

Ileocecal Interpositional Graft for Gastric Replacement after Total Gastrectomy

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ABSTRACT

Purpose: The aim of this study is to evaluate the technique of ileocecal segment interpositional graft after total gastrectomy for gastric cancer with assessment of its advantages and disadvantages.

Patients and methods: This is a prospective study carried out at the National Cancer Institute, Cairo University. Twenty four patients with gastric carcinoma were identified from December 1998 to February 2003. All of them were submitted to surgery after preoperative clinical, radiological and endoscopic diagnosis. Total gastrectomy with ileocecal interpositional graft were done (19 subdiaphragmatic reconstruction and 5 intrathoracic reconstruction). Patients were followed up for at least 12 months for postoperative morbidity, body weight, reflux and dumping symptoms. Gastrografen swallow, barium swallow, upper GIT endoscopy were routinely done in all patients and pouch emptying time by Tc-99m sulphur colloid was done in 11 patients only.

Results: Perioperative mortality was 8.3% (2/24). No patient reported reflux symptoms or showed endoscopic findings of reflux esophagitis in the subdiaphragmatic reconstruction group and mild reflux was noted in only one patient in the intrathoracic reconstruction group. No patient reported dumping symptoms. Emptying time showed good capacity as a reservoir of food. Postoperative decrease in body weight averaged less than 10% of preoperative weight.

Conclusions: Ileocecal interposition graft after total gastrectomy has the advantages of preventing reflux esophagitis and providing functional replacement of the stomach as a reservoir for ingested food. It can be done with acceptable morbidity and mortality. It is simpler than some of the pouch reconstructions and deserves more attention.

Key Words: Total gastrectomy - Gastric replacement - Ileocecal reservoir.

INTRODUCTION

Gastric carcinoma represents 1.04% of all malignant diseases and 7.29% of digestive sys-

tem malignancies in the Egyptian National Cancer Institute pathology registry [1]. The first Roux-en Y esophago-jejunostomy as a mean of substitution after total gastrectomy was performed in 1908 and various technical improvements followed on [2]. In addition, jejunogastrojejunostomy was added and both were counted as the standard methods of gastric reconstruction after total gastrectomy [3]. Jejunal pouch, transverse or left colonic transposition are also available [4]. Complications of the previous methods of reconstruction are early and late dumping syndromes, blind loop syndrome and reflux esophagitis [5]. The previous complications result ultimately in progressive loss of weight, bad quality of life and severe symptoms that need surgical intervention in some instances [6]. To overcome these problems, we have evaluated the ileocecal interpositional graft for replacing distal esophagus and stomach. Lee [7] and Hunnicut [8] first described the reconstruction of the stomach by means of ileocolon interposition in the early 1950s. Although the concept and the initial experiences were promising, use of this technique had not been reported in the surgical literature since 1952. Recently, about seven studies were published in which the same ileocolon segment was used to replace the stomach after total or proximal gastrectomy [9-15]. Pediatric Surgeons have used the same ileocecal segment for esophageal replacement in children with esophageal atresia with convincing results [16].

MATERIAL AND METHODS

This is a prospective study carried out at the National Cancer Institute, Cairo University.

Twenty four patients with gastric carcinoma were treated from December 1998 to February 2003. All of them were submitted to total gastrectomy with ileocecal interpositional graft (19 subdiaphragmatic reconstruction and 5 intrathoracic reconstruction). Ileocecal segment was rotated 180° clockwise and placed between the esophagus and the duodenum (ileum to esophagus and colon to duodenum). Preoperative assessment included proper clinical examination, gastroscopy with biopsy, chest X-ray, abdominal CT or ultrasound, routine laboratory investigations and weight record. Patients were followed up for at least 12 months for postoperative morbidity, body weight loss or gain Reflux and dumping symptoms were also reported. Gastrograffin swallow, barium swallow and upper GIT endoscopy were routinely done in all patients. Pouch emptying time using technetium 99m (Tc-99m) sulphur colloid mixed with semisolid meal (yoghurt) was done in 11 patients only. Gastrograffin swallow was used to test the anastomotic lines integrity in the early postoperative period (Fig. 1 A-B) and barium swallow was done later on to detect any anastomotic stenosis or esophageal dilatation (Fig. 2).

Technique:

We used a technique similar to that described by Von Flue et al. [12]. The esophagoduodenal continuity was reconstructed after total gastrectomy with or without distal esophagectomy using an interposed pedunculated ileocecal segment. Total gastrectomy with compartment 2 dissection was performed through an abdominal incision (Fig. 3 A) and distal esophagectomy through the right 6th intercostal space approach. The ileocecal segment was isolated (ileum 7 cm and cecum and ascending colon segment 17-20 cm) and pedunculated at the right colic artery (in supradiaphragmatic reconstruction) or the ileocolic artery (Fig. 3 B) in infradiaphragmatic reconstruction. An appendectomy was performed. After transection of the ascending colon, ileum and ileocolic artery, (in supradiaphragmatic reconstruction) or the right colic artery (in infradiaphragmatic reconstruction), the ileocecal segment was rotated 180° clockwise upward (Fig. 3 C). In infradiaphragmatic reconstruction the ileum was then anastomosed, end-to-end with the transected esophagus using single layer interrupted stitches (Fig. 3 D). The colonic end was drawn and placed in the subhepatic space, avoiding any twist of the vascular

pedicle. The colonic end was sewn to the duodenal stump using a single layer, transmural running suture for the posterior wall and an extramucosal running suture for the anterior wall (Fig. 3 E). The terminal end of the ileum was anastomosed with the remaining part of the ascending colon using a double layered continuous suture. If intrathoracic reconstruction will be done the transposed ileocecal segment was pushed through the esophageal hiatus of the diaphragm. The ileocecal segment was drawn to the right mediastinum. The ileum was then anastomosed, end-to-end with the transected esophagus using single layer interrupted stitches. To prevent the anastomosis from being too narrow, the antimesenteric border of the ileum was incised longitudinally. The cecal reservoir was anchored along the mediastinal pleura with several fixation stitches. The right thoracic cavity was drained with two tubes and the chest was closed. The anastomosis was checked for leaks using gastrograffin on the 6th postoperative day.

RESULTS

The data of all patients was summarized in Table (1). The study included 24 patients (15 males and 9 females). Their age ranged from 27 to 75 years with a median age of 41.5 years. In 5 patients an intrathoracic reconstruction was necessary and in the other 19 patients a single abdominal reconstruction was done. The operation was well tolerated by all patients. Mean operating time was 225 minutes. Total gastrectomy without splenectomy was done in 3 cases. In the other 21 cases splenectomy was done in addition (Fig. 4). Distal esophagectomy was performed in 7 cases. Distal pancreatectomy was done in 6 patients and pancreatectomy including the tail, body and part of the head was done in 2 patients. Transverse colectomy was done in 4 patients. Postoperative pathological staging were T4N2MO (13 patients), T3N1MO (4 patients), T4N1MO (3 patients), T3N2MO (2 patients) and T3NOMO (2 patients). Table (2) summarizes the postoperative morbidity and mortality. Two patients died within the first two weeks postoperatively, the first patient had a leak from the esophago-ileal anastomosis. Abdominal exploration was done and the fistula was sealed by oversewing. Subsequently pancreatitis developed and the patient died two weeks later from multi-organ failure (MOF). The 2nd patient developed volvulus of

the ileal loop around the colonic segment in the 3rd postoperative day. Resection anastomosis with cecopexy was done, unfortunately, the patient died 4 days later from hepatorenal failure. The other patients were followed up for at least 12 months for postoperative morbidity, body weight, reflux and dumping symptoms. At the end of the first year of postoperative follow-up only 18 patients of the whole group were alive. Four patients died within the first 8 months postoperatively (one patient died of uncontrolled diabetes mellitus and the other three patients died of malignant metastases). Body weight decreased not more than 10% of the preoperative body weight and it was stabilized after 6 months. No patient reported reflux symptoms or showed endoscopic findings of reflux esophagitis in the subdiaphragmatic reconstruction group and mild reflux was noted in only one patient in the intrathoracic reconstruction group. No patient reported dumping symptoms in both groups. To evaluate the ingested food storage capacity of the interposed ascending colon, the gastric (pouch) emptying time was measured using Tc-99m sulphur colloid mixed with semisolid meal (yoghurt) in 11 patients and 6 normal volunteers (control group). Each subject ate 200 grams of yoghurt mixed with 1 mCi of Tc-99m sulphur colloid in less than 5 minutes. Patients were imaged in the supine position using dual head gamma camera for 1 hour. Anterior and posterior dynamic images (1 min/frame) for 60 minutes were done. The artificial pouch was identified on dynamic images where a ROI (region of interest) was drawn around it and time-activity curves in both anterior and posterior projections were generated. Calculations were done from their geometric mean and the T-half for pouch emptying was identified for each group (Fig. 5). The percentage activity at any time was calculated as follows: count at the given time/count at time zero X 100. The mean T-half for normal volunteers was 29.5 minutes (SD = ± 1.37) while for patients with ileocecal pouch it was 28.4 minutes (SD = ± 0.4). The difference between the 2 groups was statistically insignificant using the Mann Whitney test (p value = 0.12). Thus the capacity for food retention was good in the pouch group and comparable with the control group. It is worth noting that the emptying time was faster in the intrathoracic group (5 cases) than the abdominal group (6 cases), however, this was statistically insignificant.



Fig. (1-A): Gastrografin meal done on the 7th postoperative day showing integrity of anastomotic lines and good reservoir of the ileocecal pouch.



Fig. (1-B): Delayed film of the same patient showing free passage of the dye distally.



Fig. (2): Barium meal done 6 months postoperatively showing the ileocecal pouch (Anterior view).



Fig. (3-A): Operative bed after total gastrectomy.



Fig. (3-D): Ileo-esophageal anastomosis.

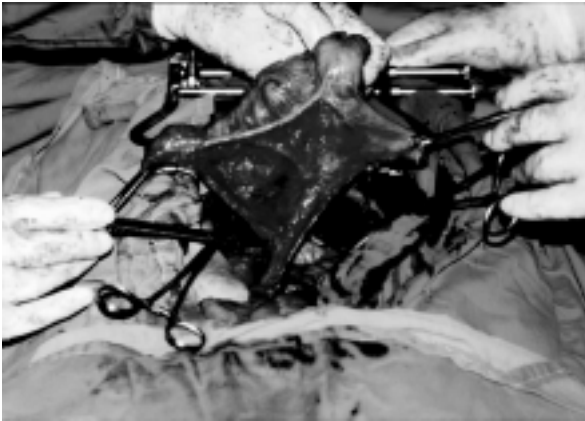


Fig. (3-B): Ileocecal segment isolated based on the ileocolic artery.



Fig. (3-E): Colo-duodenal anastomosis.

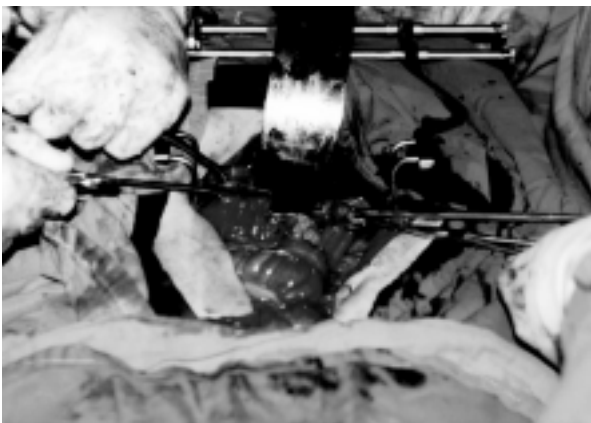


Fig. (3-C): Ileocecal segment rotated 180° clockwise upward.

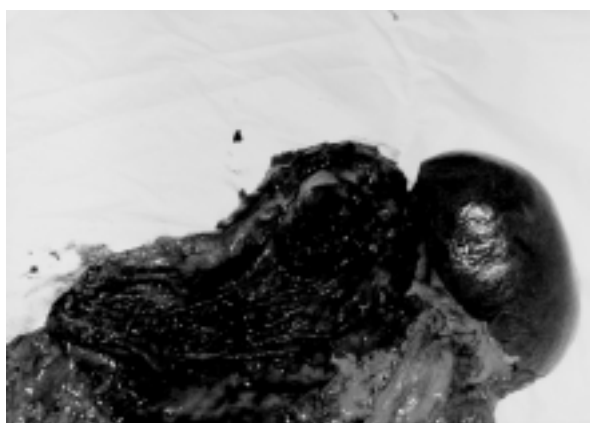


Fig. (4): Total gastrectomy with splenectomy.

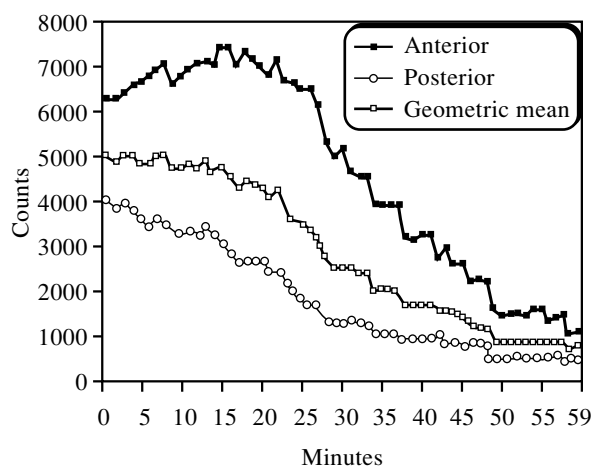


Fig. (5): Time-activity curve for patient with ileocecal pouch $T_{1/2} = 28$ minutes.

Table (1): Patients characteristics.

No. of patients	24
Sex:	
Male	15
Female	9
Age:	
Range	27-75
Median	41.5
Tumor distribution:	
Distal esophagus	1
Cardia	6
Proximal stomach (fundus & body)	12
Antrum	5
Histologic type:	
Adenocarcinoma	23
Squamous cell carcinoma	1
Type of operation:	
Intrathoracic reconstruction	5
Abdominal reconstruction	19
Extent of resection:	
Total gastrectomy	24
Splenectomy	21
Distal esophagectomy	7
Tranverse colectomy	4
Distal pancreatectomy	6
Pancreatectomy including tail, body and part of the head	2
Stage:	
T4 N2 MO	13
T3 N1 MO	4
T4 N1 MO	3
T3 N2 MO	2
T3 NO MO	2

Table (2): Postoperative morbidity and mortality.

	Intrathoracic	Abdominal
Mortality	1	1
Morbidity:		
Leak from esophago-ileal anastomosis		1
Leak from colo-duodenal anastomosis		1
Volvulus of ileal segment of the pouch	1*	
Uncontrolled diabetes		1
Pancreatitis		1**
Lung atelectasis	1	
Hospital stay (days):		
Range	12-19	11-34
Median	15	16

* Patient died on postoperative day 7.

** Patient died on postoperative day 13.

DISCUSSION

Patients undergoing gastrectomy presented problems associated with loss of reservoir function, loss of lower esophageal sphincter and bypass of the physiologic duodenal passage [14]. Various types of reconstruction have been described in the surgical literature. Nakane et al. [17,18] and Iivonen et al. [19] showed the advantages of a pouch reconstruction compared to standard Roux-en-Y reconstruction. Schwartz et al. [20] emphasized the better quality of life and normal glucose tolerance in patients undergoing an UIm pouch reconstruction including preservation of the duodenal pouch. On the other hand, several authors could not find any advantages of preservation of the duodenal passage or creation of a pouch compared to simple Roux-en-Y procedure [21-23]. The value of complicated reconstruction remains controversial. The advantages of ileocecal interpositional graft for gastric substitution can be summarized in preservation of the physiologic duodenal passage, good reservoir and excellent compliance [24] and a competent ileocecal valve which can act as an esophag-gastric cardia preventing pancreatico-biliary juice reflux. Being isoperistaltic it prevents stasis of food inside the grafted loop and the ileocecal valve had no effect on transit time [25-26] and so it does not delay passage of food. The ileocecal competence was proved in a previous study [27] done on 120 patients over more than ten years, who were submitted to radical cystectomy and orthotopic ileocecal segment substitution. It has

been shown that transposition of the ileocecal segment does not result in persistent diarrhea, as long as the resection of the ileum is not too extensive [28-30]. The idea of using the ileocecal segment as a gastric substitute is not new. Hunnicutt [8] performed the first four operations in humans in 1950. The physiological results were remarkable. Although the concept and initial experience in humans were already promising at that time, this technique had not been reported in the surgical literature since 1952 till 1997. There have been only seven published studies concerning this technique since 1997 [9-15]. These investigators concluded that this technique has the advantage of successfully preventing postoperative reflux esophagitis and providing functional replacement of the stomach as a reservoir of ingested food.

Conclusion:

We suggest that ileocecal interposition for gastric replacement is an attractive restorative technique. The technique related morbidity is low and our patients maintained a good quality of life. Further prospective randomized studies are necessary to compare this technique with the standard procedures for reconstruction after gastrectomy.

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