home care was 18%, while it was 33% for hospitalized patients. The 30-day mortality for patients cared for at home was also 18%, yet it was 50% for patients cared for at the hospital.

Complications of PEG tubes generally are divided into procedural related and post placement complications. No procedural related complications were reported in the current series. Post PEG tube placement complications were documented in 39 patients (46%), major complications occurred in 4 patients (5%), (Table 2), while minor complications happened in 35 patients (41%), (Table 3). Five major complications including pressure necrosis of

stoma mucosa, gastric hemorrhage and sepsis happened in four patients. Minor complications were mostly related to leak from the stoma, and peristomal skin irritation, or itching. PEG tube was replaced in 18 patients. The indication of replacement was either a minor complication (most frequently leak from the tube), or due to accidental tube removal.

Generally, the main causes of patients' mortality were due to the underlying co-morbidities. The overall documented mortality rate was 52.9%. The seven day, 30 day, and one year mortalities were 11%, 31.8%, and 48%, respectively. The mortality in patients who had the tube for more than one year was 5%. Mortality among elderly patients was 38%. Diabetes is the most common medical co-morbidity (65 %) of patients who died during the study period.

Measurements of albumin with at least one level at or after PEG placement were available for 73 patients, while measurements of hemoglobin were available for 79 patients. Assessment of Mortality rate (MR) according to the cutoff values of albumin and hemoglobin measured at or after PEG placement was determined, by considering the normal albumin value 35 g/L or more, and the average normal hemoglobin value for both males and females 12 mg/dL or more. The MR among patients with albumin value of 35g/L or more, at or after the time of PEG placement was 4%, while it was 47% among patients with lower albumin levels. Considering the MR among patients with hemoglobin value of 12mg/dL or more, at or after the time of PEG placement, it was 15%, while it was 35% among patients with lower hemoglobins.

Discussion

At our institution, percutaneous endoscopic gastrostomy tube placement was safe and successful in 98% of cases, which is similar to other studies (94% to 98%), regardless of the technique used (4,9,14). Common reasons for unsuccessful PEG tube placement include esophageal or pharyngeal obstruction caused by cancer, inadequate transillumination, intraprocedural deterioration in the clinical status of the patient, anatomic alterations, an incidental finding of gastric cancer, and development of hematoma at the gastrostomy site (4,14). Procedural-related complications were generally infrequent (1.5% to 4% of cases) (11,15).

The primary indication for tube feeding in most of our patients was neurologically based. Similarly, prior studies showed that neurological disorders are the most common indications for PEG placement in up to 75% (4). Some studies have reported dementia as the most common indication for PEG, (10,16) while others have reported

head and neck malignancy and stroke as the most common (17,18).

In this study, we adopted the measurements of serum albumin and hemoglobin as the patient's nutritional indices. We found that at least one quarter of our patients had modest improvement of serum albumin after PEG placement. The median increase of serum albumin of 4 g/L was achieved in about one month duration after PEG placement. More than one fourth of the patients (27%) had improved swallowing function and attained normal oral intake in the median period of three months. In several studies, serum albumin was used to evaluate the nutritional status of patients. One prospective study reported a significant improvement in serum albumin level among PEG fed stroke patients as compared to naso-gastric tube feeds, (19) while another study reported no significant improvement among nursing home patients (10). In a community-based study, 70% of patients who had undergone PEG had no statistically significant improvement in nutritional, functional, or subjective health status. Almost half of those patients had an increase in serum albumin of 5 g/L or more and 12% attained normal oral intake (20).

Retrospective reports demonstrated that 10-20% of patients would recover oral feeding abilities after PEG placement (21-23). No predictive factors for improved rates of recovery to oral feeding were identified. More than one third of our patient population had significant improvement regarding their serum albumin value, in addition to attaining normal swallowing function with long term use of PEG tube.

It has been known that the preferred method for elective feeding tube placement among trauma patients is PEG (24). The poorest outcome was noted among cancer patients because of the extensive disease course and higher mortality. The shortest survivals reported were due to underlying diagnoses of malignancies and severe dementia (11).

In our series, PEG tubes were placed effectively in about 20% of patients who then used the tube more than a year. The median of single tube function was nine weeks with an average functional period of 31 weeks. In one study, it was reported a median tube function of 28 weeks among head and neck cancer patients. Only 12% of patients had the tube for one week or less, most of them died shortly thereafter, and very few returned to normal oral intake (25). This may represent a selection of patients with shortened life expectancy. The American Gastroenterological Association has recommended nasogastric or nasoenteric tube feeding as the preferred method for providing short-term enteral nutrition (<30 days) (26).

The current study showed that the degree of nutritional improvement as documented by serum albumin and

hemoglobin levels was higher in hospitalized patients than those being cared at home. This can be related to extensive care and special formula feeds used in the hospitalized individuals as compared to home care alone.

Patients who were admitted to hospital because of significant morbidity had prolonged nutrition by PEG tube with a median stay of more than two months. Mortality rates with hospitalized patients were higher than for patients cared for at home mainly due to significant co morbidities. These results were comparable to other reports (26, 27).

In our series, the major complication rate (5%), mainly GI bleeding and sepsis, is within the range of other literature reports (0-20 %) (9,24,28,29) On the other hand, minor complication rates were relatively high (41%). However most of the minor complications were managed conservatively without significant consequences. The reported minor complications in the literature were ranged between (8-88%) (9,18,24,29).

GI bleeding occurred in 0.6% to 1.2% of cases after PEG-tube placement (4,15,29). Acute bleeding may be procedural related, but significant post-placement upper-GI bleeding is attributed to concomitant peptic ulcer disease, buried bumper syndrome, or erosion of the posterior gastric wall opposite the internal bolster (30).

Of our minor complications noted, 50% were leakage from the stoma and skin irritation with itching. Excessive leakage around PEG site is one of the common complications of long-term PEG placement. Risk factors that promote increased leakage include the use of corrosive agents, cutaneous fungal infection, bacterial PEG-site infection, and the development of exophytic granulation tissue around the stoma. Mechanical factors such as side torsion on the tube with ulceration on one side of the tract, absence of an external bolster and buried bumper syndrome may promote excess leakage too (30).

Mortality rate (MR) in our series was variable in comparison with other studies according to the given period. We have encountered a relatively higher short-term mortality; 30-day MR of 31.8%. While the long-term mortality was comparable or even less than international documented values; 1-year MR of 48%, and 4-year MR of 53%. Previous studies have reported 30-day mortality rates after PEG tube placement range from 1.5 to 32.8% (4, 7,9,10,12,31-36). A 1-year mortality rate of up to 66% and 4-year mortality rate up to 73% have been reported (12,9). This elevated 30-day mortality rate can be attributed to poor candidate selection for PEG tube placement, which is why identification of patient-associated risk factors that predict short-term mortality would allow better selection of patients most likely to benefit from PEG tubes. However,

appropriate patient selection for PEG tubes placement is often complex in tertiary care and trauma centers, where most candidates have complicated underlying medical or surgical illnesses. In order to determine criteria for patient selection, some authors have adopted the Charlson co-morbidity index developed to predict the long-term risk of death from co-morbid diseases in longitudinal studies (37). Several studies have evaluated the outcome of patients receiving PEG (7,9-11,35,36). Patient's survival after PEG tube placement is often poor and reflects the pre-existing patient co-morbidities rather than the PEG tubes itself (11). Mortality in this study was closely related to age, sex and co-existing diabetes or other severe co-morbid conditions. It was previously stated that characteristics such as elderly, male gender, history of diabetes mellitus, and certain specific indications for PEG were more likely associated with complications and increased risk of death (9). With regard to mortality rate relation to serum albumin and hemoglobin values, we found that patients with normal values measured at the time of PEG placement or thereafter had lower mortality rates, while those with abnormally low values had higher mortality rates. Previous studies have concluded that low serum albumin may be an independent predictor of decreased survival (10,36,38). While other studies have conflicting results (21,35).

The limitations of our study are related to being a retrospective with limited data available for analysis. Selection bias may have impact on our results particularly the 30-day mortality rate, since our sample represents only tertiary centers settings. Our sample size was also relatively small, and the study was conducted at a single urban, university-based hospital, and thus may not be applicable to other community-based hospitals. These factors would be essential to consider in the design of future studies.

In summary, the rate of successful PEG placement at our institution is high with no reported procedural-related morbidity or mortality. Post-PEG tube placement complications are comparable to previously published data. The 30-day mortality in this series is significantly higher than previous studies, mostly due to severe underlying co-morbidities. Overall the long-term mortality rate was comparable to other published series. Proper selection of patients with expected survival benefit would likely minimize the mortality and complication rate. Future studies are needed to define better parameters and criteria of patient selection to achieve more favorable outcomes.

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