CURRENT INDICATIONS OF GASTRIC RESECTION AND ROUX-Y LOOP RECONSTRUCTION

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Keywords: *gastric resection, gastrectomy, Roux-Y loop, current indications*

Abstract: *Gastric resection is one of the first surgical procedures performed in the surgery's modern era. Names like Pean, Billroth, Finsterer, Reychel, Polya and Roux still remain milestones on the evolutionary road of the gastric surgery. Gastric cancer is nowadays the major indication for gastrectomy but there still is a significant amount of diseases of the upper gastrointestinal tract, where the gastric resection plays an important role. The gastrectomy followed by Roux-Y loop reconstruction is the choice procedure for many of these diseases. The present article establishes the current indications of the procedure emphasizing its advantages compared to other reconstructive techniques.*

Cuvinte cheie: *rezecţie gastrică, gastrectomie, ansa Y a la Roux, indicaţii actuale*

Rezumat: *Rezecţia gastrică este una dintre primele intervenţii chirurgicale efectuate în perioada modernă a chirurgiei. Nume precum Pean, Billroth, Finsterer, Reychel, Polya şi Roux rămân în continuare pietre de hotar pe drumul evoluţiei chirurgiei gastrice. Neoplasmul gastric este în prezent indicaţia majoră de gastrectomie însă există un număr semnificativ de alte afecţiuni ale etajului eso-gastro-duodenal unde rezecţia gastrică joacă un rol important. Procedeul de gastrectomie şi reconstrucţie pe ansă în Y a la Roux este de elecţie în multe din aceste afecţiuni. Prezentul articol stabileşte indicaţiile actuale ale acestui procedeu subliniind avantajele sale comparativ cu alte tehnici chirurgicale de reconstrucţie.*

Gastric resection is a surgical procedure which is dated over 130 years ago, its indications, surgical technique and reconstruction method being constantly modified with the passing of time. After the introduction of the antisecretory drugs (antihistamines and later, proton pump inhibitors) the indications of gastric resection in the treatment of peptic ulcer have been dramatically reduced, so nowadays gastric carcinoma is the main indication for gastrectomy. However, there still are some other diseases of the upper gastrointestinal tract with a lower incidence but with equally clinical importance in which gastrectomy is indicated as the primary procedure or as an alternative treatment after the recurrences following other techniques. The Roux-Y loop anastomosis has not always been the choice procedure after a gastrectomy but today, multiple studies confirm its advantages.

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1. Carcinoma of the stomach and esogastric junction. The carcinoma of the stomach and esogastric junction is currently the main indication for gastrectomy. Gastric resection is the only possibility of curative treatment and therefore, the standard treatment for all potentially resectable gastric carcinomas. The only exception is the early gastric cancer (T1aN0M0) where the endoscopic R0 resection is possible. The purpose of a curative resection is the complete removal of the tumour with free resection margins along with its corresponding lymph nodes. Tumour-free resection margins are generally obtained by keeping an in-situ distance of 5 cm from the tumour (for the intestinal type in Lauren's classification) or of 8 cm (for the diffuse type in Lauren's classification).(1) These limits are based on the studies published by Hermanek et al in the 80's and 90's.(2,3) In order to provide these margins, the carcinoma of the proximal and middle third of the stomach usually requires a total gastrectomy. The cases of the carcinoma of the esogastric junction, types II and III according to Siewert's classifications, require an additional resection of the distal esophagus. For the tumours located in the distal third, the margins described by Hermanek can be obtained for the intestinal type carcinoma by performing a subtotal gastrectomy.(3)

Nowadays, there is no unanimously accepted standard reconstructive procedure following the total or subtotal gastrectomy. The reconstructive technique can be chosen according to the surgeon's experience. Globally, the anastomosis using the Roux-Y loop is the most used technique in re-establishing the digestive transit after a gastrectomy. According to the published data, the use of a gastric pouch is associated with a higher quality of life and postoperative bodyweight.(4) Other reconstruction possibilities include the preservation of the duodenal passage and the interposition of a jejunal loop.

2. Gastro-esophageal reflux disease (GERD). The Roux-Y gastric resection in the treatment of the reflux esophagitis was first performed by Holt and Large.(5) The authors treated a series of 10 patients with severe reflux esophagitis, most of them having a history of eso-gastric surgical procedures like cardioplasty, cardiomyotomy or gastric resection with Pean or Billroth II anastomosis. The most of the cases were treated by using a subtotal gastrectomy followed by a Roux-Y gastrojejunostomy with excellent postoperative results. A few years later, Herrington et al published a series of 6 patients with GERD for whom the standard antireflux procedures failed to control the acid and biliary reflux, patients who had severe symptoms caused by the reflux esophagitis. In these cases, Herrington performed an antrectomy, a bilateral troncular

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Article received on 25.05.2012 and accepted for publication on 20.07.2012
ACTA MEDICA TRANSILVANICA September 2012;2(3):253-255

vagotomy and a gastrojejunostomy using a 40-50 cm long Roux-Y loop. The author named this procedure total duodenal diversion.(6)

Nowadays, GERD is the most frequent benign disease of the upper gastrointestinal tract in the western countries and its incidence is continuously rising. The cause of this disease is the reflux of the gastric content in the distal esophagus. The natural evolution of the reflux disease with intestinal metaplasia in the distal esophagus (known as Barrett's esophagus) and later the development of an adenocarcinoma in this area are well known. The Barrett esophagus is the most important risk factor for the adenocarcinoma of the distal esophagus and therefore, it is considered a precancerous condition. Compared to the normal population, the risk for developing adenocarcinoma for the patients with Barrett esophagus is, depending on the length of the esophageal segment with metaplasia, 40-200 times higher.(7,8) According to the epidemiological data, it is considered that approximately 10% of the patients with GERD develop a Barrett esophagus. 10% of the patients with Barrett esophagus develop areas of dysplasia and later adenocarcinoma. Hence, there is a certain cause-effect relation between GERD and adenocarcinoma of the distal esophagus.(9)

The surgery in GERD is reserved for the patients who show a poor response to the conservative treatment with proton pump inhibitors and prokinetics. The antireflux procedures address the dysfunction underlying this disease. The first line of treatment consists in the fundoplication techniques that restore the function of the cardia by using a valve around the lower esophageal sphincter (Nissen, Toupet, Dor, Belsey, Lind et al.). The 2/3 gastric resection associated with vagotomy and Roux-Y loop gastrojejunostomy has the best long-term results in controlling the acid and biliary reflux in the distal esophagus. However, due to the fact that it is a far more invasive procedure as compared to the fundoplication, it is not indicated as the primary choice procedure in GERD.

The gastric resection followed by a Roux-Y loop anastomosis is indicated in GERD, in the recurrences after fundoplication, when a revision of the last procedure is not possible or is considered too risky. Another indication of the Roux-Y gastrectomy is the reflux esophagitis after a previous gastrectomy. This disease, which is part of the postgastrectomy syndromes, is more severe after the Billroth II reconstruction compared to the Billroth I, according to the indirect studies through manometry and pH-metry. In the cases with severe symptomatology with no or poor response to the treatment with proton pump inhibitors and biliary acids chelating resins, a degastro-gastrectomy and Roux-Y loop anastomosis is indicated.

3. Peptic ulcer. Due to the efficiency of the treatment with proton pump inhibitors and the eradication therapy for Helicobacter pylori, the current indications of elective surgery for peptic ulcer have been drastically reduced after the 90's.(10)

Nowadays, the elective surgical procedures for gastric ulcer are only performed in a reduced percentage in the patients with negative Helicobacter pylori, which despite the treatment with high-dose proton pump inhibitors or due to the lack of compliance to the therapy, an ulcer healing cannot be obtained. In the presence of a presumed malignancy or in the cases with sever symptomatology and multiple recurrences and also in the cases with imminent complications (perforation, haemorrhage, stenosis), the elective surgical treatment is also indicated. In the case of the duodenal ulcer (which is associated in 90-95% with positive Helicobacter pylori), the indications for elective surgery are limited to the cases with frequent recurrences and severe symptomatology with no response to the eradication therapy for Helicobacter.(11)

Regarding the reconstruction technique after gastrectomy, the possibilities include the Pean-Billroth I gastroduodenostomy, the Billroth II gastrojejunostomy and the Roux-Y loop gastrojejunostomy. The postoperative mortality after the procedures is similar according to the published data and it is below 1% .(12) The Roux-Y anastomosis is also similar to the Billroth I and Billroth II in regards to the morbidity rates and the operative risk.(12)

According to older studies, the recurrence of the peptic ulcer in these cases is reported between 8 and 15% (Kennedy 1978, (13) Menguy 1980, (14) Nielsen 1974. (15) More recent data obtained through prospective randomized studies shows that in terms of ulcer recurrence for the Johnson I gastric ulcer, the results are significantly better without differences between Billroth I and Roux-Y.(16,17,18) A recent prospective randomized study shows the long-term results after gastrectomy and vagotomy for duodenal ulcer, comparing the Billroth II and the Roux-Y reconstruction (Csendes et al. 2009.(19) The authors showed no difference in terms of mortality and morbidity after the two procedures but the long-term surveillance showed the advantages of the Roux-Y gastrojejunostomy. This reconstruction technique after gastrectomy was associated with significantly lower symptomatology, higher quality of life and a smaller number of pathological findings in the endoscopy. Based on this study, we can state that the Roux-Y anastomosis is the choice procedure after the gastric resection for duodenal ulcer. Other prospective studies in these regard are not available and the retrospective studies show similar results – lower incidence of reflux esophagitis and superior quality of life after the Roux-Y anastomosis (Namikawa et al. 2010).(20)

4. Duodenal injuries are a real challenge for the surgeon in terms of diagnostic and treatment and the lack of adequate therapy can often lead to disastrous results. The total amount of fluids which flows daily through the duodenum exceeds 6 litres, so a leakage at this level can cause severe hydroelectrolytic imbalances. The release of a high quantity of activated pancreatic enzymes in the retroperitoneal space and in the peritoneal cavity is potentially lethal. The preoperative diagnosis in isolated blunt duodenal injuries can be very difficult and even today there is no treatment method that can completely eliminate the risk of fistula on the duodenal suture lines. Severe blunt traumatic injuries of the duodenum are often diagnosed as an abdominal sepsis through the Winiwarter syndrome caused by the insidious appearance of the biliary retroperitoneal collection associated with emphysema. The treatment of the duodenal injuries is still very controversial. There is no consensus regarding the optimal treatment. The percentage of the patients treated with simple primary suture, suture over a decompression tube or pyloric exclusion varies between different services.

Flint has observed that the duodenal leakage has not occurred when the primary suture was performed for injuries that involved less than 20% of the duodenal circumference.(21) For the patients with third degree duodenal rupture, the rate of fistula appearance was over 40% for the cases treated with primary suture while the introduction of the pyloric exclusion reduced this rate to less than 15%. The bypass procedure using a Roux-Y jejunal loop is a major indication in the severe duodenal trauma when often a limited gastric resection is required in order to obtain viable margins and the deviation of the digestive transit from the duodenum drastically reduces the incidence of the leakage along the suture lines.

5. Morbid obesity. The gastric resection and the reconstruction with a Roux-Y loop is one of the first techniques used in the treatment of morbid obesity. Scopinaro et al published in 1979 the first experience with this procedure in the treatment of obesity, procedure named by the author biliopancreatic

diversion.(22) Scopinaro performed a distal gastrectomy leaving a gastric remnant of approximately 200-300 ml, which was than anastomosed with a Roux-Y loop, the distal anastomosis of the Roux loop being 50 cm proximal to the ileocecal valve. Through this bypass, the mixing of the aliments with the digestive enzymes occurred only 50 cm proximal to the cecum, which causes a certain degree of malabsorption. In order to reduce the complications and the digestive and metabolic side effects, many modifications to this procedure were proposed. The most known modification of the technique was the one developed by Larrad who used a much shorter biliodigestive limb, of only 50 cm, procedure also known as 50-50-BPD.(23) In the era of minimally invasive surgery, many surgeons avoid the distal gastrectomy (antrectomy) in order to reduce the complications related to the duodenal stump. The biliopancreatic diversion is one of the most efficient procedures of bariatric surgery and it is largely used worldwide in the treatment of morbid obesity, a disease with an ever growing incidence.

Conclusions:

Gastric resection is currently indicated for the gastric carcinoma and the carcinoma of the eso-gastric junction, for the peptic ulcer in the selected case, for the recurrence of the gastro-esophageal reflux disease after fundoplication, for the severe duodenal injuries and for the treatment of morbid obesity. The reconstruction using the Roux-Y loop anastomosis is a logical choice after gastrectomy, considering the lower postoperative complications and the superior quality of life.

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