Section: General Surgery

Original Research Article

EFFICACY OF LAPAROSCOPIC VERSUS OPEN-FEEDING JEJUNOSTOMY TECHNIQUES IN PATIENTS WITH UPPER GASTROINTESTINAL MALIGNANCIES

H.Syed Ahamed Kamil[1], T.Jegan Mohan[1], Maluva Mounika[2]

[1]Assistant Professor, Department of General Surgery, Madurai medical college, Tamilnadu, India
[2]Senior Resident, Department of General Surgery, Maharajah Institute of Medical Sciences Hospital, Vizianagaram, Andhra Pradesh, India

Received : 12/01/2023
Received in revised form : 08/02/2023
Accepted : 20/02/2023

Keywords:
Laparoscopic, Jejunostomy, Gastrostomy tube, Malignancies, Gastrointestinal cancer.

Corresponding Author:
Dr. T. Jegan Mohan
Email: dr_jeganmohan@yahoo.com

DOI: 10.47009/jamp.2023.5.2.212

Source of Support: Nil,
Conflict of Interest: None declared

Int J Acad Med Pharm
2023; 5 (2); 999-1003

Abstract

Background: Enteral feeding via a gastrostomy tube is a widely used method for patients unable to take food orally. In the present study, we have compared the efficacy of laparoscopic and open-feeding jejunostomy procedures in upper gastrointestinal cancer patients. **Materials and Methods:** This is comparative research conducted at Govt Rajaji Hospital Madurai for one year. It included 40 patients who needed feeding jejunostomy for upper gastrointestinal malignancies. These patients were divided into groups: Group A and Group B. Group A received feeding jejunostomy placement via the routine open modified Witzels technique. At the same time, Group B underwent laparoscopic placement of the feeding jejunostomy tube. **Result:** The age group of 51-60 years had the highest number of feedings jejunostomies performed, with a maximum of 15 procedures. The mean procedure time was 105±17.6 minutes for open-feeding jejunostomy and 140±18.7 minutes for laparoscopic feeding jejunostomy. The difference in procedure time between open-feeding jejunostomy and laparoscopic-feeding jejunostomy was significant (<0.001). The post-operative hospital stay was significantly shorter in patients undergoing laparoscopic feeding jejunostomy than those undergoing open-feeding jejunostomy (p-value = 0.036). **Conclusion:** Using laparoscopic feeding jejunostomy as a minimally invasive technique is feasible and cost-effective. While the procedure can be time-consuming, endo-training can minimise its duration.

INTRODUCTION

Enteral feeding via a gastrostomy tube is a widely used method for patients unable to take food orally. The tube is inserted into the stomach through the abdomen under local anaesthesia. This method is considered safe and effective for patients who have difficulty swallowing or are at risk of aspirating food into the lungs due to various medical conditions. Bush performed the first successful jejunostomy for nutritional purposes in 1858.[1] Since then, the technique has evolved and is now a commonly performed procedure for patients who require long-term nutritional support.[2]

Jejunostomy tubes can be placed using different techniques and can be either temporary or permanent, depending on the patient's needs.[3] Laparoscopic gastrostomy tube (GT) placement provides several advantages to patients, including smaller incision size, less post-operative pain, better cosmetic outcomes, and a lower risk of developing an incisional hernia than the traditional open approach. Furthermore, the laparoscopic technique offers improved visualization of the stomach and intra-abdominal cavity, resulting in reduced complications and better patient outcomes. The 2-port technique is a common approach for laparoscopic GT placement.[4,5] This technique involves creating two small incisions in the abdomen, one at the umbilicus and the other in the left upper quadrant.

The surgeon uses specialized laparoscopic instruments to pull the stomach up to the anterior abdominal wall through the upper quadrant incision and create a gastrostomy. The stomach is then secured to the abdominal wall using T-fasteners or regular sutures. Compared to the traditional open gastrostomy tube (GT) placement, the laparoscopic approach has been found to have several advantages, including shorter operative time and similar costs. However, this technique may present challenges when adhesions are present, particularly in patients with prior upper abdominal surgery. In such cases, the mobilization of the stomach can be difficult, and the surgeon may need to use additional ports. Some

studies have reported the use of up to four ports when dealing with adhesions during laparoscopic GT placement.[6-8]

The study aims to compare the advantages of laparoscopic feeding jejunostomy over open technique in patients with upper gastrointestinal malignancy.

MATERIALS AND METHODS

This comparative study was conducted at the Department of general surgery Govt Rajaji Hospital Madurai for one year. A total of 40 patients were required to feed jejunostomy for upper gastrointestinal malignancies. The patients were divided into two groups, Group A and Group B. Group A is undergoing feeding jejunostomy placement via routine open modified Witzel technique. Group B is undergoing laparoscopic placement of a feeding jejunostomy tube. The current study collected data on the patient's demographics, clinical history, laboratory investigations, CT imaging, intraoperative findings, and post-operative complications, such as jejunostomy site infection, tube blockage, dislodgement, intraoperative leak or sepsis.

Group A

The patient underwent surgery with standard preoperative antibiotic prophylaxis of 2 g of cefuroxime IV and 0.5 g of metronidazole given 30 minutes before the procedure. The surgery was performed under spinal anaesthesia with the patient in a supine position. An upper midline laparotomy incision was made to access the jejunum. The jejunum was assessed from the DJ flexure, and at 40 cm from the DJ flexure, a purse-string stitch was taken at the antimesenteric border. An enterotomy was made, and a 16-size Ryles tube was inserted distally. Seromuscular tunnelling was performed using 2-0 silk, and the jejunum was fixed to the parietal wall using 2-0 Vicryl. After the surgery, the rectus was performed using one loop Ethilon, and the skin closure was done with 2-0 cutting Ethilon. The patient was closely monitored for post-operative complications and recovery. On post-operative day 3, the medical team assessed the patient to ensure they were stable and could tolerate enteral nutrition.

Group B

The jejunum is assessed starting from the Treitz ligament to establish a length of about 40 cm. The jejunum mobility and adjacency to the abdominal wall at the planned jejunostomy point are checked. A 5mm port is introduced into the abdominal cavity at the planned jejunostomy point. A 12-size Foley catheter is inserted via the abdominal wall into the abdominal cavity. The catheter is then introduced into the jejunal lumen with the help of two graspers. A purse string stitch is taken with 2-0 Vicryl in the jejunum at the antimesenteric border, and an enterotomy is made. The catheter is advanced into the jejunum, and the Foley bulb is inflated with 10 ml of distilled water. The purse string stitch is then tightened around the Foley catheter, fixing the jejunum to the abdominal wall. The tube is fixed to the skin with two independent 2.0 silk sutures. Jejunostomy patency is checked with 20 ml of normal saline.

The data collected was input into Microsoft Excel and presented as mean +/- SD or median based on distribution. Unpaired t-tests were used to compare quantitative variables between groups, while the chi-square test was used for categorical variables. Statistical significance was set at a p-value of <0.05 for all tests. The data analysis was performed using SPSS software version 16 for Windows.

RESULTS

The age group of 51-60 years had the highest number of feedings jejunostomies performed, with a maximum of 15 procedures. Out of these, eight procedures were performed using the open method and 7 using the laparoscopic method. On the other hand, the age group of more than 60 years had the least number of procedures performed, with only two performed using the open technique and 4 using the laparoscopic technique.

The male-to-female ratio was 2.6:1, and out of a total of 29 jejunostomies performed (15 using the open method and 14 using the laparoscopic method). The majority of procedures were performed on males. A total of 29 males and 11 females underwent the procedure.

Among the co-morbidities associated with malignancy, type 2 diabetes mellitus was the most common. In the open group, three patients had diabetes, while in the laparoscopy group, four patients had diabetes.

The most common indication for feeding jejunostomy (F J) was advanced stomach carcinoma. Out of a total of 15 patients, eight patients underwent open FJ, and seven patients underwent laparoscopic FJ.

Table 1: Showing Age, gender co-morbidity and aetiology distribution among the groups.

Age	Open Feeding Jejunostomy	Laparoscopic Feeding Jejunostomy	P-value
< 40	4	5	0.881
41-50	6	4	
51-60	8	7	
>60	2	4	
Mean ± SD	50.2± 8.895	50.7±11.819	
Gender			
Male	15	14	1.0
Female	5	6	

ISSN (O): 2687-5365; ISSN (P): 2753-6556

Co-Morbidity			
CAD	1	0	0.502
CAD, S-HTN	2	0	
CVA	0	1	
DM	3	4	
DM, HTN	1	1	
HTN	3	1	
S-HTN, CVA	0	1	
Nil	10	12	
AETIOLOGY			
Advanced Ca Stomach	8	7	0.63
Advanced Ca, oesophagus	0	1	
Advanced Ca, GEJ	1	0	
Ca distal oesophagus	0	1	
Ca, oesophagus	5	5	
Ca, Stoma0ch	4	2	
Ca, GEJ	2	1	
Ca. Gastroesophageal	0	1	
Carcinoma distal oesophagus	0	1	
Carcinoma oesophagus	0	1	

Table 2: shows the time taken for each of the procedures; open and laparoscopic method

Procedure Time in min	Open Feeding Jejunostomy	Laparoscopic Feeding Jejunostomy	P-Value
<90	9	0	<0.001
90 – 150	11	17	
> 150	0	3	
Mean±SD	105±17.6	140±18.7	

For open feeding jejunostomy, nine procedures were completed in less than 90 minutes, 11 procedures were completed in 90-150 minutes, and no procedures took more than 150 minutes. No procedures were completed in less than 90 minutes for laparoscopic feeding jejunostomy. Seventeen procedures were completed in 90-150 minutes, and three took more than 150 minutes. The mean procedure time was 105±17.6 minutes for open-feeding jejunostomy and 140±18.7 minutes for laparoscopic feeding jejunostomy. The difference in procedure time between open-feeding jejunostomy and laparoscopic-feeding jejunostomy was significant (<0.001).

Table 3: shows complications in both techniques.

Post Op Period	Post-Op Period Open Feeding Jejunostomy	Laparoscopic Feeding Jejunostomy
Dislodgement POD-21	0	1
Minimal Discharge	1	0
Minimal Discharge, PeritubalPOD-7	0	1
Minimal Wound Discharge	1	0
Peritubal Excoriation on POD-14	1	0
Peritubal Excoriation on POD-4	0	1
Peritubal Excoriation on POD-5	0	1
Peritubal Excoriation on POD-7	0	1
POD-3 wound Discharge	2	0
POD-7, Peritabal Leak	0	1
Tube Dislodgement POD-18	1	0
Tube Lock POD-14	0	1
Nil	14	13

Out of 20 patients who underwent feeding jejunostomy, six patients in the open group and 7 in the laparoscopic group experienced post-operative complications. The post-operative complications were observed on days 1, 3, 5, and 7 during monthly follow-up visits. The most common complications observed were minimal wound discharge and peritubal excoriation. These complications were managed conservatively with the use of antibiotics. In both the open and laparoscopic groups, each patient's feeding tubes were dislodged on postoperative days 21 and 18, respectively.

Table 4: shows post-op hospital stay, difficulty, and chemo started days

Post-Op Hosp Stay-in Days	Open Feeding Jejunostomy	Laparoscopic Feeding Jejunostomy	P-value
< 5	8	14	0.036
> 5	12	5	
Mean ± SD	6.35±1.5	5.2±1.7	
Chemo Started on [POD]			
<10	10	13	0.12
>10	10	7	
Mean ± SD	11.7±2.5	10.3±3.1	

ISSN (O): 2687-5365; ISSN (P): 2753-6556

Difficulty			
Yes	1	4	1.0
No	19	16	

The post-operative stay was shorter for patients who underwent laparoscopic feeding jejunostomy than those who underwent open feeding jejunostomy, specifically, out of the 19 patients who underwent laparoscopic feeding jejunostomy (since one patient's post-operative stay duration is not provided). Fourteen patients had a post-operative stay of fewer than five days, while five patients had a post-operative stay of more than five days.

The post-operative hospital stay was significantly shorter in patients undergoing laparoscopic feeding jejunostomy than those undergoing open-feeding jejunostomy (p-value = 0.036).

13 out of 20 patients who underwent laparoscopic feeding jejunostomy started chemotherapy within ten days after the procedure, while 7 out of 20 patients started chemotherapy after ten days. On the other hand, 10 out of 20 patients who underwent open-feeding jejunostomy started chemotherapy within ten days after the procedure, while 10 out of 20 patients started chemotherapy after ten days.

Out of 20 patients who underwent open-feeding jejunostomy, one patient experienced difficulty, while out of 20 patients who underwent laparoscopic feeding jejunostomy, four patients experienced difficulty. The p-value of 1.0 suggests that the difference in difficulty between the two methods is not statistically significant.

DISCUSSION

Proper nutrition plays a crucial role in the successful treatment and recovery of patients with upper gastrointestinal cancer. The integration of nutritional support into the overall management of these patients is vital to the completion of neoadjuvant therapy and surgery, as well as to their survival outcomes. In particular, total laparoscopic or laparoscopically assisted methods of feeding jejunostomy insertion have shown many advantages.

Patients who underwent laparoscopic feeding jejunostomy were slightly older on average than those who underwent open feeding jejunostomy. However, the difference in mean age between the two groups is not statistically significant. The distribution of patients across age categories is also relatively balanced between the two groups. The gender distribution was fairly even between the open and laparoscopic feeding jejunostomy groups, with slightly more females in the laparoscopic group. However, this difference is not statistically significant.

Regarding co-morbidities, there were no significant differences in the frequency of specific co-morbidities between the two groups. Most patients had no co-morbidities, and the most common co-morbidity was diabetes mellitus. Braak et al. also observed that diabetes mellitus was a more common co-morbidity in patients with jejunostomy-related complications.[9] The etiology of the malignancy did not show significant differences between the two groups. The most common aetiology was advanced gastric cancer, followed by carcinoma of the oesophagus. This study highlights the risk of major complications in patients undergoing open jejunostomy insertion, which aligns with existing literature.[10,11]

The present study found that laparoscopic feeding jejunostomy required a significantly longer time to perform compared to open feeding jejunostomy. The mean procedure time for laparoscopic feeding jejunostomy was 140±18.7 minutes, while for open feeding jejunostomy, it was 105±17.6 minutes, with a statistically significant difference ($p<0.001$). Similarly, in another study conducted by Hsin et al., it was found that the mean operative duration of the laparoscopic feeding jejunostomy group was about 30 minutes longer than the open feeding jejunostomy group (159 ± 57.2 minutes vs. 128 ± 34.6 minutes, $P = 0.001$). Our study found that laparoscopic placement of feeding jejunostomy tubes is associated with a shorter post-operative hospital stay than open-feeding jejunostomy.[12] This finding is consistent with previous studies which reported that laparoscopic placement of feeding jejunostomy tubes offers several advantages over traditional open surgery, including reduced pain, shorter hospital stays, and quicker recovery times.[13,14]

It is important to note that this study had a relatively small sample size, with only 20 patients in each group. Therefore, the results should be interpreted cautiously, and further research must confirm these findings. Additionally, the current study's operation duration was about 30 minutes longer in the laparoscopic feeding jejunostomy group. The researchers attributed this longer duration to their initial lack of experience with the laparoscopic technique. It is possible that with more experience, the procedure time for laparoscopic feeding jejunostomy could be reduced to be more comparable to open-feeding jejunostomy.

CONCLUSION

The use of laparoscopic feeding jejunostomy as a minimally invasive technique, combined with endo-training, can offer many benefits to patients, including reduced recovery time, less pain, and a lower risk of complications.

REFERENCES

1. Blumenstein I, Shastri YM, Stein J. Gastroenteric tube feeding: techniques, problems and solutions. World J Gastroenterol. 2014; 20:8505–24.

ISSN (O): 2687-5365; ISSN (P): 2753-6556

2. Gong C-S. Surgical feeding tube insertion, the literature review and the actual procedure. Int J Gastrointest Interv. 2021; 10:59–62.
3. Gastrostomy versus Gastrojejunostomy or Jejunostomy Feeding Tubes: A Review of Clinical Effectiveness, Cost-Effectiveness and Guidelines.
4. Bankhead RR, Fisher CA, Rolandelli RH. Gastrostomy tube placement outcomes: comparison of surgical, endoscopic, and laparoscopic methods. Nutr Clin Pract. 2005; 20:607–12.
5. Lydiatt DD, Murayama KM, Hollins RR, Thompson JS. Laparoscopic gastrostomy versus open gastrostomy in head and neck cancer patients. Laryngoscope. 1996; 106:407–10.
6. Kandil E, Alabbas H, Jacob C, Friedlander P, Duchesne J, Joshi V, et al. A simple and safe minimally invasive technique for laparoscopic gastrostomy. JSLS. 2010; 14:62–5.
7. Ho HS, Ngo H. Gastrostomy for enteral access. A comparison among placement by laparotomy, laparoscopy, and endoscopy. Surg Endosc. 1999; 13:991–4.
8. Mizrahi I, Garg M, Divino CM, Nguyen S. Comparison of a laparoscopic versus open approach to gastrostomy tubes. JSLS. 2014; 18:28–33.
9. Van Braak H, Gorter RR, Van Wijk MP, De Jong JR. Laparoscopic Roux-en-Y feeding jejunostomy as a long-term solution for severe feeding problems in children. Eur J Pediatr. 2023; 182:601–7.
10. Han-Geurts IJM, Lim A, Stijnen T, Bonjer HJ. Laparoscopic feeding jejunostomy: a systematic review. Surg Endosc. 2005; 19:951–7.
11. Siow SL, Mahendran HA, Wong CM, Milaksh NK, Nyunt M. Laparoscopic T-tube feeding jejunostomy as an adjunct to staging laparoscopy for upper gastrointestinal malignancies: the technique and review of outcomes. BMC Surg. 2017; 17:25.
12. Tsai H-I, Chou T-C, Yu M-C, Yeh C-N, Peng M-T, Hsieh C-H, et al. Purely laparoscopic feeding jejunostomy: a procedure which deserves more attention. BMC Surg. 2021; 21:37.
13. Glaser F, Sannwald GA, Buhr HJ, Kuntz C, Mayer H, Klee F, et al. General stress response to conventional and laparoscopic cholecystectomy. Ann Surg. 1995; 221:372–80.
14. Pedersen AG, Petersen OB, Wara P, Rønning H, Qvist N, Laurberg S. Randomized clinical trial of laparoscopic versus open appendicectomy: Laparoscopic versus open appendicectomy. Br J Surg. 2001; 88:200–5.

ISSN (O): 2687-5365; ISSN (P): 2753-6556