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ORIGINAL ARTICLE

Evaluation of Feeding Jejunostomy Versus Total Parenteral Nutrition in High-risk Surgical Patients

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Abstract

Background: **Nutritional support continues to be a vital component in the care of surgical patients. While its routine use in the healthy elective surgical patient is rarely necessary, it is indicated in severely catabolic patients or in the individual who cannot eat for a long period. Other factors influencing the need for nutritional support include the age of the patient, the existence of malnutrition as well as its severity, and the presence of cancer cachexia.**

Aim and objectives: **To evaluate feeding jejunostomy as a route of enteral nutrition in comparison with total parenteral nutrition in high-risk surgical persons.**

Patients and methods: **This prospective controlled trial was conducted in the Department of Surgery, Al-Azhar University Hospitals on 40 high-risk surgical patients in whom major gastrointestinal surgeries were contemplated. Every individual was randomly assigned to one of two groups.**

Result: **There was significant variance among the groups regarding postoperative albumin. There was no significant alteration among the groups regarding demographic characteristics, comorbidities, clinical presentation, type of operation, operative data, and general or local complications. The most found complication among group A was colic (15%) followed by abdominal distention and diarrhea (10%).**

Conclusion: **Enteral nutrition via jejunostomy tube is a safe technique and can significantly decrease the need for postoperative albumin infusion compared with total parenteral nutrition. Both strategies were comparable in outcome and the incidence of complications.**

Keywords: Feeding jejunostomy, High risk, Total parenteral nutrition

1. Introduction

Nutritional support continues to be an essential part of the care that is provided to people undergoing surgical procedures. While its routine use in the healthy elective surgical patient is rarely necessary, it is indicated in severely catabolic patients or in the individual who cannot eat for a long period. Other factors influencing the need for nutritional support include the age of the patient, the presence and severity of malnutrition, and presence of cancer cachexia.[1]

Women who are undergoing surgery typically go through a period of 'nil by mouth,' which results in 'bowel rest.' This bowel rest has been linked to a loss in mucosal bulk of fifty percent as well as mucosal atrophy, which takes place within a few days. In a similar manner, the failure to supply enteral nutrients, which is what happens when TPN is used, caused a reduction in mucosal thickness, reduced villous height, increased gastrointestinal tract edema, decreased gastrointestinal tract permeability, altered gastrointestinal tract barrier function, and ultimately led to gastrointestinal tract mucosal atrophy, which led to an increased bacterial translocation of luminal bacteria into the systemic circulation.[2]

Because it is less expensive, safer, and better at maintaining the nutritional, metabolic, immunolocal, as well as barrier function of the intestines with fewer septic problems, enteral nutrition is preferred

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over complete parenteral nutrition (PN) for administering feeding in a variety of clinical contexts.[3]

In the same way that dialysis treats renal failure, in addition, ventilator support treats respiratory failure and PN treats gastrointestinal failure. PN should be given when enteral feeding is not possible. Many conditions necessitate parenteral nourishment, including but not limited to prolonged ileus, intestinal obstruction, malabsorption, short gut, inflammatory bowel disease, as well as elevated output intestinal fistulae.[4]

Jejunostomy can be performed using a variety of methods, including the percutaneous, endoscopic, and laparoscopic approaches, as well as the needle catheter and transverse Witzel techniques.[5]

A jejunostomy feeding might cause gastrointestinal, metabolic, viral, or mechanical complications. Abdominal bloating and cramping are symptoms of gastrointestinal problems, including delayed gastric emptying, intestinal blockage, and dietary fermentation. Disorders of electrolyte and fluid balance, hyperglycemia, nutrient shortages, particularly of vitamins and minerals, and refeeding syndrome are all examples of metabolic problems. Enteral formula contamination with germs and jejunostomy site infection are also examples of infectious consequences. Tube obstruction, malposition, and dislodgement are all examples of mechanical difficulties. Rare cases of jejunal perforation, knot formation, as well as intussusception have also been described.[6]

The purpose of this study was to compare total parenteral nutrition (TPN) versus feeding jejunostomy as an enteral nutrition route for patients undergoing high-risk surgical procedures.

2. Patients and methods

This trial was a prospective controlled study that was carried out in the surgical departments of the hospitals affiliated with Al-Azhar University on forty high-risk surgical patients in whom major gastrointestinal surgeries were contemplated.

Patients were randomly divided into two groups: group A: included 20 high-risk surgical patients who had major gastrointestinal surgery with placing a jejunostomy feeding tube at the time of the primary procedure or after it and group B: included 20 high-risk surgical patients in whom major gastrointestinal surgery was contemplated without jejunostomy feeding tube.

Ethical considerations: Before any participants underwent surgery, both the study and the procedure were thoroughly discussed with them, along with their informed consent obtained.

2.1. High-risk surgical patients

A Nutritional Risk Index was calculated for each patient as the following: 1.519 X serum albumin (g/dl)+0.417 X (current preoperative body and weight/usual weight) X 100.

The value obtained was scored as less than 83.5 = severely malnourished, 83.5–97.5 = mildly malnourished, and 97.5 but less than 100 = borderline malnourished.

Malnourished surgical patients as upper gastrointestinal malignancies include esophageal cancer, gastric cancer, and pancreatic cancer.

Patients susceptible to leakage after surgeries include immunocompromised as diabetes mellitus, old age, patients receiving chemotherapy, and steroid and obese patients.

Patients who had severe necrotizing pancreatitis, high-output intestinal fistula, suture dehiscence after sleeve gastrectomy, chemical burns of the esophagus and stomach, and exploratory laparotomy.

All patients were subjected to diagnosis through preoperative, intraoperative, and postoperative evaluations as follows:

Preoperatively (routine preoperative assessment): Detailed history-taking, clinical examination, and diagnostic imaging.

2.2. Preoperatively (nnutritional assessment)

Clinically: Dietetic recall (symptoms and signs of malnutrition and medical conditions affecting dietary intake) and anthropometric measurements (the body mass index was calculated, assessment of muscle mass, and assessment of body fat).

Laboratory: Hemoglobin (normally (male = 13–15 g/dl, female = 12–14 g/dl)) and biochemical markers (serum albumin: (normally = 3–5 g/dl) and transferrin: (normally = 210–430 mg/dl)).

Intraoperatively: group A: involved patients who had a feeding jejunostomy tube placed at the time of operation and group B: patients received the needed fluid replacements in the form of total parenteral nutrition (TPN) Figs. 1–4.

2.3. Postoperative evaluation

In the second postoperative week, both groups underwent reassessment regarding nutritional status assessment and postoperative complications (general and local complications).

Data management: The data were analyzed statistically using SPSS statistical package. The following tests were used: X = mean, SD = standard

deviation, independent sample T-test and X2 = chi-square test.

3. Results

Table 1.

This table shows that there is no significant change among the 2 studied groups concerning age and sex Table 2.

This table shows that regarding comorbidities, the comorbidity frequencies were comparable in the two groups without statistical significance found Table 3.

This table shows that there is no significant variance among the two studied groups regarding presenting symptoms Table 4, Fig. 5.

This table shows that there is no significant alteration among the two studied groups according to operation types Table 5.

This table shows that there is no significant difference between the groups regarding operative time, blood loss, and hospital stay Table 6.

This table shows that there is a significant degree of differentiation among the categories regarding postoperative albumin Table 7.

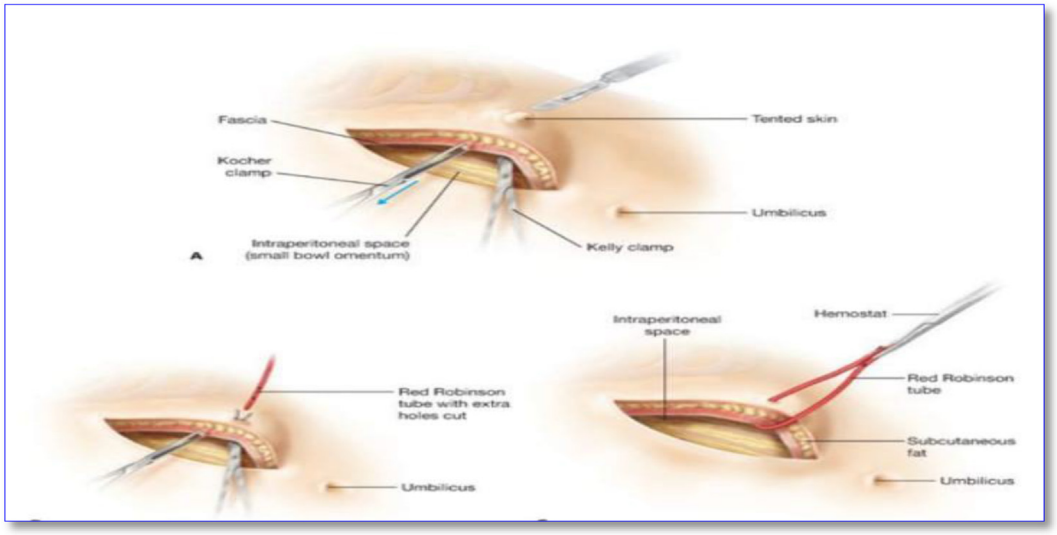

Fig. 1. Facial retraction anterior and midline with stab incision being made for the feeding tube.

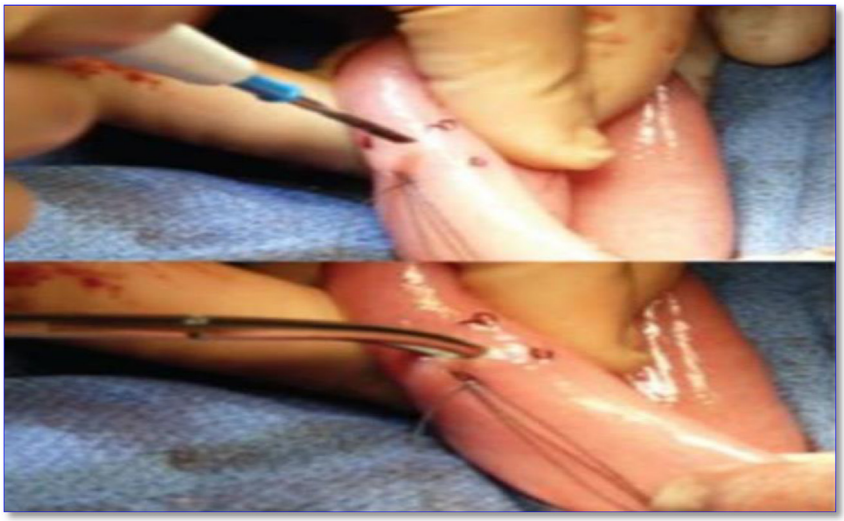

Fig. 2. The enterotomy is made with a cautery and then a hemestar is used to pop into the lumen.

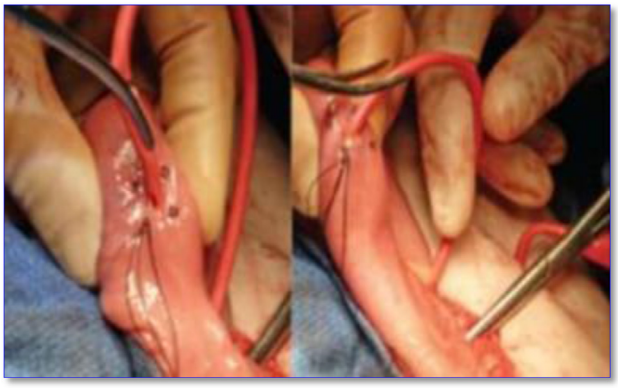

Fig. 3. Directing and of the feeding tube into the distal jejunum.

Fig. 4. Tying down purse string to secure the feeding tube.

Table 1. Demographic characteristics among the examined groups.

Variables	Group A ($n = 20$)	Group B ($n = 20$)	t	*P*
Age (y)				
Mean ± SD	59.33 ± 8.64	60.73 ± 7.58	0.544	0.589
Sex				
Male	14 (70%)	15 (75%)	0.125	0.723
Female	6 (30%)	5 (25%)		

Table 2. Comorbidities among both the studied groups.

Variables	Group A ($n = 20$) *N* (%)	Group B ($n = 20$) *N* (%)	χ^2	*P*
DM	5 (25%)	6 (30%)	0.125	0.723
HTN	7 (35)	9 (45%)	0.417	0.519
Smoking	13 (65%)	12 (60%)	0.107	0.744
Heart disease	10 (50%)	9 (45%)	0.100	0.752
Pulmonary disease	1 (5%)	2 (10%)	0.361	0.548

This table shows that the most found complication among group A was colic (15%) followed by abdominal distention and diarrhea (10%).

Table 3. Comparative clinical findings among the two groups that were studied.

Variables	Group A ($n = 20$) *N* (%)	Group B ($n = 20$) *N* (%)	χ^2	*P*
Abdominal pain	6 (30%)	7 (35%)	0.114	0.736
Nausea and vomiting	13 (65%)	15 (75%)	0.476	0.490
Bloating	8 (40%)	7 (35%)	0.107	0.744
Diarrhea	9 (45%)	8 (40%)	0.102	0.749
Marked weight loss	7 (35%)	6 (30%)	0.114	0.736
Anemia	11 (55%)	12 (60%)	0.102	0.749

Table 4. Types of operation dispersal between the 2 studied groups.

	Group A ($n = 20$) *N* (%)	Group B ($n = 20$) *N* (%)	χ^2	*P*
Laryngo pharynges esophagectomy	3 (15%)	2 (10%)		
Oesophago gastric resection	12 (60%)	14 (70%)	0.465	0.793
Pancreatoduodenectomy	5 (25%)	4 (20%)		

4. Discussion

Participants who have suffered severe injuries often have a hypermetabolic reaction, which puts them at increased risk for developing infection complications, delayed wound healing, organ failure, and ultimately death. However, there is a possibility that the risk of complications and death could be increased by certain methods, timing, routes of distribution, and volumes of nutritional support. Therefore, it is absolutely necessary to provide optimal nutritional assistance in order to reduce this risk and improve outcomes. This Clinical Practice Guideline (CPG) addresses the specifics of giving nutritional support to persons who have been injured in conflict during the postinjury period. These specifics include the timing, route, and kind of nourishment that is provided.[7]

The main results of this study were as follows:

Regarding baseline data according to the results of the most recent research, there were not significant variations among both groups that were studied as well as their age, sex, comorbidities, BMI, muscle mass, body fat, presentation, and ASA classification.

Regarding operative data between the two studied groups, it was found that there was no significant alteration among the groups with regard to operative blood loss, time, and hospital stay.

In line with the findings of the most recent study[8] enrolled in total, 2980 patients with stomach cancer underwent gastrectomy, along with 715 of them, or

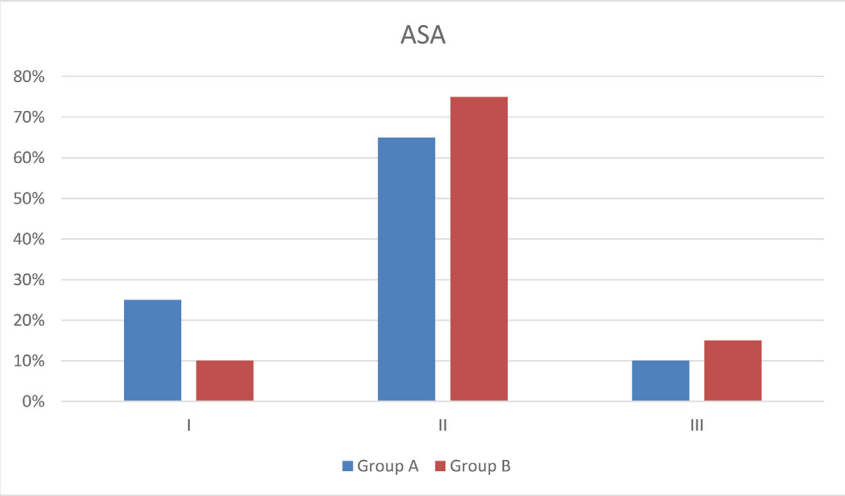

Fig. 5. ASA the disbursement among both of the groups.

Table 5. Comparative information regarding the two groups that were studied.

	Group A ($n = 20$)	Group B ($n = 20$)	T	*P*
Operative time (min)				
Mean ± SD	359.1 ± 88.6	376.4 ± 94.2	0.598	0.553
Blood loss (mL)				
Mean ± SD	523.2 ± 282.5	641.8 ± 348.1	0.933	0.281
Hospital stay (days)				
Mean ± SD	18.54 ± 6.23	16.7 ± 6.84	0.889	0.379

Table 6. Postoperative laboratory data among each studied group.

	Group A ($n = 20$)	Group B ($n = 20$)	t	*P*
Total protein (g/dl)				
Mean ± SD	6.28 ± 0.743	6.36 ± 0.657	0.361	0.720
Albumin (g/dl)				
Mean ± SD	3.42 ± 0.651	3.83 ± 0.519	**2.2**	**0.034**

Table 7. Postoperative complications related to jejunostomy tube among both of the distinct categories that were investigated.

	Group A ($n = 20$) *N* (%)
Diarrhea	2 (10%)
Abdominal distention	2 (10%)
Colic	3 (15%)
Tube displacement	1 (5%)
Tube obstruction	0

24% also had a feeding jejunostomy tube inserted. According to the findings of the trial, when the adjustments were made, there was not a significant distinction among the groups in terms of the baseline data. There was not a significant distinction among the groups in terms of the amount of blood lost or the length of time spent in the hospital. In contrast to our findings, the operation duration was marginally longer for patients who had feeding tubes inserted (median, 248 vs. 233 min, $P = 0.01$), but other than that, there were no significant variations in the results among the groups.

In line with the current study,[9] enrolled a total of 1024 patients, of which 45.27% were treated with jejunostomy, but, in addition, 54.73% were not. The groups were similar, although there were several distinguishing features based on histological analysis of the tumors. There were no major variations in hospital stays.

Similarly,[10] compared 33 cases who received postoperative enteral nutrition via feeding jejunostomy with 43 individuals who did not receive enteral nutrition via feeding jejunostomy, both groups were similar in baseline data. They also revealed that hospitalization duration was not significantly distinct among the two groups. As regards postoperative anthropometric parameters between the two examined groups, the current trial revealed that there was no significant alteration among the groups regarding muscle mass and body fat.

The current research was funded by[11] who reported that postoperative body loss was nonsignificantly differed between groups.

Also,[10] revealed that there were no significant variances in the rate of weight loss at the 3rd and 6th postoperative day, but at 14 days postoperatively, this rate was significantly lower in individuals who received enteral nutrition via feeding jejunostomy, three months following esophagectomy, there was not a statistically significant distinction in weight reduction among both groups.

Regarding postoperative laboratory data among the 2 studied groups, it was found that there was a

significant change among the groups regarding postoperative albumin. However, there was no significant variance among the groups regarding postoperative total protein.

This was agreed with[11] who reported that on the 5th postoperative day, serum albumin was 4.2 ± 0.4 g/dl in early enteral feeding group and 3.6 ± 0.3 g/dl in the control group ($P = 0.041$). Also, serum transferrin was 260.8 ± 2.5 mg/dl in addition to 208 ± 1.8 mg/dl in early enteral feeding and also the control group, respectively (P under 0.001). But there was no significant alteration among the groups concerning postoperative total protein.

Also, our results were supported by Han *et al.* who revealed that the use of early enteral nutrition via tube jejunostomy was associated with significantly lower need for postoperative albumin infusion.[5]

Regarding postoperative complications between the two studied groups, the existing trial displayed that there was no significant alteration among the groups regarding general or local complications.

In alignment with the current study,[9] revealed that there were no significant differences in postoperative surgical complications, or 90-day mortality rate. According to the Clavien Dindo grading system, there were no statistically significant variations in the occurrence or severity of complications. In addition, compared to persons with anastomotic leaks and no jejunostomy, those with a jejunostomy had a significantly lower risk of severe morbidity, as determined by a Clavier Dindo score more than and equal to IIIb (adjusted odds ratio 0.19, 95% CI: 0.04–0.94, $P = 0.041$).

Also, our results were supported by[5] who revealed that concerning problems, there was not a significant distinction among the groups. One year following an operation, the death rate among those in the EEN group was 8.7%, lower than the death rate for patients in the TPN group (9.9%). A lower percentage of patients in the EEN group (12.41%) experienced anastomotic leakage problems than in the TPN group (15.27%). As a whole, there is no significant variability.

Furthermore, the meta-analysis by[12] that involved 9 studies with 1258 patients, found that neither the EEN nor the TPN group was at any higher risk for postoperative complications, infections, or mortality. The overall postoperative complications, length of hospital stay, and death were not significantly distinct among the two combination procedures compared with a single strategy.

In the current study regarding postoperative complications related to jejunostomy tube, the current study showed that the most found complication among jejunostomy tube group was colic (15%) followed by abdominal distention and diarrhea (10%).

Moreover,[10] revealed that greater rates of bowel blockage were seen in the feeding jejunostomy group than in TPN group (9.1% vs. = 0%, $P = 0.044$).

Moreover,[9] revealed that no substantial increased risk of complications due to the jejunostomy was seen.

4.1. Conclusion

Enteral nutrition via jejunostomy tube is a safe method and can significantly decrease the need for postoperative albumin infusion compared with TPN. Both strategies were comparable in outcome and the incidence of complications. For patients with gastrointestinal tolerance, enteral nutrition via jejunostomy tube can be deemed to be of high importance; otherwise, PN combined with enteral nutrition is suggested as a safe strategy.

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Conflicts of interest

No conflict of interest: yes.

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