SSRG International Journal of Medical Science
ISSN: 2393–9117 / https://doi.org/10.14445/23939117/IJMS-V10I4P102

Volume 10 Issue 4, 8-12, Jul-Aug 2023


*Original Article*

# The Role of Billroth I Type Gastroduodenostomy in the Treatment of Gastric-duodenal Ulcers

Mehmet Sait Ozsoy

*Istanbul Medeniyet University, Faculty of Medicine, Department of General Surgery, Goztepe Prof. Dr. Suleyman Yalcin City Hospital, Istanbul, Turkey.*

*Corresponding Autor : saitozsoy@gmail.com*

Received: 30 May 2023 Revised: 05 July 2023 Accepted: 17 July 2023 Published: 26 July 2023

***Abstract*** *- In this study, patients who applied to our clinic due to peptic ulcer and its complications and underwent Billroth I type gastroduodenostomy were evaluated. The findings of 51 patients who were followed up from 74 patients who applied to our clinic with peptic ulcer and its complications between February 1987 and June 1995, who were diagnosed with a surgical indication as a result of the examinations and who were treated with Billroth I type gastroduodenostomy were evaluated. The patients were followed for an average of 5.7 years (2-10 years). The mean age of the patients was 43 years, 8 were female, and 43 were male, and surgical intervention was decided with 4 different indications. Surgery was performed once in 9 patients (17%) and 2 times in 2 patients (4%). Thirty (58%) patients with surgical indications were operated for pyloric stenosis. The mean operation time was 126 minutes (95-170). Morbidity was 10 %( 5 patients) and mortality was 2 %( 1 patient). The mean postoperative hospital stay ranged between 12 and 1 day (9-22). In this study; considering the developments in the diagnosis and treatment of peptic ulcer; we concluded that Billroth I type gastroduodenostomy is a good alternative in patients with complications and surgical indications because the passage is physiological, the postoperative complications are less than other methods, and the long-term results are satisfactory.*

***Keywords*** *- Stomach, Duodenum, Peptic ulcer, Complication, Billroth I.*

## 1. Introduction

At the end of the twentieth century, serious developments were observed in the etiology, physiopathology, diagnosis and treatment of peptic ulcer compared to the early 20th century. Many methods for treating the disease and its complications have found application. Elective surgeries for treating peptic ulcers have been an important part of abdominal surgery for many years. With the development and widespread use of effective H2-receptor blockers in 1977, elective interventions for peptic ulcers have declined markedly [1,2]. Eradication of Helicobacter pylori also significantly reduced peptic ulcer recurrence and reduced the need for surgical treatment. The development of peptic ulcer surgery has resulted from the clinical application of knowledge gained from laboratory research on human and animal gastrointestinal tract physiology. This new understanding of the mechanism of gastrointestinal secretion and motility has led to the development of the surgical treatment of peptic ulcer disease. The aim of peptic ulcer surgery is the least possible mortality and recurrent ulcer rate and minimal postoperative gastrointestinal side effects. In treating peptic ulcers and their complications, Billroth I type gastroduodenostomy has always been used as a popular surgical technique and is one of the most frequently applied procedures. In this study, the findings of 51 patients who applied to our clinic due to peptic ulcer and its complications and underwent Billroth I type gastroduodenostomy were evaluated.

## 2. Materials and Methods

Out of 74 patients who were evaluated for duodenal ulcer, gastric ulcer and pyloric stenosis and who underwent Billroth I type gastric resection between February 1987 and June 1995 in the 4th General Surgery Clinic of Istanbul Training Hospital, 51 that could be reached were included in the study. The results of these 51 patients were evaluated clinically and classified according to the Visick criteria[3](Table 1).

**Table 1. Visick criteria**

| |
|---|
| Visick -I Clinically asymptomatic and have exceptionally good results |
| Visick - II Good results without pain symptoms with very few digestive disorders |
| Visick -III Patients who can recover with rest and diet and do not require medical treatment |
| Visick - IV Mediocre results, dumping, diarrhea, bilious vomiting, pains that require more or less doctor treatment |
| |

The following protocol was applied in the preoperative period to patients hospitalized with surgical indication:

1. H2 receptor blocker was started in all patients.
2. Nutrition with parenteral nutritive solutions to provide electrolyte balance was provided for patients who could not tolerate a watery diet, had vomiting, and had fluid and electrolyte deficits.
3. Total parenteral nutrition with a subclavian catheter was started in severely cachectic patients.
4. Lactated solutions were avoided, as they may aggravate metabolic alkalosis, especially in patients with pyloric stenosis.
5. Preoperative nasogastric decompression was applied to patients due to gastric dilatation.

Patients who applied this protocol for 3-7 days preoperatively were taken into operation. A median supra-umbilical incision was used. The stomach was first skeletonized by the greater curvature, then by the lesser curvature. The pylorus and the first part of the duodenum were prepared, and subtotal gastric resection was performed according to the Shoemaker-Zenker technique. The lesser curvature was closed with 2/0 chrome catgut and 2/0 silk. The greater curvature edge was used for anastomosis. Passage continuity was ensured by applying two layers of sutures (2/0 chrome catgut and 3/0 silk) for the gastroduodenal anastomosis. Rubber drains were placed in Winslow in all of our patients. In the postoperative period, the nasogastric tube was kept for an average of 4 days. Liquid food was started on the 5th day, and solid food was started on the 7th day. Abdominal drains were removed on the 6-7th postoperative day.

## 3. Results

The mean age of the patients was 43.3 years, 8 were female, and 43 were male. The gender distribution of the patients included in the study is shown in Table 2. Smoking was detected in 36(70%) of our cases.

**Table 2. Gender distribution**

| Gender | N(Count) | % |
|---|---|---|
| Female | 8 | 16 |
| Male | 43 | 84 |
| Total | 51 | 100 |

Surgical intervention was decided for the patients with 64 different indications. Nine (17%) of the patients included in this study had previously undergone raffia and omentoplasty due to ulcus perforation. In one patient (2%), raffia and omentoplasty were performed twice in 6 years. One (2%) patient underwent elective surgery due to duodenal ulcus, and 1 (2%) due to pyloric stenosis. The operation indications of our patients are shown in Table 3.

**Table 3. Operation indications**

| Diagnosis | N(Count) | % |
|---|---|---|
| Pyloric stenosis | 30 | 59 |
| Suture duodenal ulcer | 9 | 17 |
| Duodenal ulcus with bleeding | 7 | 14 |
| Gastric ulcus | 3 | 6 |
| Total | 51 | 100 |

Considering the general symptoms of gastric ulcer, duodenal ulcer and pyloric stenosis, preoperative signs and symptoms observed in the patients are shown in Table 4.

**Table 4. Symptoms**

| Symptom | N(Count) | % |
|---|---|---|
| Epigastric pain | 44 | 86 |
| Nause, vomiting | 31 | 61 |
| Bloating | 43 | 84 |
| Sour, burning | 39 | 76 |
| Weight loss | 25 | 49 |
| Fatigue | 22 | 43 |
| Hematemesis | 5 | 10 |
| Melena | 5 | 10 |

Patients were diagnosed by performing gastric-duodenal imaging and endoscopy, according to which the decision for elective surgery was made. Thirty(58%) of these patients had pyloric stenosis, and complaints of nausea, vomiting, and weight loss were evident. The mean operation time was 126 minutes(95-170 minutes). Our mean postoperative hospital stay was 12.1 days(9-22 days). Morbidity was 10%(5 patients), mortality was 2%(1 patient). There was no operative mortality in any patient. Mortality was one patient (2%) in the postoperative period, and the patient died due to heart failure on the 16th postoperative day. Relaparotomy was performed on the 1st postoperative day in one patient due to hemorrhagic diathesis, in 1 patient on the 3rd postoperative day due to anastomotic leakage, and a subcutaneous infection developed in 3 patients. The total morbidity was found to be 10%.

**Table 5. Control findings**

| Finding | N(Count) | % |
|---|---|---|
| Epigastric pain | 1 | 2 |
| Sour, burning | 7 | 14 |
| Vomiting | 3 | 6 |
| Reflux gastritis | 2 | 4 |
| Dumping | 4 | 8 |
| Bloating | 2 | 4 |
| Diarrhea | 1 | 2 |
| Incisional hernia | 2 | 4 |

**Table 6. Results by Visick classification**

| | N(Count) | % |
|---|---|---|
| Visick -I | 36 | 70 |
| Visick - II | 14 | 28 |
| Visick -III | 1 | 2 |
| Visick - IV | 0 | 0 |
| Total | 51 | 100 |

Patients were followed for 2-10 years(Mean: 5.7 years). The findings detected during the controls are shown in Table 5. In control, endoscopic examinations performed on these patients, acute gastritis was detected in only 2 patients, and the other patients were evaluated as normal.

## 4. Discussion

The primary reason for developing and using surgical interventions for peptic ulcer has been to healing the ulcer and prevent ulcer recurrence. The use of large gastrectomy in the first half of the century was considered too dangerous, and many patients were treated with simple gastrojejunostomy. In long-term follow-ups, it lost popularity due to the high rate (30-50%) of ulcer recurrence. Instead, reconstruction of subtotal gastrectomy with gastroduodenostomy (Billroth I) and gastrojejunostomy (Billroth II) came[4]. Surgical treatment aims to cure ulcer disease without allowing postoperative side effects and to eliminate the problems of ulcer and its complications. With the development of H2 receptor blockers, proton pump inhibitors and the treatment of Helicobacter pylori infection in recent years, elective surgery has moved away from being the primary treatment method for peptic ulcer. Forty-one(82%) patients in our study group consisted of patients with complications. Most of the patients had epigastric pain, heartburn, burning, nausea, vomiting, and weight loss complaints. In particular, complaints such as nausea, vomiting and weight loss are common findings among patients with pyloric stenosis. Smoking, which is known to be an effective factor in ulcer formation and delay in treatment, was found in 36 patients(70%)[5].

Today, optimal treatment of peptic ulcer disease requires a good knowledge of various operative approaches. Choosing the best surgery for patients with specific ulcer complications requires experience. With the development of medical treatment, surgical treatment has been largely limited to life-saving interventions[1,2]. In this study, Billroth I type gastroduodenostomy was performed with low morbidity, mortality and postoperative complications in patients who were indicated for surgical treatment due to peptic ulcer and its complications.

Stomach-duodenal radiography and endoscopic examination were used for diagnosis in patients in our study group. In stomach-duodenum imaging, especially in patients diagnosed with pyloric stenosis, Findings such as gastric dilatation, increased gastric secretion, and barium residue were encountered. In a study conducted by Thompson et al. in 1981, they showed that the two findings mentioned above are sufficient for the diagnosis[6,7]. The important role of endoscopic examination and multiple biopsies in determining the surgical technique should not be overlooked, especially in patients with suspected malignancy. Stabile states that nasogastric decompression is very important in terms of gaining tone of the stomach, resolution of edema and operational safety and that it should be applied for at least 72 hours[2]. Nasogastric decompression was applied for 3-7 days in patients in our study group.

In a study conducted by Boey et al. in 1987, it was pointed out that in 2/3 of the patients who underwent rafia and omentoplasty due to ulcus perforation, the presence of ulcer persists and relapses after primary treatment. Then definitive intervention is required[8,9]. In our study group, 9(17%) of the patients who underwent elective surgical treatment were individuals who had previously undergone emergency surgery for ulcus perforation but did not show clinical and laboratory improvement. These findings suggest the necessity of definitive surgery during the emergency intervention in appropriate cases. Boey et al. recommend methods such as proximal gastric vagotomy, in which the gastrointestinal tract is not opened, in these patients[10].

There are alternatives, such as gastroduodenostomy and gastrojejunostomy, for the continuity of the passage in patients with gastric resection indications. Becker et al. state that the use of gastroduodenostomy provides a physiological passage, which is a distinct advantage over gastrojejunostomy. Again, in this study, it was revealed that there was no significant difference in terms of ulcer recurrence in patients who underwent these two anastomosis techniques [4]. In a study conducted by Lukasiewicz et al. in 1994 to determine the effect of partial gastric resection on gastric emptying, it was found that gastric emptying was not affected in patients who underwent Billroth I type gastroduodenostomy. There was a delay in gastric emptying in patients who underwent Billroth II and Roux en Y[11].
In a study conducted by Sowa et al. in 1993 on the development of cancer in patients who underwent gastrectomy, it was shown that 6 of 7 patients with carcinoma developed Billroth II, 1 of them Billroth I, and 4 of these patients developed carcinoma in the anastomotic line [12]. No carcinoma development was detected in the examination of patients in our study group.

The incidence of alkaline reflux gastritis after gastric surgery is 5-15%. Epigastric pain, burning, nausea, bilious vomiting, and reflux gastritis develop when the pylorus is resected, disabled, or destroyed. The biliary bowel contents need to come into contact with the gastric mucosa to develop this event [13]. In a study conducted by Delcore et al. in 1991, it was revealed that the operation with the highest risk

of developing this picture was Billroth II type gastrojejunostomy, and the incidence was lower in Billroth I[14]. In the examinations of the patients in our study group, the development of alkaline reflux gastritis was observed in 2 patients(4%).

Dumping syndrome is one of the most common postgastrectomy syndromes. Hyperosmolar is characterized by the appearance of gastrointestinal and vasomotor symptoms after intake of carbohydrate-rich food[15]. Symptoms include a feeling of fullness, cramping abdominal pain, nausea, vomiting and severe diarrhea, sweating, restlessness, head and facial flushing, and palpitations. The incidence of dumping syndrome is high after surgeries that cause rapid gastric emptying. Billroth II gastrojejunostomy may cause rapid emptying due to bypassing both pyloric and duodenal control mechanisms, and the incidence of dumping may increase up to 50% in the early postoperative period. The incidence of dumping is lower in Billroth I gastroduodenostomy and pyloroplasty[16]. Findings of dumping syndrome were observed in 4 patients (8%) in our study group.

Complications such as stumpf leak, afferent loop syndrome, efferent loop syndrome, mesocolic herniation, and jejunogastric invagination may be encountered in patients who underwent Billroth II type gastrojejunostomy, albeit at a low rate[17]. There is no risk of developing these complications in Billroth I-type gastroduodenostomy.

It has been reported that the addition of truncal vagotomy reduces ulcer recurrence in patients who underwent gastroduodenostomy[6,10]. Patients in our study group underwent high resection without vagotomy, and no recurrence of ulcers was observed clinically and endoscopically in control examinations. Relaparotomy was performed in 1 patient(2%) due to anastomotic leakage and in 1 patient(2%) due to hemorrhagic diathesis in the postoperative period, which was found to be compatible with the literature[16].

In a study conducted by Emas et al. in Sweden, good and very good results were obtained in 71% of patients in the evaluation of patients who underwent partial gastrectomy and gastroduodenostomy for peptic ulcer according to Visick criteria [18]. In evaluating the patients in our study group according to Visick criteria, very good results were obtained in 36 patients (70%) and good results in 14 patients(28%).

Today, laparoscopic-assisted distal gastrectomy(LADG) has become the preferred approach for distal gastrectomy. In a meta-analysis conducted by Kim et al. in 2019, Billroth I was considered the best option in terms of postoperative complications and operation time, while Roux-en-Y was evaluated as the most effective anastomosis to reduce the incidence of bile reflux, gastritis and reflux esophagitis[19].

Billroth I reconstruction is usually performed after traditional open distal gastrectomy, or Laparoscopic assisted distal gastrectomy (LADG) in Korea and Japan. Advances in surgical staplers have simplified resection and anastomosis in Billroth I reconstruction after distal gastrectomy, resulting in shorter operative times[20].

In a study conducted by Ganesh et al. in 2012, the obvious advantages of Billroth I type anastomosis include a simplified anastomosis, shorter surgical time, and more physiological restoration of continuity, faster and smoother postoperative recovery in most patients. Although it was stated that the Billroth II anastomosis was more advantageous and less complicated, they stated that the incidence of bile reflux and gallstone formation was also lower. Dumping incidence was lower than the Billroth II type of reconstruction[21].

In a study that included 809 patients who underwent distal gastrectomy for gastric cancer for four years and aimed to analyze postoperative complications, Sah et al. preferred Billroth I type gastroduodenostomy, the postoperative complication rate was within an acceptable range, there was an uneventful recovery in most of their patients, and the postoperative mortality was higher than previously reported data. They stated that they prefer the Billroth I anastomosis method to the Billroth II method and that they rarely use the Roux-en-Y method after distal gastrectomy. They stated that the Billroth II anastomosis method is associated with a higher rate of early postoperative complications. Therefore, they concluded that the Billroth I method should be the first choice after distal gastrectomy as long as the patient's anatomical and oncological environment allows[22].

## 5. Conclusion

Along with the important developments in the etiology, physiopathology, diagnosis and treatment of peptic ulcer disease, many methods have started to be applied to treat peptic ulcer disease and its complications. Advances in medical treatment, in particular, have limited the need for surgical treatment. In surgical treatment, the goal was to reach a method that would provide the least mortality, morbidity, ulcer recurrence and postoperative side effects, with many procedures applied for this purpose. Billroth I type gastroduodenostomy is also one of the most frequently performed procedures.

In this study, considering these developments in the diagnosis and treatment of peptic ulcer, we concluded that Billroth I type gastroduodenostomy is a good alternative in patients with complications and surgical indications because the passage is physiological, the postoperative complications are few than other methods, and the long-term results are satisfactory.

## Previous Presentation

This study was presented as an oral presentation at the 3rd International "Baskent" Physical, Social and Health Sciences Congress on 4-5 December 2021.

## References

[1] Harvey V Fineberg, and Laurie A Pearlman, "Surgical Treatment of Peptic Ulcer in the United States: Trends before and after the Introduction of Cimetidine," *Lancet*, vol. 317, no. 8233, pp. 1305-1307, 1981. [CrossRef] [Google Scholar] [Publisher Link]

[2] Stabile BE, and Passor E, "Duodenal Ulcer: A Disease in Evaluation" *Curr.Surg*, vol. 114, pp. 1153-1156, 1979.

[3] A. Hedley Visick, "A Study of the Failures after Gastrectomy," *Annals of the Royal College of Surgeons of England*, vol. 3, no. 5, pp. 266-284, 1948. [Google Scholar] [Publisher Link]

[4] Paul H. Jordan, "Surgery for Peptic Ulcer Disease," *Current Problems in Surgery*, vol. 28, no. 4, pp. 265-330, 1991. [CrossRef] [Google Scholar] [Publisher Link]

[5] Becker HD, and Peiper HJ, "Ulcus ventriculi, Chirurgish Symposion Gottingen" Herousgegeben, George Thiere Verlag Stuttgart, pp. 69- 71, 1977.

[6] Stephen Sontag et al., "Cimetidine, Cigarette Smoking, and Recurrence of Duodenal Ulcer," *The New England Journal of Medicine*, vol. 311, pp. 689-93, 1984. [CrossRef] [Google Scholar] [Publisher Link]

[7] V. M. Thompson et al., "Radiologic Investigation of Peptic Ulcer Disease," *Radiologic Clinics of North America*, vol. 20, no. 4, pp. 701-720, 1982. [Google Scholar] [Publisher Link]

[8] Mark Feldman, *Gastrointestinal Disease Sleisenger/Fordtran*, 4th Edition, Elsevier, pp. 659-734 and 814-897, 1989. [Google Scholar]

[9] John Boey, and John Wong, "Perforated Duodenal Ulcers," *World Journal of Surgery*, vol. 11, no. 3, pp. 319–324, 1987. [Google Scholar] [Publisher Link]

[10] Wangensteen SL, Wray RC, and Golden GT, "Perforated duodenal ulcer" *Am J Surg*, vol. 123, no. 5, pp. 538-542, 1972.

[11] S. Lukasiewicz, and K. Jonderko, "Partial Gastric Resection for Peptic Ulcer--Comparison of the Effect of Variant Reconstructive Procedures on Gastric Emptying, Gastric Acid Secretion and Gastrin Release in the Early Postoperative Period ii. Billroth-i Gastroduodenostomy and Comparison Versus Gastroenteroanastomotic Procedures," *East African Medical Journal*, vol. 71, no. 7, pp. 414-420, 1994. [Google Scholar] [Publisher Link]

[12] M. Sowa et al., "Early Cancer of the Gastric Remnant with Special Reference to the Importance of Follow-up of Gastrectomized Patients," *European Journal of Surgical Oncology: the Journal of the European Society of Surgical Oncology and the British Association of Surgical Oncology*, vol. 19, no. 1, pp. 43-49, 1993. [Google Scholar] [Publisher Link]

[13] Wallace P. Ritchie, "Alkaline Reflux Gastritis: An Objective Assessment of Its Diagnosis and Treatment," *Annals of Surgery*, vol. 192, no. 3, pp. 288-298, 1980. [Google Scholar] [Publisher Link]

[14] Romano Delcore, and Lawrence Y. Cheung, "Surgical Options in Postgastrectomy Syndromes," *Surgical Clinics of North America*, vol. 71, no. 1, pp. 57-75, 1991. [CrossRef] [Google Scholar] [Publisher Link]

[15] Schwartz I. Seymour et al., *Maingot's Abdominal Operations*, Appleton & Lange, 9th Edition, pp. 599-678 and 701-770, 1990. [Google Scholar] [Publisher Link]

[16] M M Eisenberg et al., "Vagotomy and Drainage Procedure for Duodenal Ulcer: The Results of Ten Years' Experience," *Annals of Surgery*, vol. 170, no. 3, pp. 317-328, 1969. [CrossRef] [Google Scholar] [Publisher Link]

[17] John A. Heerden, "Stomach Surgery," *Scientific and Technical Publications Translation Foundation*, Istanbul, p.76, 1994.

[18] Sverre Emås, Gorgi Grupcev, and Bo Eriksson, "Ten-year Follow-Up of A Prospective, Randomized Trial of Selective Proximal Vagotomy with Ulcer Excision and Partial Gastrectomy with Gastroduodenostomy for Treating Corporeal Gastric Ulcer," *American Journal of Surgery*, vol. 167, no. 6, pp. 596-600, 1994. [CrossRef] [Google Scholar] [Publisher Link]

[19] Min Seo Kim et al., "Revisiting Laparoscopic Reconstruction for Billroth 1 versus Billroth 2 Versus Roux-en-Y after Distal Gastrectomy: A Systematic Review and Meta-Analysis in the Modern Era," *World Journal of Surgery*, vol. 53, pp. 1581-1593, 2019. [CrossRef] [Google Scholar] [Publisher Link]

[20] Kyu-Chul Kang et al., "Comparison of Billroth I and Billroth II Reconstructions after Laparoscopy-Assisted Distal Gastrectomy: A Retrospective Analysis of Large-Scale Multicenter Results from Korea," *Surgical Endoscopy*, vol. 25, no. 6, pp. 1953-1961, 2011. [CrossRef] [Google Scholar] [Publisher Link]

[21] M.S. Ganesh, K.G. Reddy, and D.S. Venkata Subbareddy, "The Feasibility and Advantages of Billroth-I Reconstruction in Distal Gastric Cancers Following Resection," *Indian Journal of Cancer*, vol. 49, no. 2, pp. 251-253, 2012. [CrossRef] [Google Scholar] [Publisher Link]

[22] Birendra K Sah et al., "Gastric cancer surgery," *BMC Cancer*, vol. 9, no. 1, pp. 1-8, 2009.