

## RESULTS FROM THE APPLICATION OF EXTRAMUCOUS VALVULAR PYLOROPLASTY

D. Radev

*Department of Surgery, Medical University of Varna*

### ABSTRACT

A method for pyloroplasty with complete reconstruction of the pyloric area was presented. The task was solved by pneumatic preparation and ring-shaped removal of pylorus musculature within a zone of 3,0-3,5 cm. The integrity of the underlying mucous muf was preserved and the latter was invaginated into the lumen. Thus a circular mucous-submucous valve in the region of the gastroduodenal ligament was formed. Due to the preserved anatomical integrity, innervation and blood supply of this mucous-submucous layer after its pleating created a zone wide like a normal pylorus between the stomach and duodenum. The method had been preliminarily tested in dogs and then clinically applied in 28 peptic ulcer patients. The duration of the postoperative following-up was between 6 months and 10 years. The results from the operation were good. This technique could successfully be applied in gastric surgery for preventing the dumping syndrome and reflux gastritis when pyloroplasty is required.

**Key words:** pyloroplasty, duodenogastric reflux, reflux gastritis, peptic ulcer disease, dumping syndrome, prevention

### INTRODUCTION

Until the recent decade, vagotomies commonly used for the treatment of pyloric and duodenal ulcer have often been combined with pyloroplasty (2). The frequency of elective surgical operations for peptic ulcer has decreased in the last years as a result of the therapeutic efficacy of modern drugs while urgent operations have increased (8,15). Pyloroplasty is usually performed in gastric and esophageal surgery as well (5,12,16).

Reflux gastritis is caused by the excessive reflux of alkaline duodenal content into the stomach and can lead to intractable symptoms. The main cause of pathologic duodenogastric reflux is previous gastric surgery in which the pylorus is removed or rendered dysfunctional (9). This reflux remains very difficult to diagnose and treat. Dumping syndrome and reflux gastritis after pyloroplasty is an insufficiently solved problem yet despite the presence of more than 60 pyloroplastic techniques performed on the occasion of various diseases (10,16).

The purpose of the present communication is to describe the operative technique of the extramucous valvular pyloroplasty and its advantages as revealed by our own results.

### MATERIAL AND METHODS

Twelve years ago we suggested an operative method of pyloroplasty that aimed at creating a valvular mechanism at the site of the destructed pylorus and thus preventing both the dumping syndrome and reflux gastritis. This method was subsequently patented in Bulgaria (1).

A performance of the suggested technique for pyloroplasty is illustrated on Fig. 1 (a, b, and c).

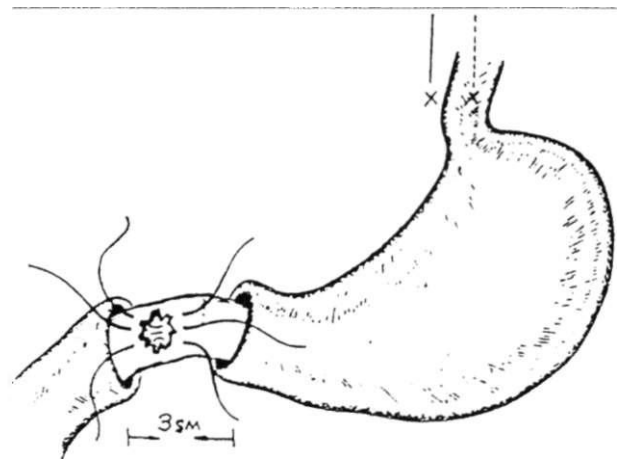


Fig. 1. Operative method for valvular pyloroplasty  
a – truncal vagotomy, preparing the muscular flap and revealing the ulcerative defect

### Address for correspondence:

D. Radev, Dept. of Surgery, Medical University of Varna,  
55 Marin Drinov St, BG-9002 Varna,  
BULGARIA

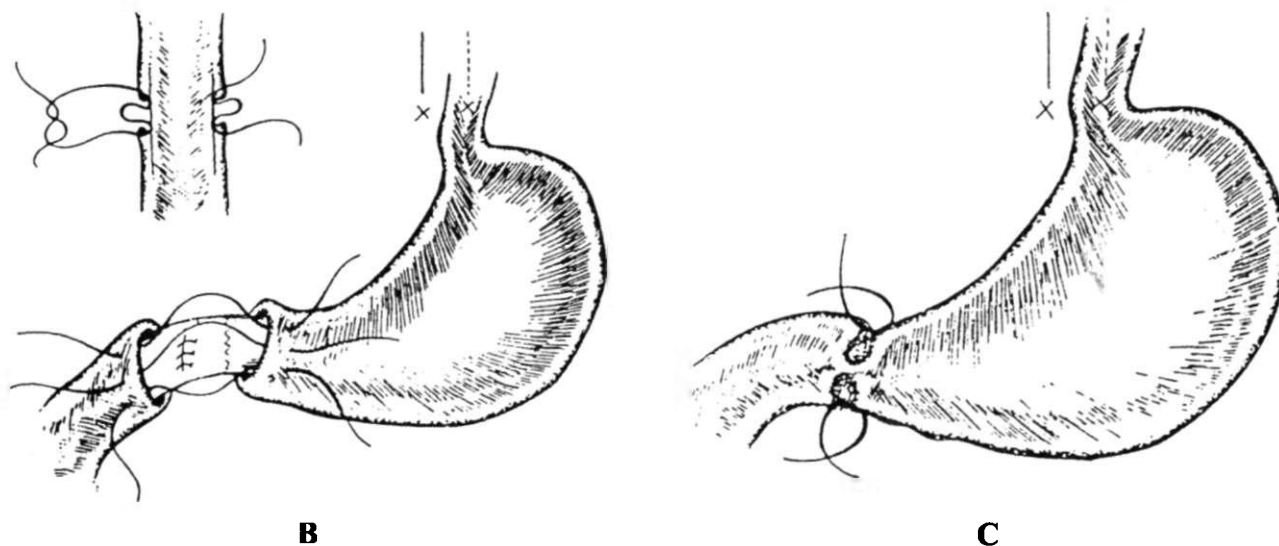


Fig. 1. Operative method for valvular pyloroplasty. b – restoring the mucosal defect and suturing; c – final appearance of pyloroplasty

After finishing the eventual vagotomy, a scaffolding of the small and large curvature in the pyloric part only is done so that the posterior duodenal wall becomes free 2 cm below the pylorus. Preliminarily, air insufflation under pressure using 20 ml-syringe at incision lines between the muscular and submucous layers enabling the pneumatic preparation. Circular cuts using sharp scalpel are done to the submucous layer at 2 cm below and 1 cm over the pylorus. Transversal myotomies are not strictly perpendicular to the longitudinal axis but at acute angle open towards the stomach like the normal pyloric direction.

The ring-shaped muscular flap including the pylorus is prepared by a sharp and blunt manner taking care to preserve the intactness of the mucosa. When the ulcer remains within the muscular flap then the surrounding sclerosing issues are cut away and the true ulcerous defect of the mucosa is uncovered.

The defect is closed into a transversal direction using thin traumatic catgut (Fig. 1-a). Then sero-muscular stitches are applied on the anterior and posterior surfaces of the stomach and duodenum which binding brings nearer and adapts the muscle edges (Fig. 1-b). By this way the mucosa is invaginated into the lumen as a transverse mucous-submucous fold (Fig. 1-c).

Initially, the operative method was applied in chronic experiments on dogs. Electrophysiological and histological examinations were performed and the method was introduced in clinical practice in 1998. Electrodes on the stomach, duodenum, and jejunum were operatively implanted to mongrel dogs under general anaesthesia. The patterns of electromyoelectrical activity of the organs were controlled for one-year period after valvular pyloroplasty and truncal vagotomy. The motor activity of the stomach and intestine as assessed according to the electrical activity lead out from these organs.

## RESULTS AND DISCUSSION

Until 1991, a total of 28 male patients with duodenal ulcer aged between 18 and 55 years (mean age of 36,8 years) were operated on. Because of perforated duodenal ulcer emergency truncal vagotomies were done in 16 patients. The rest patients were operated according to plan by means of truncal vagotomy in 10 cases but selective proximal vagotomy in two. Until the third month after operation, there was a dissociation of spike activity between canine stomach and duodenum arguing a disturbed coordination. The latter restored, however, during the fourth month. Two dogs were autopsied one year after operation. No macroscopic alterations in both stomach and duodenum could be established (Fig. 2).

The newly-created valve looked like a normal pylorus. It was 6 mm thick and 11 mm high and protruded into the lumen. The histological structure of gastric and duodenal mucosae covering the fold was preserved. The submucous layer was doubled, richly vascularized, and the muscular layers were continuous.

There was no postoperative lethality at all. All the patients were clinically, roentgenologically, and endoscopically followed-up for 6 months up to 10 years (at an average of 7,4 years) after operation. There were three lethal cases during the catamnestic observation: two patients died from myocardial infarction and one - after car accident. No ulcerative relapses could be detected. The postoperative results were very good (Visick: I-II) in 23 patients (82,14 per cent of the cases) six years after operation.

The roentgenological image of the valvular pyloroplasty was characterized by slightly prolonged distance between antrum and bulbus duodeni and well-outlined pyloric canal beginning with sharp arc-like contours of both curvatures in the prepyloric area (Fig. 3).



Fig. 2. Canine gastric and duodenal mucosae one year after operation. Preserved appearance of the mucous fold; 1 – stomach; 2 – duodenum

This roentgenological structure in the pyloroplastic region remained constant even two years after operation. There were no x-ray signs of gastric stasis and dilatation in any patients. It was noteworthy that prior to operation, two patients presented with subcompensated gastric dilatation because of ulcerative pyloric stenosis. There were, however, no symptoms of stenosis one year after operation. Duodenal dyskinesia with antiperistalsis was roentgenologically proved in seven patients. It should be mentioned that, preoperatively, four of them complained of duodenal dyskinesia and severe duodenogastric reflux as well. Postoperatively, the duodenal dyskinesia persisted to the same extent while the duodenogastric reflux was hardly detected in one patient only.

Since 1996, we rely more and more on the ultrasonoscopic examination for the catamnestic following-up. The world clinical practice convincingly proves its role when alterations in the pyloroplastic area and motility disorders in the antral, pyloric, and duodenal regions are concerned (3,6,14).

The unavoidable elimination of the natural pyloric “play” and disturbed coordination of antropyloroduodenal motility is a well-known disadvantage of all the pyloroplastics (13). Recently used pyloroplastic techniques ensure a reliable gastric drainage by means of cutting the pylorus sphincter. Unfortunately, the creation of a wide common orifice between the stomach and duodenum predisposes to rapid emptying accompanied by dumping syndrome as well as to the appearance of duodenogastric reflux and reflux gastritis (4,11). The altered integrity of the mucosa and the opportunity for infectious contamination represent another disadvantage of the pyloroplasty. Thus the extramucous pyloroplasty in the form of anterior hemipylorotomy has been introduced to avoid the danger of infection (7,16).

These techniques are characterized, however, by lack of pylorus closing capacity and weaker antropyloric antireflux barrier.



Fig. 3. Typical x-ray image of valvular pyloroplasty

The ring-shaped removal of the pyloric area preserving the mucous muff is technically possible due to the anatomic existence of a free intraperitoneal part of the proximal duodenum and the tunnel structure of the digestive tract. The application of pneumatic dissection for separating the muscular from the submucous layer and especially in the duodenal region is of importance for the technical performance, too. The experimental studies prove the physiological nature of this operation. The provisorily destroyed antroduodenal coordination has been restored within 4 months. These initial coordination disturbances could probably be explained with the absent inhibitory influence upon the intramural nervous system of the duodenum after the cessation of plexus myentericus. On the other hand, the restored continuity in the conduction of the myoelectrical complex from the stomach towards the duodenum after the fourth month could possibly be due to the fact that the integrity of plexus submucosus remains intact with this kind of pyloroplasty. The clinical observations demonstrate that there is no danger of stenotic phenomena and gastric stasis at all.

The advantages of this method consist in the circumstance that the operatively created mucous-submucous valve functions as a neopylorus and ensures portion-shaped gastric emptying and impedes from an eventually emerged reflux. The preserved anatomical integrity of the mucous-submucous layer and the junction of homogenous tissues during its pleating create an operative safety of the gastroduodenal ligament and prevent the insufficiency. A complete reconstruction of the pyloric region is performed that provides an outlined perspicuity and thus avoids the deformations typical of the other pyloroplastic techniques.

Despite our relatively modest experience we feel allowed to state that this method is indicated in emergency and planned gastric surgery. The valvular pyloroplasty could successfully be applied in any cases necessitating pyloroplastic interventions. According to our own data, the technical performance of this intervention is easiest in cases with anterior wall duodenal ulcer close to the pylorus. It is particularly recommended in perforated ulcers as the time consumption is not greater than that with the rest pyloroplastic techniques. Besides this method can successfully be used with posterior ulcer penetrating to pancreatic head.

Large cicatrix lesions covering the medial part of bulbus duodeni are contraindicated.

It could be concluded that this surgical method is easy to perform, reliable, and safe. It is an appropriate problem solution for drainage gastric operations.

### REFERENCES

1. Радев, Д., Е. Атанасова, М. Лалеан, Е. Калчев, Д. Наков, Л. Карагеоргиев. Оперативен метод за пилоропластика. Патент № 90434/1989 на Република България.
2. Archimandritis, A., P. Apostolopoulos, S. Sougioultzis, I. Delladetsima, P. Davaris, M. Tzivras. *Eur. J. Gastroenterol. Hepatol.*, **12**, 2000, 93-96.
3. Berstad, A., T. Hausken, O. H. Gilya. *Scand. J. Gastroenterol.*, **31**, 1996, Suppl 220, 75-82.
4. Bonavina, L., R. Incarbone, A. Segalin, B. Chella, A. Peracchia. *Hepatogastroenterology*, **46**, 1999, 92-99.
5. Deschamps, C., V. F. Trastek, M. S. Allen, P. C. Pairolero, J. O. Johnson, D. R. Larson. *J. Thorac. Cardiovasc. Surg.*, **113**, 1997, 545-550.
6. Gilya, O. H., T. Hausken, S. Odegaard. *Scand. J. Gastroenterol.*, **31**, 1996, 847-885.
7. Holle, G. E., S. B. Reiser, K. W. Frey. *Amer. J. Physiol.*, **251**, 1986, G752-G758.
8. Hurtado-Andrade, H. *Rev. Gastroenterol. Mex.*, **63**, 1998, 187-197.
9. Klinger, P. J., G. Perdakis, P. Wilson, R. A. Hinder. *Hepatogastroenterology*, **46**, 1999, 97-102.
10. Marshall, R. E., A. Anggiansah, W. A. Owen, W. J. Owen. *Brit. J. Surg.*, **86**, 1999, 271-275.
11. Mason, R. J., T. R. De Meester. *Hepatogastroenterology*, **46**, 1999, 48-53.
12. Okuyama, H., M. Urao, G. A. Starr, R. A. Drongowski, A. G. Coran, R. B. Hirschl. *J. Pediatr. Surg.*, **32**, 1997, 316-319.
13. Schumpelick, V., G. Arlt. In: Gastro-pyloro-duodenal coordination. New York, Wrightson Biomedical Publishing Ltd, 1990, 167-181.
14. Wedman, B., R. J. Adamek, M. Wegener. *J. Ultrasound Med.*, **16**, 1995, 124-126.
15. Wysocki, A. Z. Biesiada, P. Beben, A. Budzynski. *Dig. Surg.*, **17**, 2000, 132-137.
16. Yamashita, Y., T. Hirai, H. Mukaida, A. Yoshimoto, M. Kuwahara, H. Inoue, et al. *Surg. Today*, **29**, 1999, 107-110.