Percutaneous Endoscopic Gastrostomy (PEG) vs. Lap-assistedgastrostomy (LAG) in children; which is better in pediatric age group?

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Received 17 March 2019
Accepted 14 April 2019

The Egyptian Journal of Surgery 2019, 38:531–534

Aim
To compare the operative and postoperative results in pediatric patients who required gastrostomy insertion via laparoscope versus endoscope.
Materials and methods
The study was plotted on 49 patients with feeding difficulty and no gastroesophageal reflux requiring gastrostomy during the period between January 2016 and January 2019. They were classified into two groups according to the type of gastrostomy insertion. The first group (25 patients) underwent percutaneous gastrostomy insertion via an endoscope (PEG) and the second group (24 patients) underwent laparoscopic-assisted gastrostomy (LAG) insertion. Data for comparison included the mean operative time and postoperative recovery and the presence of complications.
Results
Group 1 (PEG group) scored a mean operative time of 16±4.5 min, which was much shorter when compared with the mean operative time of group 2 (laparoscopic insertion) which scored 42±7 min. No intraoperative complications were recorded in the LAG group while in the PEG group we had one case of intestinal injury. Regarding the postoperative course, group 1 (PEG) showed better postoperative recovery with much less postoperative pain with no scars and feeding was initiated as early as the first day postoperatively and we had one case of stomach wall erosion due to tight compression of the PEG lock on the abdominal wall. Group 2 (laparoscope) showed less patient's tolerability to early feeding when compared with group 1 with a slightly higher score on the pain scale, we had one case of internal hernia which required reexploration.
Conclusion
Minimal invasive techniques for gastrostomy insertion became the procedures of choice. Better results regarding postoperative recovery and operative time can be achieved when doing it using the PEG technique rather than the LAG technique. Safety is still questionable with PEG techniques and requires more skillful and trained practitioners to avoid complications.

Keywords:
laparoscopic gastrostomy, pediatric laparoscopy, percutaneous gastrostomy

Egyptian J Surgery 38:531–534

1110-1121

Introduction

Gastrostomy tube insertion is one of the most common procedures performed in the pediatric age group as a radical choice to overcome feeding difficulty, according to the European Society for Clinical Nutrition and Metabolism. Gastrostomy tube should be inserted for all patients who face feeding difficulty for more than 2–3 weeks [1].

Many techniques have been described for gastrostomy insertion either through laparotomy or through minimally invasive techniques [2,3].

Percutaneous endoscopic gastrostomy (PEG) technique has been described as early as 1980 [4], since then it has been widely used by medical practitioners for gastrostomy insertion, later on and with the rising use of the laparoscopy, new techniques have been described for laparoscopic-assisted gastrostomy (LAG) describing it as a safer and more practical technique [5].

In this study, we present our series of patients who underwent gastrostomy insertion through both techniques trying to figure out the main points of strength and weakness of these techniques and how feasible and safe they can be.

Materials and methods

During the period between January 2016 and January 2019, a total of 86 gastrostomy tubes were inserted in patients with feeding difficulties in our department in Ain Shams University Hospitals, Cairo; 37 patients had the tube inserted via the open technique, most of them were cases of esophageal atresia.

The remaining 49 patients had their gastrostomy tubes inserted via minimally invasive procedures either through laparoscopic-assisted technique (LAG) or through percutaneous endoscopic technique (PEG) and the data were collected from our medical records such as demographic, primary pathology, presence of reflux, operative time, intraoperative and postoperative complications, postinsertion feeding pattern, and length of hospital stay Data were analyzed and the patients were classified into two groups, group 1 included 25 patients who underwent the PEG technique and group 2 included 24 patients who underwent the LAG technique and data were statistically studied to compare the two techniques.

The two groups were compared regarding the operative course (operative time and the occurrence of intraoperative complications) and the postoperative course (the feasibility to initiate feeding and pain score on CRIES pain scale [6] and the occurrence of postoperative complications and weight gain during the 6-month follow-up).

Patients who underwent the open technique for insertion and those who had associated reflux requiring fundoplication were excluded from the study.

Operative technique

Percutaneous endoscopic gastrostomy technique

All the cases were done using the pull technique using the flexible esophageal endoscope under general anesthesia introduced through the mouth; transillumination is obtained through the abdominal wall after inflation of the stomach and its adherence to the abdominal wall.

Guided by the scope light, a wide-bore needle is inserted into the stomach under vision of the endoscope and a guidewire is inserted and grasped by endoscopic forceps and pulled out through the mouth, then the guidewire will be attached to the gastrostomy tube and pulled into the stomach guided by the guidewire until it is dragged out of the stomach through the initial puncture site and fixed to the abdominal wall.

Laparoscopic-assisted gastrostomy technique

The patients were operated under general anesthesia in the supine position, introduction of a 5 mm 30° lens was done via a transumbilical port for identification of the stomach. Another 5 mm grasper was inserted to grasp the carefully chosen part of the anterior wall of the stomach and pulled toward the abdominal wall. The laparoscopic instrument is replaced by babcock forceps and the puncture site is slightly widened to let the stomach wall out and the stomach is fixed to the abdominal wall and opened for insertion of the gastrostomy tube.

Statistical analysis

Categorical data were presented as number and percentage while continuous data were expressed as absolute numbers or mean and SD. Comparisons between the two groups were carried out by the independent Student's *t* test for continuous variables. *P* values less than 0.05 were considered statistically significant. All statistical analyses were performed using the statistical software SPSS V22 (IBM Corp., Armonk, New York, USA).

Results

A total of 49 patients underwent gastrostomy insertion via minimally invasive procedures; they were classifies into two groups, group 1 included 25 patients (18 men/seven women) with a mean age of 35±3 months and underwent the PEG technique and group 2 included 24 patients (14 men/10 women) with a mean age of 32 ±4.3 months and underwent the LAG technique.

All the patients were indicated for gastrostomy due to feeding difficulty namely cerebral palsy with swallowing problems and all the patients were investigated to assure the absence of gastroesophageal reflux.

Regarding the operative time, in group 1 with the PEG technique, the mean operative time was 16±4.5 min while that in group 2 with the LAG technique it was 42 ±7 min with statistically significant difference ($P<0.001$).

Intraoperative complications were recorded in group 1 with the PEG technique; we had one case of bowel perforation during the procedure which required laparotomy and repair of the perforation, while in group 2 no intraoperative complications were recorded.

Regarding postoperative complications, in the PEG group we had one case of abdominal wall erosion on

day 3 postoperatively due to tight compression of the tube lock against the abdominal wall, while in the LAG group we had one case of internal hernia where small bowl loops herniated through a pocket between the abdominal wall and port site dragged momentum and reexploration via laparoscope was done.

Postoperative course showed easier initiation of feeding in group 1 with the PEG technique where the patients could start feeding on the day of surgery and full feeding could be reached after 2.1±0.5 days with less pain score on the pain scale for pediatrics, while in group 2 patients with LAG feeding was started after 1.6±0.4 days and full feeding could be reached after 3.4±0.8 days with higher pain score on the pain scale with statistically significant difference ($P<0.001$). Both groups of patients showed postoperative comparable weight gain, in the PEG group it was 4.33±1 while in the laparoscopic group it was 4.25±1.14 with no statistical difference between both groups ($P=0.789$).

The mean hospital stay in group 1 patients with PEG was shorter (2.3±0.5 days) when compared with that of the LAG group with a mean time of 4.1±0.6 days with statistically significant difference ($P<0.001$).

Discussion

PEG was first described in 1980 after which it was widely used by surgeons and gastroenterologists for patients with feeding difficulties [5]. Laparoscopic techniques were used few years later and started to be a trusted procedure for gastrostomy insertion in children considering that it could minimize the hazards that could be associated with the PEG technique [7]. Comparisons started to be done between the two groups regarding the efficacy and associated complications.

The PEG technique was the earlier to appear and it offered the advantage of scarless operation with a shorter time in the operating room [5]; on the other hand, many studies mentioned different factors which may affect the safety of the patients during the procedure, like the difficulty in identification of the proper position for insertion of the tube from the inside of the stomach [8] and more incidence of bowl injury during the procedure especially in cases of intraperitoneal adhesions following previous laparotomy [8,9]. Moreover, the idea of lack of gastropexy in PEG and the possibility of stomach dehiscence due to lack of fixation raised questions about the safety of the procedure in the literature [10].

On the other hand, the LAG technique has gained good reputation since it was described giving the advantage of proper choice of the site of tube insertion into the stomach with less incidence of bowl injury and better chance of undergoing other techniques in the same session like fundoplication if indicated [7,11].

Regarding the complications, it has been found that both techniques carry almost the same risk of minor complications like granuloma formation and leakage of the gastric content [12], while the risk of major complications like bowl injury or gastro colic fistula or hemorrhage has been found to be higher in patients who underwent PEG when compared with LAG patients [11,13]. Some studies even went to mentioning that mortality rates has been recorded up to 2% in PEG patients versus 0% in LAG patients and considered PEG accordingly one of the unsafe techniques in children and recommended LAG as a procedure of choice for gastrostomy insertion [10]. We present our series of patients who underwent gastrostomy insertion for feeding difficulties through either PEG or LAG techniques; we had faced two major complications – namely intestinal injury and stomach erosion – in PEG patients and no major complications in LAG patients and we had almost equal rates of minor complications in both groups.

The PEG technique offered us the advantage of doing the procedure in a short period of time with shorter exposure to anesthesia, early initiation of feeding, and reaching the full feeding within a shorter time and early patient discharge with overall shorter hospital stay which may reflect an economic privilege.

On the other hand, the LAG procedures offered us better choice of the gastrostomy site of insertion with relatively longer operation time and longer hospital stay.

There were no differences between the two groups regarding the occurrence of complications related to stomach fixation or buried bumper syndrome.

The complications we faced with the PEG technique were related to avoidable factors; the case with stomach erosion occurred due to tight compression of the gastrostomy lock against the abdominal wall due to lack of experience at the beginning of the study, while the case of intestinal perforation occurred in a patient with extensive intraperitoneal adhesions due to previous laparotomy .These factors were avoided later depending on more experienced hands and with increasing of the learning curve and careful selection of the candidates.

The limitations of our study included the small number of patients which was due to the selection of patients with the same pathology (cerebral palsy with feeding difficulty) and exclusion of the patients who needed further fundoplication or those who were operated via open techniques. Further studies with larger sample sizes and randomized statistical approaches are needed to support the literature with more data about such techniques in cerebral palsy (CP) patients.

We recommend the PEG techniques as a good procedure for gastrostomy insertion in the pediatric age group with good economic advantage and postoperative feeding, and that better results can be achieved with lower rates of complications if putting into consideration the good choice of the patients and making sure that that technique is done by experienced practitioners.

Financial support and sponsorship
Nil.

Conflicts of interest
There are no conflicts of interest.

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