

Roux-en Y with J pouch versus simple roux-en Y reconstruction after total gastrectomy for gastric cancer functional assessment and quality of life

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Background

Replacement of the reservoir function of the stomach after total gastrectomy is of particular importance. And several types of gastric substitutes have been suggested. The most widely accepted is the Hunt-Lawrence- Rodino or Jejunal pouch.

Aim and objectives

To compare the nutritional, functional outcomes and quality life of a Jejunal pouch reconstruction to the simple Roux -en-Y esophago jejunostomy in patients who had total gastrectomy due to cancer.

Subjects and methods

40 patients underwent total gastrectomy and reconstruction at the upper GIT surgery unit of the Department of Surgery of the University Medical School of Ain shams between august 2020 and October 2022. Patients divided into two groups, group (A) 20 patients reconstructed by simple roux -en - y esophagojejunostomy. Group (B) 20 patients reconstructed by roux - en - y esophagojejunostomy with oral type jejunal pouch. Both groups were compared regarding anthropometric, nutritional and laboratory values at preoperative, 3 and 6 months p o , also early postoperative complications, post gastrectomy and reflux symptoms and patient's QOLI using Eypasch questionnaire at 6 month p o.

Results

No significant difference regarding morbidity or mortality associated with pouch reconstruction (P -value >0.05). also no significance regarding body weight, BMI at 3 and 6 months p o. the pouch group was associated with a lower incidence of dumping, diarrhea and reflux symptoms (P -value <0.05)., also a better food intake, and better quality of life parameters at 6 months post -operative (P -value <0.05).

Conclusion

In a 6-month follow-up after total gastrectomy, pouch reconstruction was superior to Roux-en-Y esophagojejunostomy in terms of p o food intake, incidence of dumping, diarrhoea, and reflux symptoms, as well as quality of life.

Keywords:

Total gastrectomy, Reconstruction, Jejunal pouch, Quality of life

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Abbreviations: EJA, Oesophageal-jejunalanastomosis; JP, jejunal pouch; OPNI, Odonera's Prognostic nutritional index; QoL, Quality of life; R- y, roux-en y; RE, Reflux oesophagitis; TG, Total gastrectomy.

Introduction

Nutritional status and quality of life might be negatively impacted by postgastrectomy symptoms, which arise since the stomach is no longer there [1,2].

The prognosis for people diagnosed with stomach cancer is dismal. Therefore, it is crucial to put all of one's energy towards making sure that one's remaining life is as high-quality as possible [3,4].

To lessen the negative consequences of stomach removal, the surgeon may fashion a gastric replacement from the remaining intestine; this substitute may or may not have a reservoir and may or may not retain passage through the duodenum. It's possible that a reservoir and the duodenal route improve quality of life [5,6].

The first total gastrectomy for stomach cancer was described in 1887 by Schlatter. And since that time,

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doctors have been trying to figure out the best way to compensate the stomach [7].

After a complete gastrectomy, many experts agree that oesophagojejunostomy with pouch development and duodenal transit preservation is the best method for reconstructing the digestive system [8].

However, promoting the technique in low-end healthcare facilities is challenging because of its complexity. Because of its reservoir for digestion and absorption and its brandability, jejunal pouch restoration with Roux-en-Y oesophagojejunostomy and without duodenal transit preservation has been demonstrated to be an alternate strategy [9].

The purpose of this prospective, randomised, parallel, controlled trial is to compare nutritional, functional, and quality of life parameters between patients who underwent a jejunal pouch reconstruction and those who underwent a simple Roux-en-Y oesophagojejunostomy reconstruction following total gastrectomy for cancer.

Patient and method

40 patients underwent total gastrectomy at the upper GIT surgery unit of the Department of Surgery of the University Medical School of Ain shams between august 2020 and October 2022. Patients divided into two groups, (A) 20 patients underwent simple roux -en - y esophago-jejunostomy reconstruction. (B) 20 patients underwent roux-en - y esophago-jejunostomy with oral jejunal pouch reconstruction. And without maintained passage through the duodenum in both procedures.

Inclusion criteria

Patients with early stomach cancer, Age ≤ 75 years old, with resectable gastric cancer, without distant metastasis on preoperative assessment, and accepted cardio-respiratory functions with no contraindication to general anaesthesia.

Exclusion criteria

Patient unfit for major surgery and Patient in late stage of stomach cancer.

Both groups were compared regarding body weight, BMI, nutritional and laboratory values including (OPNI or odonera's nutritional prognostic index, calculated as follows: $10 \times$ serum albumin(g/dl)

$+0.005 \times$ absolute lymphocyte count (number/mm³) in peripheral blood [10], also estimation of s Hb, s albumin, total s protein, s iron, s TIBC (total iron binding capacity), and s cholesterol) at preoperative, 3 and 6 months p o, the operation time and reconstruction time were recorded in both groups as well as any additional surgical procedure early postoperative mortality and morbidity including the incidence of leak, chest infection, as well as hospital stay, follow up endoscopy for all studied populations at 6 month p o, to compare the incidence of stricture and reflux esophagitis also a special questionnaire regarding food intake quality and quantity, postgastrectomy dumping, diarrhea and reflux symptoms, and patient's QOLI using Eypasch [11] questionnaire at 6 months p o. (Figs 1–4)

Operative technique

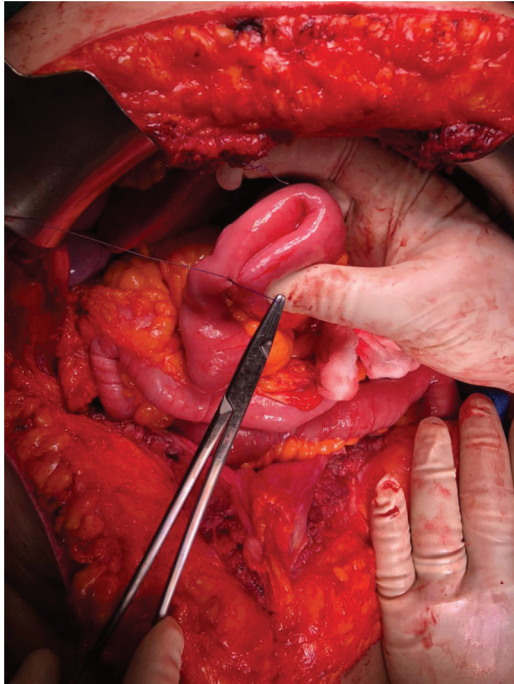
Group A: esophago-jejunostomy repair using the Roux-en-Y technique.

A linear stapling device was used to seal the duodenal stump after a complete gastrectomy., and the jejunum was divided using a 60-mm linear stapling device, 20 cm distal to the Treitz's ligament. After that, An end-to-side esophago-jejunostomy was performed at the distal side of the jejunum using a 25-mm circular stapler. Finally, a linear stapler was used to restore the jejunal continuity with a side-to-side jejunojejunostomy 50 cm distal to the esophago-jejunostomy.

Group B: After a complete gastrectomy, a jejunal pouch was created by severing the intestine 20 centimetres (cm) distal to the treitz ligament, using a linear stapling instrument. The Roux limb was shortened by 15 centimetres on average by folding the proximal end into a 'inverted J' shape. The future pouch is opened at the jejunal stump, and the two branches are anastomosed side to side with sequential charges from a 60 mm linear stapler. Typically, two or three charges are needed. The apex of the pouch, where the a mucus bridge is located, is left uncut. Then, a circular stapler with a 25-mm diameter was inserted via the same incision as the linear stapler to complete the end-to-side esophago-jejunostomy. Then mechanical transverse closure of the enterotomy follows.

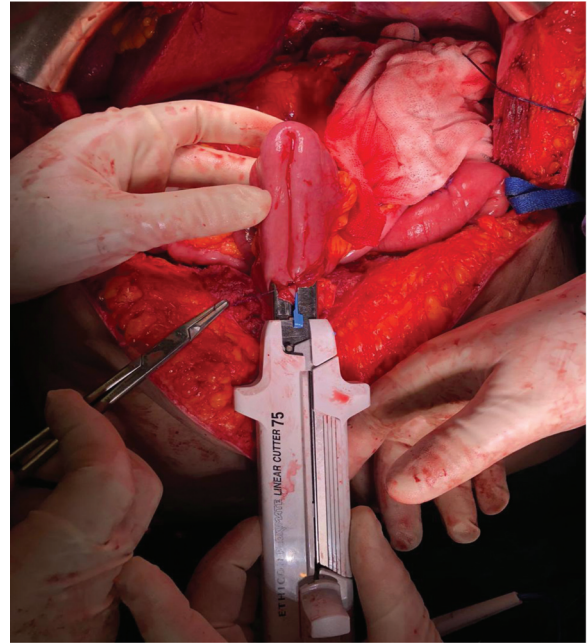
Finally, side to side jejuno-jejunal anastomosis using a linear stapler is performed 50 cm distally to the top of the pouch.

Photo a



Show doubling of jejunal loop for creation of the jejunal pouch.

Photo b



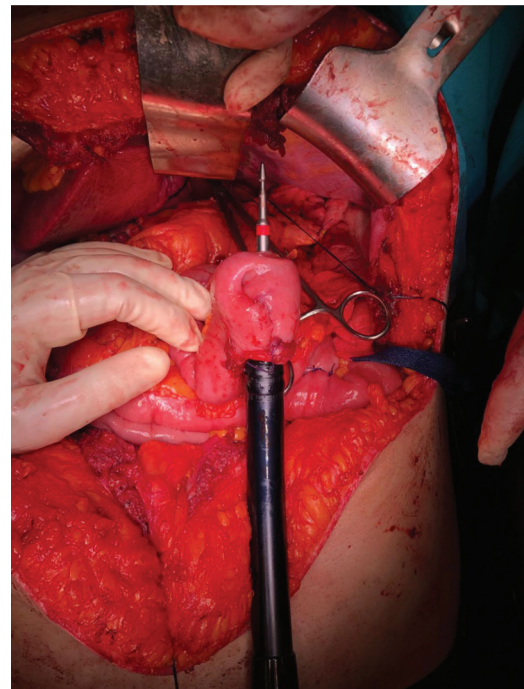
Show doubling of jejunal loop and insertion of linear stapler.

Photo c



Show the opened lower end of the jejunal pouch for insertion of stapler.

Photo d



Show insertion of the circular stapler through the opened lower end and tip of stapler brought out from the apex of jejunal pouch for esophago jejunal anastomosis.

Results

In our study there was no significance between both groups regarding demographic data (P -value >0.05). Age in the studied groups ranged from 37–67 years. Male represented 25 (62.5%) cases and female

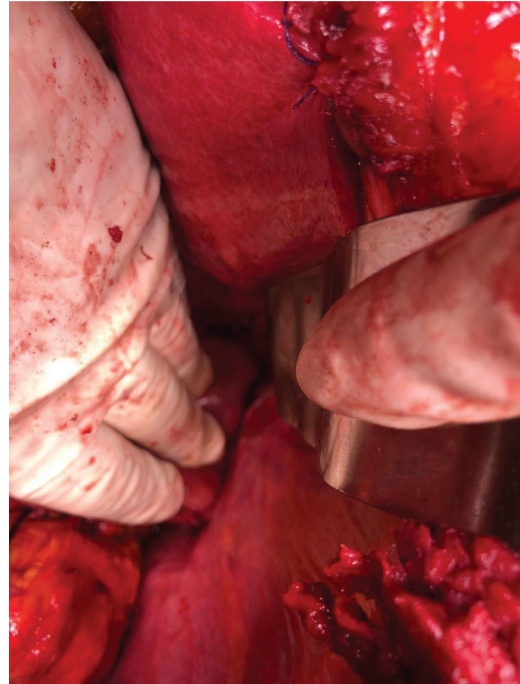
represented 15 (37.5%) cases. Also there was no significance regarding preoperative body weight, BMI, OPNI, and other laboratory data (P -value >0.05)., no significant differences in surgery related data were found except in reconstruction time which was longer in J pouch group (P -value <0.05). although

Photo e



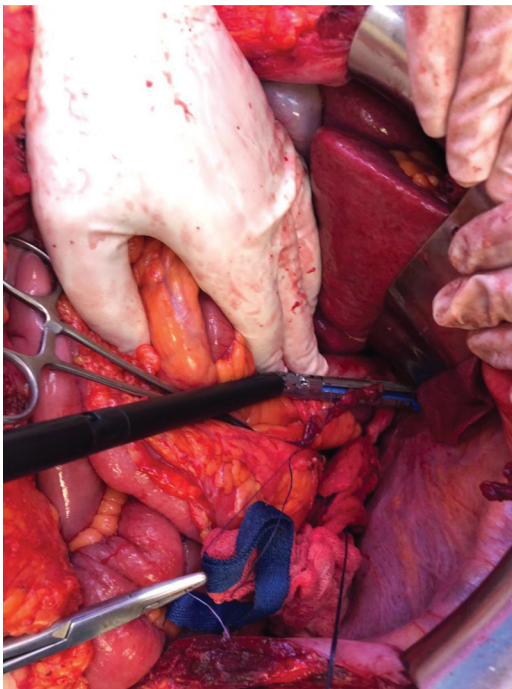
Shows complete esophago jejunal pouch anastomosis.

Photo g



Show complete jejunal pouch reconstruction.

Photo f



The opened lower end of pouch closed with stappler.

the whole operative time was slightly longer in pouch group than simple roux- en- y (Mean±SD =4.80 ±0.29 h v s 4.63±0.34 h) but that results was not significant with (*P* value=0.092)., Also, no significance regarding additional surgical procedures.

No significant mortality or morbidity and increased hospital stay associated with pouch reconstruction

(*P*-value >0.05). The Prevalence of mortality was 5.0% from all population one case in each group due to complications of leak into the chest.

The incidence of Leak and wound infection was observed in two (5.0%) cases for each complication, one case in each group.,pulmonary infection was the most common complication 4(20%) cases in each group.

Post- operative endoscopy (at six months p o) revealed lower incidence of Reflux esophagitis and anastomotic stricture in the pouch group it was found in 7 (17.5%) cases, 5 (25.0%) patients in group (A) and only 2 (10.0%) cases In the pouch group (B)., also Stricture was observed in 5 (12.5%) cases, 4 (20.0%) in the group (A) and 1 (5.0%) case in the pouch group (B), and in spite of these results, it was not statistically significant.

Follow up of body weight and BMI revealed marked reduction in the p o values of both parameters especially at 3 months p o without significant difference between both groups., At six months p o, the body weight and body mass index get some improvement compared to the recorded values at three months p o, but still below the preoperative values, and without significance between groups (*P*-value >0.05).

There was no significance regarding laboratory data and nutritional index (OPNI) of the studied patients at 3 months postoperative (*P* value >0.05), and

comparing the same parameters at 6 months post-operative revealed that there was a significance in the values of s. albumin, total s protein and OPNI in favour of the jejunal pouch group of patients (P value <0.05).

We noticed that patients with J pouch reconstruction experience better quality of food intake without feeling of rapid fullness and early satiety after meals in contrast to those in simple roux-en-y group (P value <0.05).

Also regarding food quantity per meal and frequency of meals per day the results was highly significant for J pouch group versus roux-en-y group ($P=0.003$). As patients in the pouch group were able to ingest more quantities of food per meal, may be due to the reservoir capacity of their pouch and less feeling of rapid fullness and early satiety, and so they tend to have less frequent meals per day. In contrast to the other group of patients who suffer poor eating and unable to ingest adequate quantities in every meal and so they tend to ingest more meals per day.

We noticed that patients in the pouch group have a lower incidence of early satiety, Dumping, Fullness and

Diarrhea than patients in the simple roux-en-y group the results was highly significant., as for dumping 4 patients in pouch group (21.1%) v s 16 patients in simple roux-en-y (84.2%) with ($P=0.000$).

Early satiety in 5 patients in pouch group(26.3%) v s 15 patients in simple roux-en-y (78.9%) ($P=0.001$), diarrhea 5 patients in pouch group(26.3%) v s 13 patients in simple roux-en-y (68.4%) ($P=0.009$).

Also regarding post prandial fullness, 3 patients in pouch group(15.8%) v s 17 patients in simple roux-en-y (89.5%) ($P=0.000$).

Also, we noticed that reflux symptoms as heart burn and vomiting were significantly lower in the pouch group of patients (P value <0.05).

Finally, patients who underwent jejunal pouch reconstructions after total gastrectomy had a highly significant QOLI score measurements than patients with simple roux-en-y reconstruction (Mean \pm SD=101.53 \pm 5.27 vs 109.89 \pm 5.70) in Simple Roux-en-y and pouch group respectively (P value <0.001) (Tables 1 and 2).

Table 1 Comparison between Roux-en-Y and Jejunal pouch groups regarding body weight, body mass index and labs data of the studied patients at 6 months post-operative

6 months postoperative	Simple Roux-en-y no.=20	Roux-en-y with jejunal pouch no.=20	Total no.=40	Test value●	P-value	Sig.
Body Weight Kg						
Mean \pm SD	60.47 \pm 5.85	63.84 \pm 5.96	62.16 \pm 6.07	-1.758	0.087	NS
Range	48-68	52-72	48-72			
BMI Kg/m2						
Mean \pm SD	21.03 \pm 1.48	21.60 \pm 1.09	21.31 \pm 1.32	-1.366	0.180	NS
Range	19.37-24.21	19.85-23.89	18.49-24.21			
Hb (mg/dl)						
Mean \pm SD	10.87 \pm 1.07	10.95 \pm 0.71	10.91 \pm 0.90	-0.268	0.790	NS
Range	9-12.5	9.5-12	9-12.5			
S iron Mmol/ L						
Mean \pm SD	14.84 \pm 2.34	16.16 \pm 1.98	15.50 \pm 2.24	-1.871	0.069	NS
Range	11-19	12-19	11-19			
TIBC Mmol/						
Mean \pm SD	54.32 \pm 2.93	56.63 \pm 5.45	55.47 \pm 4.47	-1.632	0.111	NS
Range	49-61	48-68	48-68			
S albumin mg/dl						
Mean \pm SD	3.44 \pm 0.18	3.62 \pm 0.22	3.53 \pm 0.22	-2.730	0.010	S
Range	3.2-3.9	3.3-4	3.2-4			
Total S.portien mg/dl						
Mean \pm SD	6.26 \pm 0.22	6.47 \pm 0.32	6.37 \pm 0.29	-2.316	0.026	S
Range	6.1-6.9	5.9-6.9	5.9-6.9			
S cholesterol mg/dl						
Mean \pm SD	203.63 \pm 42.11	203.95 \pm 9.37	203.79 \pm 30.09	-0.032	0.975	NS
Range	39-250	185-230	39-250			
OPNI						
Mean \pm SD	46.74 \pm 1.97	48.47 \pm 2.20	47.61 \pm 2.24	-2.568	0.015	S
Range	43-52	45-53	43-53			

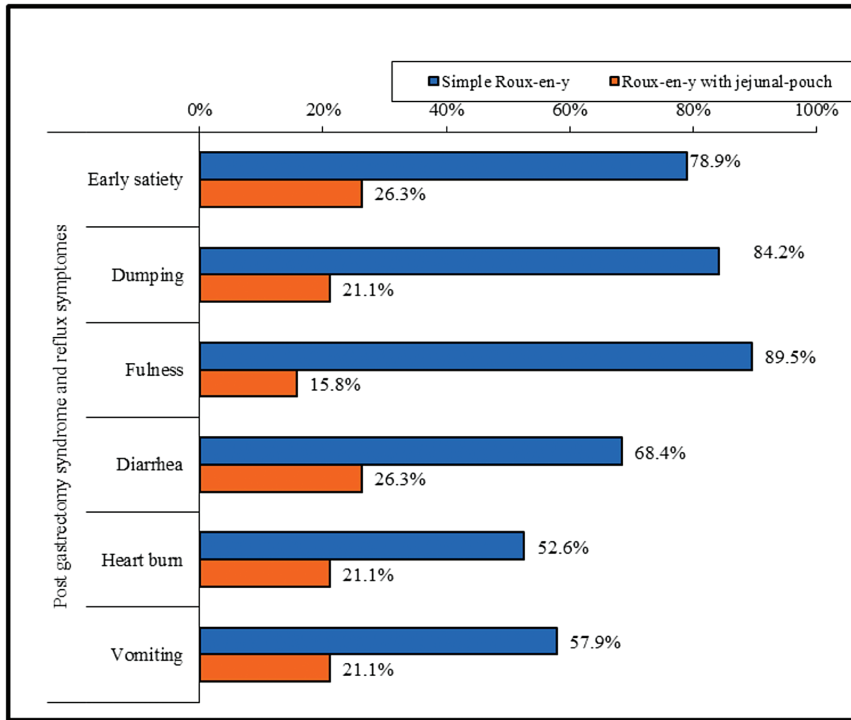
P-value >0.05: Non significant (NS); P-value <0.05: Significant (S); P-value <0.01: highly significant (HS). ●Independent t-test.

Table 2 Comparison between Roux-en-Y and Jejunal pouch groups regarding QOLI. (using Eypasch questionnaire)

QOLI (Eypasch questionnaire)	Simple Roux-en-y no.=20	Roux-en-y with jejunal pouch no.=20	Total no.=40	Test value●	P-value	Sig.
Mean±SD	101.53±5.27	109.89±5.70	105.71±6.88	-4.695	0.000	HS
Range	95–111	103–122	95–122			

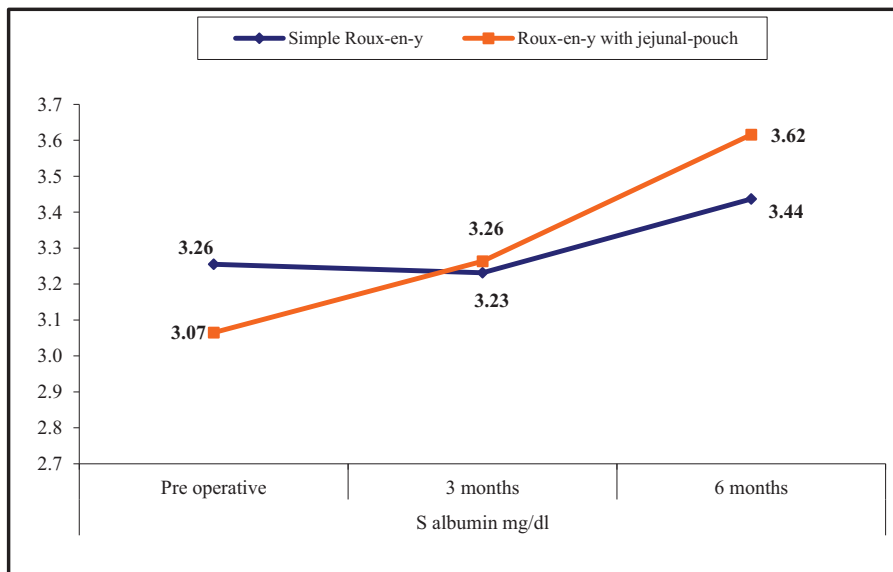
P-value >0.05: Non significant (NS); P-value <0.05: Significant (S); P-value<0.01: highly significant (HS). ●Independent t-test.

Figure 1



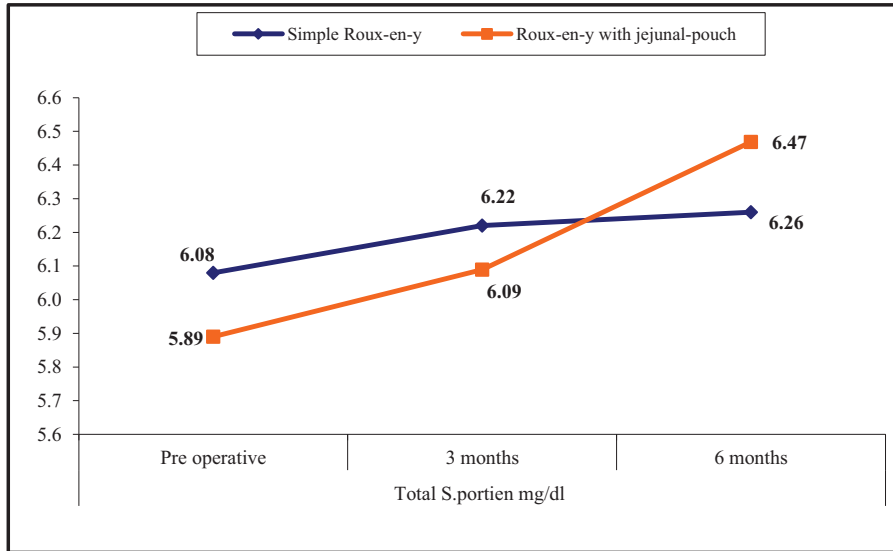
Comparison between Roux-en-Y and Jejunal pouch groups regarding postgastrectomy and reflux symptoms at six month P.O.

Figure 2



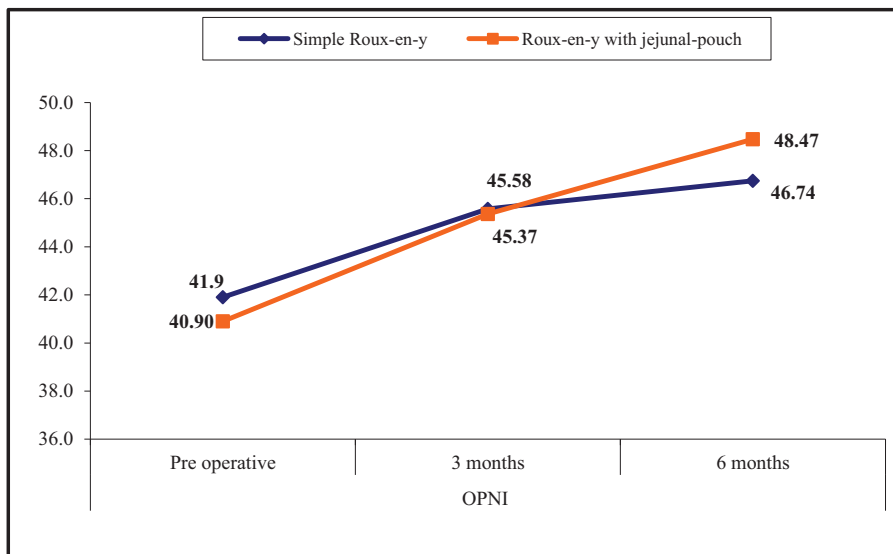
Follow up of s. albumin level. changes from preoperative to six months p o in both studied groups.

Figure 3



Follow up of total s. protein level. changes from preoperative to six months p. o in both studied groups.

Figure 4



Follow up of OPNI changes from preoperative to six months p. o in both studied groups.

Discussion

Postgastrectomy syndrome is a collection of symptoms seen by patients who have undergone TG, including diarrhoea, upper abdomen discomfort after meals, reflux esophagitis, dumping syndrome, and refractory anaemia [12].

There have been various documented methods for reconstruction following TG throughout the last decades. However, there are no agreed-upon

standards for the best kind of reconstruction owing to a dearth of clinical data.

Roux-en-Y EJ is the most typical procedure. IT's benefits include being simple to implement and linked to less postoperative morbidity than traditional surgical procedures. Consistent with the lack of physiological storage and the quick emptying of food, this procedure is associated with a greater prevalence of bowel-related problems, such as

diarrhoea, dumping, and reflux, all of which may negatively impact a patient's quality of life [9].

Multiple recent clinical trials have linked reservoir existence after TG to improved QoL and higher body weight [13]. However, Fujiwara Y showed that there is little benefits in building a reservoir beyond TG [14]. Miyoshi K. stated that weight gain is not greatly influenced by pouch repair after TG [15].

Body weight and BMI at 3 and 6 months post-operatively, as well as postoperative morbidity, hospital stay, and mortality, were similar between the Roux-en-Y and Jejunal pouch groups in our research. Similar to what we discovered, Fein *et al.* found no significant differences between the groups in terms of body weight (P value >0.05) or postoperative complications and death [16], According to Chen *et al.*, there was no significant difference in early postoperative morbidity, hospital stay, or death across the groups tested. Additionally, patients who had pouch reconstruction exhibited better body mass index and daily QoL [9].

In our study the pouch reconstruction was not associated with significant increase in the operative time may be due to the use of mechanical staplers which make the procedure more easier and faster. Our results supported with Fein *et al.* who reported There were no statistically significant variations in operative time between the groups [16]. In contrast, according to a study by Zonča *et al.* the pouch procedure requires a prolonged operation time ($P<0.05$) [5]. Moreover, Chen *et al.* found a significant difference in the operation time between the pouch group and the non-pouch group [9].

Despite the lack of statistical significance, our research found that the pouch group of patients had a lower incidence of reflux esophagitis and stricture than the non-pouch group. Yukihiko T, *et al.* reported that the choice of jejunal pouch technique allowed the use of a larger EEA (EEA 28 or EEA 31) than that of Roux-en-Y reconstruction (EEA 25), resulting in avoidance of anastomotic stricture and post prandial symptoms ($P<0.05$) [17] this is consistent with our results, hence Chen *et al.* Compared to the Roux-en-Y group, reflux oesophagitis was less prevalent in the jejunal pouch group, but this difference was not statistically significant [9].

In our study we observed that the nutritional index (OPNI) improved in both groups *p o* and was significantly better in the pouch group at 6 months

p o as well as total s protein and s albumin. Chen *et al.* reported that the PNI was better in the jejunal pouch group, although the difference was not significant [9] also Yasushi Nakane,*et al.* reported that The total protein level in the PR group showed gradual increase after gastrectomy and was significantly higher than that in the RY group 12 months ($P<0.05$) and 24 Months ($P<0.01$) postoperative. Also, there was a significant difference between the PNI in the PR and RY groups 12 months ($P<0.01$) and 24 months ($P<0.05$) postoperatively [18].

In our study there was a significance between the two groups and in favour of the pouch group regarding Food intake, Postgastrectomy syndrome and reflux symptoms at six months post- operative with (P value <0.05). patient's in pouch group showed significantly better quality and quantity of food, may be due to their reservoir capacity they tend to intake adequate quantities of food per meal without feeling of early satiety or rapid fullness, than patients in the ordinary R - Y reconstruction also the pouch group show lower incidence of dumping, diarrhea and reflux symptoms in this respect our results agree with Iivonen, M. K. who reported a Significant difference between the J -pouch and Orr-RY group parameters regarding postgastrectomy symptoms and in favour of the pouch group of patients who suffers less frequent symptoms, and better eating capacity and the patients ate fewer meals per day ($P<0.05$) [19] also Yasushi Nakane,*et al.* Reported that the incidence of postgastrectomy syndrome including dumping, diarrhea, retention and fullness and others are significantly less frequent in the Jejunal pouch group of patients at six months *p o* compared to the conventional Roux -en- y reconstruction which also shows a significant higher incidence of heart burn and bile reflux [18] another study by Pavlov R.*et al.*, Dumping syndrome was less common in the pouch group 6 and 12 months after surgery, and heartburn was less common in the Roux-en-Y pouch repair group 12 months after surgery, as reported by him [20].

In our study there was a high significance between Simple Roux-en-y and Roux-en-y with jejunal pouch and in favour of the pouch group regarding QOLI using (Eypasch questionnaire) at six months postoperative (P value <0.001)., Our study agreed with Tsuji, *et a.* a statewide multi-institutional cross-sectional research found that patients who had pouch repair, especially oral pouches, had a far higher quality of life after surgery than those who did not [21]. Our findings also corroborated those of Zona *et al.*, who demonstrated that a year following surgery, a standardised Eypasch

questionnaire was used to evaluate patients' quality of life. His study found that the J pouch reconstruction empties more slowly than the Roux-en-Y reconstruction and is associated with a higher quality of life [5]. Additionally, Chen *et al.* found that jejunal pouch reconstruction following TG was more effective at enhancing nutritional intake and quality of life than the conventional Roux-en-Y esophago-jejunosomy [9].

Contrary to our findings, Fein *et al.* found no improvement in quality of life following Roux-en-Y reconstruction with a pouch in the first postoperative year. However, 30 months after the procedure, patients reported a much higher quality of life than those who had undergone Roux-en-Y reconstruction without a pouch [16].

Conclusion

Our results shown that jejunal pouch reconstruction after total gastrectomy for gastric cancer is possible, safe, and not related with increased morbidity or mortality. This procedure combines the benefits of increased food intake with reduced postgastrectomy and reflux symptom incidence and enhanced quality of life. Our findings suggest that jejunal pouch repair is an effective surgical alternative to the more common R-Y reconstruction. however, More research is needed to confirm this method's efficacy (Photo a–g).

Acknowledgements

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Nil.

Conflicts of interest

There are no conflicts of interest.

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