

Safety and Effectiveness of Percutaneous Endoscopic Gastrostomy in Children

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ABSTRACT

Objective: To determine the safety and effectiveness of percutaneous endoscopic gastrostomy in Paediatrics population.

Study Design: Prospective longitudinal study.

Place and Duration of Study: Department of Pediatric Gastroenterology, Pak Emirates Military hospital, Rawalpindi Pakistan, from Mar 2014 till Dec 2017.

Methodology: Total 40 children who underwent percutaneous gastrostomy at the Paediatric gastroenterology department were included in the study. Patients were followed up for a period for 6 months. Demographic data, indications, weight gain and complications were noted for 6 months after the procedure.

Results: Forty patients were enrolled and there were 23(57.5%) males with mean age of 39.8±20.2 months. Swallowing difficulty 23(47.5%) was the major indication followed by poor weight gain 10(25%), prolonged nasogastric tube feeding 8(20%) and frequent aspirations 3(7.5%). Majority 32(80%) had underlying diagnosis of cerebral palsy. In six months follow up, 38(95%) children had an increment in weight (mean weight gain 1.89±1.0Kg). Early feed at 6 hours after procedure was tolerated by 38(95%) of patients. The majority of children did not have any complications and only few were observed to have wound infection, vomiting, and irritability in 3(7.50%), 1(2.50%) and 3(7.50%) respectively.

Conclusion: Percutaneous endoscopic gastrostomy placement is a minimally invasive, safe and effective feeding technique for neurologically impaired children, especially cerebral palsy patients requiring long term assisted feeding.

Keywords: Cerebral palsy, Digestive system, Endoscopy, Gastrostomy, Nutrition, Paediatrics.

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INTRODUCTION

Feeding through tube placed in the stomach is a useful way of nutritional support in a patient who has swallowing difficulties with a well-functioning gastrointestinal system. In these children, enteral nutrition can be administered via nasogastric tube (NGT) or by endoscopically placed percutaneous gastrostomy tube (PEG). Feeding with NGT is associated with, reflux esophagitis, esophageal mucosal damage, aspiration pneumonia, sinusitis and replacement of the tube every 3-4 weeks.¹ PEG method of feeding is considered if NGT feeding is likely to be required for a longer duration.²

PEG insertion is minimally invasive, relatively easy, quick to perform and associated with low morbidity and mortality. The use of PEG feeding has increased progressively since its introduction in 1981.^{3,4} PEG placement is one of the commonest indications for Upper GI endoscopy and around 216,000 PEG are performed annually worldwide today.⁴ PEG is mostly

used in neurologically impaired children including hypoxic brain damage, leukomalacia, cerebral palsy or neurodegenerative disorders for improving nutrient intake and reduce the time required for feeding.^{1,5}

In past, surgical gastrostomy was the method used to insert a gastrostomy tube, but this procedure is invasive and associated with much higher morbidity and mortality.⁶ Safety and effectiveness of PEG has been documented in literature; with minimum short and long term complications. It is the feeding method preferred for enteral feeding in patients with neurological problems and swallowing impairments.^{7,8} In one large study, undesirable complications were encountered in 2.8% patients while 97.2% patients undergoing PEG insertion had no short term side effects.⁹

There is limited data available on PEG insertion in children in Pakistan. Pediatric gastroenterology department, Military hospital Rawalpindi introduced this procedure for the first time. However, there was a need to establish the safety and effectiveness of this procedure in children. The current study evaluated the safety and effectiveness of PEG insertion in terms of outcomes and complications among neurologically impaired children.

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METHODOLOGY

The prospective longitudinal study was conducted at the Department of Pediatric Gastroenterology, Military Hospital, Rawalpindi Pakistan during the period of March 2014 till December 2017. Patients were recruited by consecutive non-probability sampling after ethical approval from the Institution Review Board and informed written consents from parents/guardians of the patients.

Inclusion Criteria: Patients with neuromuscular disorders having feeding difficulty, poor weight gain and/or prolonged naso-gastric feeding were included in the study.

Exclusion Criteria: None

Sample size (n) was calculated using WHO sample size calculator keeping confidence level (1-α) 95%, absolute precision (d) 5% and safety of PEG insertion 97.2%.¹² Following formula was used to calculate the sample size.

$$n = \frac{z_{1-\alpha/2}^2 P(1 - P)}{d^2}$$

Procedure of Percutaneous endoscopic gastrostomy feeding was described to parents and explained about the risks and complications. Barium meal follow through was done prior to referral for PEG insertion to rule out GERD and gastric outlet obstruction in all patients. All anticoagulants were stopped 3-7 days prior to procedure with the instruction nothing per oral 12-hours prior to the procedure. Patients were anaesthetised by Propofol/Ketamine and Midazolam for the procedure. Ponsky-pull through technique was used for PEG insertion using a commercial PEG kit (Cook PEG kit). Appropriate size video-endoscope was used to insufflate the stomach. Cannulation site at the body of stomach was confirmed by transillumination and indentation of anterior abdominal wall with finger. Canula was passed through skin into the air distended stomach and then guidewire was passed into the stomach through the cannula. Snare was passed through the endoscope and guide wire was grasped and snare withdrawn through the mouth along with the endoscope. In the next step, PEG tube was attached to the end of the guidewire and traction applied at the abdominal wall end of guide wire pulling the PEG tube into stomach through the mouth and esophagus and out of the abdominal wall. Endoscopy was repeated and position of PEG tube was confirmed inside the stomach. Liquid feed through PEG tube was started after six hours of tube placement followed by routine feed after twenty-four hours.

The data included age, gender, indications, type of anaesthesia, weight before and 6 months after procedure and complications. Data was compiled and analysed by Statistical Package of Social Science version 23.0. Continuous variables were summarized as Mean±Standard deviation (or median and range as appropriate). For categorical variables (ordinal and nominal) frequency and percentages were calculated.

RESULTS

Forty children underwent PEG procedure during the study period. There were 23(57.5 percent) males with mean age of 39.8±20.2 months (Range 11-78 months). Swallowing difficulty was the major indication for PEG in 19(47.5 %) children followed by poor weight gain in 10(25 %), prolonged NGT feeding in 8(20%) and frequent aspirations in 3(7.5%) as shown in Table-I. Cerebral palsy was the underlying diagnosis in 32(80%) children, neurodegenerative disorder in 4(10%) and neuromuscular disorder in 4(10%) of children as shown in Table-I.

Table-I: Indications for Percutaneous Endoscopic Gastrostomy in Study Group (n=40)

Indications by Symptoms		Indications by Diagnosis	
Swallowing difficulty	19(47.5)	Cerebral palsy	32(80%)
Poor weight gain	10(25%)	Neurodegenerative Disorder	4(10%)
Prolonged NGT feeding	8(20%)	Neuromuscular Disorder	4(10%)
Frequent aspirations	3(7.5%)		

Among all, 37(92.5%) Patients were below 3rd percentile, while only 3(7.5%) patients were within percentile for their age. Efficacy of PEG tube was observed in terms of weight gain, 38(95%) patients gained weight after PEG insertion on a mean of 1.89±1.0 Kg in six months. Only two patients lost weight of 0.20 and 0.30 kg respectively due to co-morbidities associated with their primary diseases. Early gastro-stomy feed at 6 hours after procedure was tolerated by 38(95%) patients. Only 2(5%) patients didn't tolerate early feed. Majority of the children did not have any complications and the rest had only minor and self-limited complications in the form of wound infection, vomiting and irritability as shown in the Table-II. Two patients accidentally removed their PEG; however, PEG was reinserted successfully in both patients

Table-II: Complications after Percutaneous Endoscopic Gastrostomy insertion in Study Group (n=40)

Complications	n (%age)
None	33(82.5)
wound infection	3(7.5)
Irritability	1(2.5)
Vomiting	1(2.5)
Accidental Removal of Gastrostomy tube	2(5.0)
Total	40(100)

DISCUSSION

Per endoscopic gastrostomy is an effective, safe and easy technique, requiring relatively less time as compared to other surgical techniques for Paediatric patients requiring long term assisted enteral feeding especially in neurologically handicapped paediatric population. Body weight of majority of patients increased after PEG insertion along with reduction in gastroesophageal reflux, aspirations, vomiting and gastrointestinal bleeding.¹⁰ In our study we also observed significant reduction in feeding related problems and improvement in the overall health of patients after PEG insertion for enteral feeding.

PEG insertion is the second commonest endoscopic procedure done worldwide for feeding related issues and majority of these children are neurologically handicapped like cerebral palsy and neurodegenerative disorders.⁴ In the current study, Cerebral Palsy was the most frequent indication for PEG feeding due to swallowing issues and repeated aspirations. Khattak IU *et al.* also reported similar results with cerebral palsy, the single most important indication for PEG insertion in children in his study.¹¹

Fortunato *et al.* described significant gain in weight in neurologically impaired patients after PEG treatment in his study.¹² We also noticed a significant increase in the weight gain of neurologically handicapped patients especially cerebral palsy patients. Guven *et al.* proved in his study that children having weight less than 10 kg can safely and effectively undergo PEG procedure.¹³

Previous studies have reported PEG site infection or leakage, prolonged ileus, bleeding, perforation of viscera, peritonitis, GERD and gastro-colic fistula as possible complications of PEG procedure.¹³⁻¹⁷ In our study only 7 out of 40 patients suffered complications and most of them were minor, transient and self-limited. Most common complications were PEG site infection followed by accidental PEG removal, vomiting and irritability.

Early feeding post procedure was well tolerated in our study. These results are supported by the study conducted by Hahn SJ *et al.* who concluded that early administration of feed and nutritional support after PEG insertion is safe as well as beneficial.¹⁸

Our centre was the first one who started catering these children for PEG insertion and now it had been routine procedure. Certainly there were limitations of the study which include single centre data and small

sample size, so the possibility of missing the data could not be ruled out. Moreover, the result of this could not be generalized to other settings.

CONCLUSION

Per endoscopic gastrostomy placement is a minimally invasive, safe and effective feeding technique for neurologically impaired children, especially cerebral palsy patients requiring long term assisted feeding.

Conflict of Interest: None.

Author's Contribution

Following authors have made substantial contributions to the manuscript as under:

ZS & MAL: Conception, study design, drafting the manuscript, approval of the final version to be published.

MAH & FTZ: Data acquisition, data analysis, data interpretation, critical review, approval of the final version to be published.

SH: Critical review, data acquisition, drafting the manuscript, approval of the final version to be published.

Authors agree to be accountable for all aspects of the work in ensuring that questions related to the accuracy or integrity of any part of the work are appropriately investigated and resolved.

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