



ORIGINAL ARTICLE

ASSESSMENT OF DUODENAL SWITCH PROCEDURE AS A TREATMENT OPTION FOR DUODENOGASTRIC REFLUX

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Abstract

Aim: Duodenogastric reflux is a common healthy problem and duodenal switch (DS) has been found to be a useful operation for treatment of this abnormal primary and pathologic problem.

Objective: Assessment the efficacy of the duodenal switch procedure as a treatment option for primary and pathologic duodenogastric reflux (DGR).

Methods: Over a period of 3 years, 6 patients with symptomatic primary DGR and 14 patients with pathologic DGR following gastrojejunostomy underwent pancreaticobiliary diversion using duodenal switch procedure. Endoscopic evaluation of gastric and duodenal mucosa was done before and after surgery. Symptoms were evaluated with a symptom score using a detailed questionnaire. Suprapapillary duodenojejunostomy (duodenal switch procedure) was done in all patients.

Results: During a mean follow-up period ranging from 6-34 months with a mean 24 months, most of the patients had a good satisfactory outcome as defined by endoscopic evaluation and significant reduction in the pre-operative symptoms. There was no reoperation or mortality in our study.

Conclusion: The duodenal switch procedure is an effective surgical therapy in patients with primary or pathologic or DGR.

Keywords: Alkaline reflux, Gastrojejunostomy, Antireflux Surgery.

INTRODUCTION

Duodenogastric reflux (DGR) is commonly defined as the transport of duodenal contents from the duodenum to the stomach.⁽¹⁾ The reflux of the bile into stomach can lead to a symptomatic chronic atrophic gastritis and is an important factor in the pathogenesis of gastric ulcer type I.⁽²⁾ In more than one third of the patients undergoing gastric bypass, the gastric mucosa in the excluded stomach is exposed to the potential deleterious effects of bile and remnant gastritis.^(3,4) The entity of abnormal DGR without previous gastric surgery is

called "primary duodenogastric reflux".⁽²⁾ The exact pathogenic features of bile reflux in unoperated stomach as well as its contributions to gastric mucosal lesions in chronic gastritis are still remaining unrevealed.⁽⁵⁾

A variety of operative procedures have been used to treat pathologic DGR but cause significant side effects through changes in the normal physiology of the foregut.⁽²⁾ The duodenal switch procedure first described by DeMeester to prevent duodeno-gastric reflux⁶ and it has been reported to maintain the

integrity of the antro-pyloro-duodenal mechanism with great patient satisfaction.⁽²⁾ The duodenal switch operation (Fig. 1), involves dividing the supra-ampullary duodenum, over sewing the distal lumen, and anastomosing the proximal duodenum end to end to a roux-en-Y limb of jejunum. The operation effectively eliminates bile reflux from the stomach and esophagus and is indicated in the unusual patient with severe primary bile gastritis from duodenogastric reflux.⁽⁷⁾ In this prospective study, we evaluate the efficacy of the duodenal switch operation in treatment of symptomatic primary or pathologic (after truncal vagotomy gastrojejunostomy) duodenogastric reflux by comparing endoscopic and symptomatic changes before and after surgery.

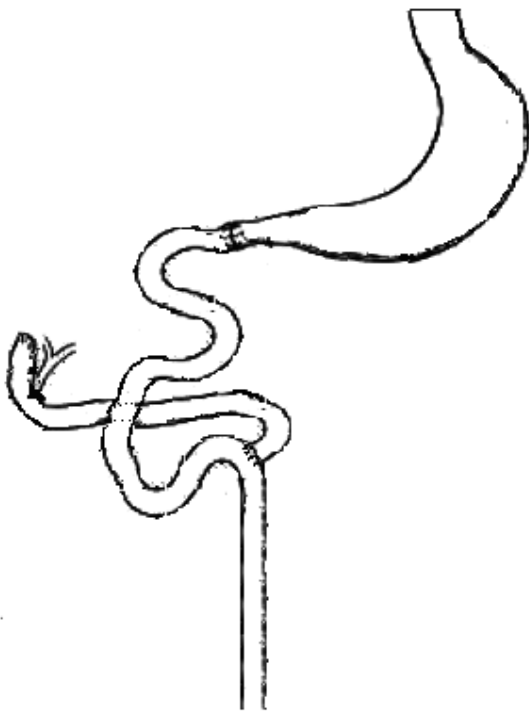


Fig 1. Duodenal switch procedure
(From Meilahn and Dempsey, 2004).⁽⁷⁾

PATIENTS AND METHODS

Over a period of 3 years, between March 2006 and January 2009, this study was conducted at El-Minia University Hospital. This study was conducted in accordance with the 1975 Declaration of Helsinki. The study protocol was approved by the Ethics committee of Minia University, Egypt, before inclusion of patients in this study, all patients were informed of its purpose, nature and duration, as well as the possible risks and benefits of this study intervention. Patients gave written informed consent before enrolment. It included 20 patients required pancreaticobiliary diversion using the

switch procedure for symptomatic gastritis related to primary DGR (6 patients) or pathologic DGR, after successfully done truncal vagotomy gastrojejunostomy (14 patients). Symptoms were evaluated with a symptom score using a detailed questionnaire. The symptoms included heart burn, acid regurgitation, food regurgitation, chest pain, dysphagia, nausea, choking, throat ache, hoarseness, coughing, dyspnea, and vomiting. The severity score ranged from 0 to 3 (0= absent symptom, 1= mild, 2= moderate, 3= severe) as mentioned by Romagnoli et al.⁽⁸⁾

Endoscopic evaluation was done pre and postoperatively after taking a written consent from the patients. The upper endoscopic examination was performed by the same experienced endoscopist to reduce the possible bias resulting from different examination techniques (interobserver variability) and all endoscopic findings, including the signs of gastritis, gastric-duodenal ulcers, erosions, masses, and the presence of blood, and/or of duodenogastric reflux in the lumen were noted. During upper endoscopy, we aspirated the residual gastric fluid and measured the bilirubin and/or pancreatic amylase content within it. The presence of yellow-green fluid with increased bilirubin and/or amylase content was accepted as the sign of duodenogastric reflux as mentioned by Byrne et al.⁽⁹⁾ All patients had gastric yellow-green fluid during preoperative endoscopy, and they had increased bilirubin and/or amylase in their gastric fluid. Patients operated, were also investigated by 24-hour intragastric bile monitoring with the Bilitec device (Medtronic, Denmark). If the Bilitec test was normal, the patient was investigated further by overnight, intermittent aspiration of gastric juice through the lumen of a nasogastric catheter to detect the eventual presence of high-concentration amylase peaks in the stomach. Mucosal erythema, erosions, or ulcerations of the gastric wall were considered endoscopic signs of gastric inflammation. We considered mucosal erythema, (mild changes), while mucosal erosion (moderate changes) however mucosal ulcer (marked changes).

Surgical technique: After general anaesthesia, we performed the procedure through a transverse supra-umbilical incision, to allow full exposure and to lessen postoperative pain. We performed the technique described by DeMeester.⁽⁶⁾

The duodenum was divided 3 cm distal to the pylorus and the small bowel 50 cm distal to the D.J. using umbilical tap from antemesenteric border of unstretched intestine. The distal Jejunum was brought up trans-mesocolic and anastomosed end-to-end to the stomach with a mono-layer continuous running suture of vicryl 3/0. The distal duodenum-proximal jejunum (biliopancreatic loop) was anastomosed end-to-side to the distal Jejunum 50 cm from the proximal anastomosis. The mesenteric rents were closed using vicryl 3/0. Then, wound closure was done with drain.

Follow up: The patients were followed up for a period

ranging from 6-34 months with a mean 24 months. Satisfaction after surgery was determined according to absence of severe symptoms and absence of the preoperative mucosal changes in the stomach during a follow-up period .Three months after the operation, upper GI endoscopy was performed to all patients to evaluate the presence of a bilious gastric lake and of residual signs of gastric inflammation (mucosal erythema, erosions, or ulcerations). Gastric exposure to bile was investigated using the 24-hour intragastric Bilitec test.

Statistical analysis: Data were analyzed using the SPSS 11.0 Statistical package program. Univariate analysis of mean and standard deviation (SD) of the numerical data was done. Paired student t-test was used to compare the mean values of preoperative and postoperative severity score of symptoms. Chi square test was used to compare preoperative and postoperative endoscopic findings. A p-value <0.05 indicated a statistical significance.

RESULTS

This study was conducted on 20 patients (8 men and 12 women), with mean age of 26.5 years (range: 20-37),

required pancreaticobiliary diversion using the switch procedure for symptomatic gastritis related to primary DGR (6 patients) or pathologic DGR, after truncal vagotomy gastrojejunostomy (14 patients).

During the follow-up period (ranging from 6 to 34 months), most of the patients had a good satisfactory outcome as defined by postoperative endoscopic evaluation, in addition to the significant improvement in the pre-operative symptoms according to the symptom score. In our study, the surgical technique was successful as there was no need for another interference (no symptomatic recurrence) as well as the mortality rate was 0.

Severity of symptoms: After a duodenal switch operation, there was a dramatic reduction of the severity of the preoperative symptoms.

Table 1 shows comparison between the severity of symptoms scores of all patients preoperatively and postoperatively. It revealed that the sum of the symptom scores of patients was 21.6±6.6 preoperatively, that reduced to 7.2±2.3 postoperatively (p-value<0.001). Also, the preoperative severity scores for each symptom was reduced significantly after duodenal switch.

Table 1. Comparison between the severity of symptoms scores of all patients preoperatively and postoperatively.

Symptoms	Scores Preoperative	Scores Postoperative	P-value
Heartburn mean (SD)	1.8(0.4)	0.6 (0.3)	<0.001*
Acid regurgitation mean (SD)	1.1(0.6)	0.4 (0.2)	<0.001*
Food regurgitation mean (SD)	1.7(0.6)	0.8 (0.3)	<0.001*
Chest pain mean (SD)	1.1(0.5)	0.7 (0.2)	0.002*
Dysphagia mean (SD)	1.8(1.1)	0.6 (0.2)	<0.001*
Nausea mean (SD)	2.3(0.6)	1.2 (0.1)	<0.001*
Choking mean (SD)	2.1(0.7)	0.4 (0.1)	<0.001*
Throat ache mean (SD)	1.6(0.4)	0.6 (0.3)	<0.001*
Hoarseness mean (SD)	1.2(0.3)	0.4 (0.2)	<0.001*
Coughing mean (SD)	1.3(0.4)	0.5 (0.1)	<0.001*
Dyspnoea mean (SD)	1.7(0.4)	0.3 (0.1)	<0.001*
Vomiting mean (SD)	2.3(0.6)	0.7 (0.2)	<0.001*
sum of the mean (SD)	21.6(6.6)	7.2(2.3)	<0.001*

(Data were expressed as mean (SD), NS: non-significant, *: significant p-value).

Fig. 2 shows the prevalence of each symptom in our patients preoperatively and postoperatively, for example, nausea was found in all patients preoperatively, but it was found in 3 patients only

postoperatively. Also, heartburn, acid and/or food regurgitation, chest pain, dysphagia, vomiting, throat ache, and dyspnea were reduced after duodenal switch.

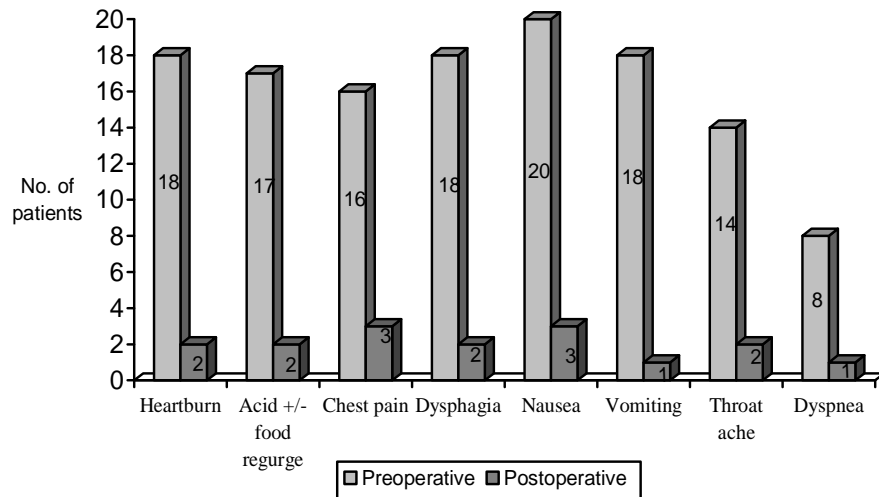


Fig 2. Prevalence of the most common symptoms of duodenogastric reflux before and after duodenal switch o.

Table 2 shows comparison between the results of endoscopic evaluation of gastric and duodenal mucosa before and after the duodenal switch. It revealed a highly significant reduction in the severity of mucosal changes after operation (p value<0.001). Most of the patients had mild (4 patients), moderate (10 patients) to marked mucosal changes (6 patients) preoperatively that improved postoperatively to become 11 patients had no mucosal changes versus 8 patients had mild mucosal changes and only one patient had moderate mucosal changes.

Table 2. Comparison between the results of endoscopic evaluation of gastric and duodenal mucosa before and after the duodenal switch.

Mucosal changes	Before DS	After DS
No change	0	11
Mild changes	4	8
Moderate changes	10	1
Marked changes	6	0
p-value < 0.001*		

(DS: duodenal switch, *: significant p-value).

Table 3 shows comparison between the results of endoscopic evaluation according to etiology of DGR before and after the duodenal switch. The mucosal lesions after previous surgery were more severe (5 patients had marked mucosal changes, 8 patients had moderate mucosal changes versus only one patient had mild mucosal changes), than with primary DGR before surgery (only one patient had marked mucosal changes, 2 patients had moderate mucosal changes versus 3 patients had mild mucosal changes), but significantly improved after duodenal switch regarding both types of DGR with p value <0.001. However, the results were more satisfactory to primary DGR (only one patient had mild mucosal changes) than postoperative DGR (7 patients had mild mucosal changes and one patient had moderate mucosal changes).

Table 3. Comparison between the results of endoscopic evaluation according to etiology of DGR before and after the duodenal switch.

Mucosal changes	Primary DGR (N=6)		Post-operative DGR (N=14)	
	Before DS	After DS	Before DS	After DS
No change	0	5	0	6
Mild changes	3	1	1	7
Moderate changes	2	0	8	1
Marked changes	1	0	5	0
	p-value < 0.001*		p-value < 0.001*	

(DGR: duodenogastric reflux, DS: duodenal switch, *: significant p-value).

DISCUSSION

Normally, reflux of alkaline duodenal contents through the pylorus into the stomach occurs during the early morning and postprandial periods. This Reflux rarely causes symptoms and consequently is usually not a primary disease. This phenomenon is more common in patients who have undergone gastric surgery.⁽¹⁰⁾ The symptoms develop after operations that distort or remove the pylorus.⁽¹¹⁾ Thus, in our study the duodenogastric reflux was more frequent in patients underwent previous gastric surgery than those with primary reflux.

Our study demonstrated that patients with duodenogastric reflux had more severe mucosal lesions before switch procedure that significantly improved after operation, suggesting the efficacy of the procedure and harmful effect of bile reflux on gastric mucosa in those patients. The exact mechanisms by which bile as well as other refluxing contents of duodenum cause gastric mucosal damage are still unclear. It has been indicated that interaction of bile acid, a component of bile, with M3 muscarinic receptor subtype expressed in chief cells may contribute to mucosal damage, manifested as active inflammation, intestinal metaplasia, glandular atrophy and focal hyperplasia, and other pathophysiological consequences of bile reflux.^(12,13) Many patients who undergo distal gastric surgery develop marked remnant gastritis. Fukuhara et al., reported that duodenogastric reflux after distal gastric surgery can cause remnant gastritis in those patients without H. pylori infection, and reconstruction with biliary diversion is protective against the development of remnant gastritis.⁽¹⁴⁾ In our study, the preoperative mucosal changes were more severe in patients with previous gastric surgery.

The duodenal switch operation has been found to be a very useful operation for treatment of primary and pathologic duodenogastric reflux.⁽¹⁵⁻¹⁷⁾ In our study we

performed the duodenal switch according to De Meester⁶, which pathophysiologically more acceptable than Roux-en-Y procedure, and completely eliminating the duodenogastric reflux.⁽¹⁸⁾ Our great satisfactory results with duodenal switch is in agreement with the fact that duodenal switch maintains the integrity of the antro-pyloro-duodenal mechanism¹⁶, and it does not cause any significant change in the intragastric pH environment.⁽¹⁹⁾

Similar to our study, Hinder, used the duodenal switch in more than 40 patients with confirmed duodenogastric reflux and this procedure proved to be well tolerated and successful in long-term follow-up.⁽¹⁵⁾ Klingler et al.,⁽¹⁶⁾ used the duodenal switch procedure for treatment of symptomatic gastritis related to abnormal primary DGR, and 94% of the patients had a good clinical outcome as defined by a significant reduction in pre-operative symptoms. Also, a small series of patients operated on by Theodoropoulos and Richardson, using duodenal switch procedure for primary bowel reflux, duodenal diverticula, and benign duodenal obstruction. They concluded that this procedure offers a much more physiologic approach to certain duodenal problems than a gastric jejunostomy.⁽¹⁷⁾

The main drawback of duodenal switch procedure is the risk for the development of an ulcer at the level of the duodenojejunostomy so immediate administration of PPI for a 2-month period until completion of the mucosal healing process should be recommended.⁽²⁰⁾

On conclusion, suprapapillary Roux-en-Y duodenojejunostomy (duodenal switch procedure) is an effective surgical therapy in patients with pathologic and primary DGR, with a significant elimination of the symptoms and gastric mucosal changes associated with this reflux.

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