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The contribution of the faculty surgery clinic named after N.N. Burdenko of I.M. Sechenov First Moscow Medical Institute in the development of organ-preserving operations with vagotomy for treatment of peptic ulcer disease

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The formation and development of organ-preserving operations with vagotomy in the second half of the 20th century in the faculty surgery clinic at the 1st Moscow Medical Institute is analyzed. The authors study the clinic when it was under the direction of academic M.I. Kuzin, during which the idea arose to reduce the negative effects of extensive resection of the stomach in patients with peptic ulcer. At first, in cases of peptic ulcer of the duodenum and later in cases of gastric ulcer, the clinic's staff consistently solved difficult issues associated with pathogenetic treatment. From organ-preserving gastrectomy combined with stem vagotomy, the clinic moved on to organ-preserving and pylorus-preserving operations: a selective proximal vagotomy – isolated and combined with duodenoplasty in cases of duodenal ulcer. From large-scale gastrectomy to stem vagotomy with drainage of gastric ulcer. Surgeons developed a new operation of "expanded proximal selective vagotomy", which allowed for adequate denervation of all parts of the acidogenic area of the stomach, and justified its use in cases of duodenal ulcer and the rejection of it in cases of stomach ulcer. The 30-year history of using different vagotomy variants led to a 10-fold reduction in mortality rates and eightfold reduction in patients becoming disabled. The staff of the P.M. Postolov Department of Surgery and Kuzin became laureates of the USSR State Prize in 1987. In order to prevent the development of reflux gastritis after stomach draining operations, the need to use the organ-sparing Roux method of stomach resection with anastomosis was substantiated. Retrospective analysis of treatment results, including the study of quality of life before and during a period from five to 25 years after surgery, provided for the formulation of an algorithm for individualized care to patients with peptic ulcer disease.

Keywords: *peptic ulcer disease, surgical treatment, organ-preserving gastrectomy, vagotomy, history of medicine*

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In October 1996, summing up the 150-year experience of the Faculty Surgery Clinic (FSC) of the Moscow Medical Academy, academician M.I. Kuzin stressed that one of the most important areas of its scientific and practical activity was stomach surgery [1]. The greatest achievement of the department's collaborators in this field of science was the development of a set of organ-saving vagotomy operations that reflected the necessity for several generations of excellent FSC surgeons and scientists to "preserve the unity of form and function." The development took place in the period from the 1970s to the 1990s.

The aspiration to reach the ideal of physiological stomach surgery was concurrent with the successes and challenges of the surgeons who worked in hospitals during World War II and the first post-war generation of doctors. In the

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years of post-war destruction they all encountered mass cases of ulcerous disease (UD). At the time the only radical method of curing UD was gastric resection.

On January 21, 1955, speaking at the 26th All-Union Congress of Surgeons, Head of the Department of Faculty Surgery at the First Moscow Medical Institute N.N. Elansky, in his report "The Physiological Foundations of Modern Surgery," stressed the non-physiology of the branch vagotomy operation, which was common among foreign countries as a method for treating UD [2].

However, in his apocryphal book on surgical gastroenterology Etudes of Stomach Surgery, S.S. Yudin writes that any gastric resection operation must always – nolens volens – be accompanied by vagotomy. To reach a state of achlorhydria in the gastric stump and cure the stomach ulcer it is necessary to concertedly cut the branches of the vagus nerve at the abdominal part of the esophagus. Yudin illustrates this concept with many drawings.

It was Yudin and his book that "brought back" from the US [3] the idea that vagotomy could be performed without gastric resection. He brought back to the USSR the Russian branch vagotomy operation originated by Nobel Laureate I.P. Pavlov. It should be noted that in the beginning of his career as a surgeon-researcher (1925–1927), Yudin worked as an assistant professor and trained in abdominal surgery in Moscow, at the First Moscow Medical Institute's Faculty Surgery Clinic on Bolshaya Pirogovskaya Street.

Yudin's authority, dedication and brilliant results heralded the era in the USSR (1960-1970s) when gastric resection was performed in both planned and emergency UD surgery. Mass gastric resections (80,000 annually) without additional branch vagotomy (according to Yudin's drawings and suggestions) caused a post-resection syndrome epidemic in the country, including recrudescence of the peptic ulcer in the gastric stump and gastrointestinal anastomosis.

According to Professor E.I. Zakharova, who worked at the Faculty Surgery Clinic at the Order of Lenin First Moscow Medical Institute in 1949–1951, primary jejunogastroplasty - the insertion of the small intestine between the gastric stump and the duodenum – should prevent any negative functional results of gastric resection. The FSC mastered this advantageous technique, actively promoted it and performed more than 100 operations in the period from the 1960s to the 1970s. Surgeons resorted to the method as a reconstructive and restorative intervention in repeated operations dealing with post-gastrectomy diseases (PGD) [4].

It became obvious that the unsatisfactory functional results of common gastric resection to treat UD (25–20% of the patients), which lead to invalidism, and the relatively high mortality rate (3–4%) [1], are natural consequences of gastric resection. Neither special types of gastrointestinal anastomosis nor a surgeon's expert technique can avert them.

These negative indicators significantly increase if the gastric resection operation is performed by surgeons who work in city and regional hospitals rather than in university surgery clinics. The removal of at least 2/3 of the stomach volume and the organism's lack of compensatory possibilities in conditions of serious disturbance of interrelations between digestive organs are the main factors of the pathogenesis of such PGD cases as gastric dumping syndrome, afferent loop syndrome and peptic ulcer of the jejunum (5).

Contrary to his teacher N.N. Elansky's opinion on vagotomy, M.I. Kuzin, who was director of the FSC in 1964, radically changed the FSC's paradigm and created a group for studying organ-saving operations in treating UD. Their work ultimately led to the abandonment of classic gastric resection for curing duodenal ulcers and then for treating certain types of stomach cancer as well. Initially the group was composed of P.M. Postolov, V.A. Fetisov, V.P. Baido, B.A. Naumov, Yu.I. Kiselev, and N.M. Kuzin.

The first step towards abandoning common resection practices was the attempt to decrease the volume of the stomach's resectioned part from 2/3 to 1/4–1/3 (before antrectomy) but to complete it with branch vagotomy (BV) or selective vagotomy (SV). Surgeons believe that the stomach can do without the first (nervous) and second (humoral) phase of gastric secretion stimulation (according to Pavlov). The FSC began performing this operation in 1968.

During this stage it was very important to evaluate the influence of various types of vagotomy combined with economical gastric resection

(EGR) on the decline of gastric acid production, the length of this influence and the possibility of restoring acid secretion in the long-term period after the operation. The work of P.M. Postolov,[1] which was the first of its kind in the FSC, studies the gastric effect of operations on duodenal ulcer patients.

The main result was the possibility of obtaining a stable, histamine-resistant achlorhydria that would be preserved for decades and would be accomplished by the elimination of vagal and gastrin phases of the stimulation of gastric juice. As Schwartz states, "no acid – no ulcer." Thus it was proven that all duodenal ulcer patients could be cured by this operation.

Postolov introduced the concept of "full" and "adequate" vagotomy in Russian literature based on Hollander's hypoglycemic secretory test. He did not find any differences between immediate and long-term effects (up to 5 years after the operation) of BV and SV on gastric secretion and the gastric stump's motility. He determined that vagotomy with EGR leads to the dilatation of the gastric stump in the early post-operation phases with the subsequent recovery of its tonicity [6].

V.A. Fetisov[2] studied the exogastric effects of vagotomy. He showed that, despite the absence of ulcer recrudescence (in a period of 3-5 years after the operation), these patients are characterized by a wide range of PGDs, which arise just as frequently as they do after "classic" stomach resection. At the same time, the small intestine's motility, its absorption of fats and glucose and the pancreas's endocrine activity do not suffer greatly after a vagotomy with economical gastric resection. Nevertheless, it leads to a significant decrease in the synthesis of enzymes of pancreatic juice [7, 8].

The vagus nerve is not only the stomach's secretory nerve but also its motor nerve. Thus it was necessary to study the influence of BV and SV on the resectioned stomach's motor-evacuation function and stump secretion.

B.A. Naumov[3] discovered the two vagotomy types' almost 100-percent "adequate" influence on the secretion of hydrochloric acid and pepsin. At the same time, despite the stomach stump's drastic decrease of motility in the first six months after the operation, its evacuation function does not suffer, and in most cases the stomach stump empties rapidly [9, 10].

Yu.I. Kiselev[4] summarized decades of work in this field. In his opinion, vagotomy with EGR effectively suppresses the secretion of hydrochloric acid independently of its pre-operation indicators (including hypersecretion), leading to stable achlorhydria.

The decrease in stomach volume due to resection and the performance of Billroth I nastomosis reduce the frequency of post-gastroresected syndromes, which continue to decline in the long-term period (5-10 years) after the surgical treatment. Since immediate and long-term results of SV and BV with EGR are identical, preference should be given to BV, which is technically simpler. Yu.I. Kiselev reevaluated the clinical results of various UD operations (according to G. Johnston) in Russian literature and made it more objective and accessible [11, 12].

It, therefore, became obvious that SV with EGR is a "gold standard" for surgically treating duodenal ulcer patients, although there are chances of PGD, as in the classic resection of 2/3 of the stomach. These outcomes motivated the group to study a second field in organ-saving operations with vagotomy: the mastery of selective proximal vagotomy (SPV), which the FCS began performing in 1976. In the course of this operation only the stomach's acidogenic area (the lower area and main body) is denervated, but the innervation of the antrum, which controls the speed and character of chyme evacuation, is preserved.

[1] In 1975, P.M. Postolov defended a Medical Sciences Ph.D. dissertation on the subject of "Vagotomy with the economical gastric resection and selective proximal vagotomy in treating ulcers in the duodenum."

[2] In 1976, V.A. Fetisov defended a Candidate in Medical Sciences dissertation on the subject of "The functional condition of the pancreas and small intestine after vagotomy with the economical gastric resection in ulcer patients."

[3] In 1978, B.A. Naumov defended a Candidate in Medical Sciences dissertation on the subject of "The secretory and motor-evacuation function of the gastric stump in duodenal ulcer patients after the vagotomy combined with economical resection."

[4] In 1980, Yu.I. Kiselev defended a Candidate in Medical Sciences dissertation on the subject of "Long-term results of branch and selective vagotomy combined with economical gastric resection concerning duodenal ulcer."

V.P. Baido[5] determined that SPV stably and effectively suppresses the synthesis of hydrochloric acid and pepsin in duodenal ulcers by an average of 85–95%, preserving the safe (not threatened with ulceration) level of these aggression factors during digestion, something that distinguishes SPV from other types of vagotomies and gastric resection. Since motor-evacuation disruptions after SPV were not noticed, it was thought that a stomach-draining operation is not necessary if there is no initial disturbance of the evacuation [13, 14].

N.M. Kuzin (1978)[6] studied the exagastric influence of SPV on the functional condition of the liver, the gallbladder and pancreas, the organs whose condition can determine the level of digestion compensation after surgical intervention on the stomach. It was proven that SPV has less negative impact and does not substantially interfere with the functioning of the biliary tract in comparison with BV and SV combined with EGR [15–17].

The clinic actively provided help to young emerging surgeons in obtaining scientific skills, and in the selecting specializations and research programs. In the beginning of the 1980s a second generation of researchers came to the FSC: O.V. Babkin, S.N. Dezhin, G.A. Rustamov, Sh.G. Verdieva and N.N. Krylov. By that time it had been established that ulceration is a consequence of the imbalance between aggression and defense factors in the gastric mucosa and the duodenum. Thus it was necessary to understand how SPV influences the condition of the protective mucosal barrier and the volume of reverse diffusion of hydrogen cations into the organ's wall (aggression factor).

G.A. Rustamov[7] concluded that an ulcer in the mucosal gastro-duodenal area leads to intensive emission of hydrogen cations not into the stomach's cavity but in the reverse direction, into its wall, resulting in the change of polarity of the transmural difference of potentials in the positive direction. This process is accompanied by the intensification of blood flow in the stomach wall if there is a duodenal ulcer and mucosal ischemia if there is a "florid" stomach ulcer (SU). After the SPV, if a stomach-draining operation is not performed, in a period of 12–14 days to a year the protective mucosal barrier and blood flow in the stomach wall will normalize. However, if a stomach-draining operation or gastric resection follows the SPV, complete normalization does not occur due to the damage of the mucosa by refluctant components from the duodenum [18, 19].

S.N. Dezhin summarized the treatment of the postbulbar duodenal ulcer [20]. Although such ulcers are relatively rare (7% of all duodenal ulcers), they are characterized by particular severity with frequent complications (in 86% of patients) and pose difficulties for conservative and surgical treatment. It was determined that for curing such patients, SPV has obvious advantages in terms of both extensive and economical gastric resection, since it is accompanied by a lower mortality rate and fewer complications.

O.V. Babkin[8] successfully studied the standardization of the SPV technique, which helped reduce the frequency of incomplete and inadequate vagotomy that leads to ulcer recrudescence and provided an opportunity for emerging surgeons to master the technique. For this purpose he used the method of intraoperative pH measuring of the acidogenic area of the stomach, as gastric secretion is maximally stimulated with histamine. Babkin concluded that when surgeons begin mastering the SPV technique they often leave out several "fields" of preserved secretion: in the intermediate area between the stomach body and antrum; in the cardiac section along the lesser curvature; around the bottom of the stomach and in the biggest "field" along the greater curvature of the stomach. While it is necessary to cut in the first three cases ("the recurrent branch" of the nerve of Latarjet,

[5] In 1977, V.P. Baido defended a Candidate in Medical Sciences dissertation on the subject of "The secretory and motor-evacuation functions of the stomach in duodenal ulcer patients after selective proximal vagotomy."

[6] In 1978, N.M. Kuzin defended a Candidate in Medical Sciences dissertation on the subject of "The influence of selective proximal vagotomy on the functional condition of the liver, gallbladder and pancreas."

[7] In 1982, G.A. Rustamov defended a Candidate in Medical Sciences dissertation on the subject of "The influence of selective proximal vagotomy on the protective barrier and blood flows of the gastric mucosa and duodena."

[8] In 1983, O.V. Babkin defended a Candidate of Medical Sciences dissertation on the subject of "Intraoperative pH measuring in surgical treatment of ulcers."

the cardiac secretory stems of the vagus nerve and the "criminal" nerve of Grassi), to prevent the preservation of unchanged secretion, in the fourth area it is necessary to mobilize the stomach's greater curvature by crossing the accompanying parasympathetic nerve fibers over the right and left gastroepiploic arteries.

This detail in the operation helped form the concept of "extensive SPV." The clinic's collaborators suggested mastering the extensive SPV technique by using the mandatory intraoperative pH stomach test. When the intervention technique becomes habitual (after 50-60 autonomous operations) and the non-denervated stomach areas no longer manifest themselves, intraoperative pH measuring can be abandoned. Extensive SPV, which the FSC has performed since 1978, has helped reduce the number of incomplete vagotomies by 75% [21].

Clearly, SPV was becoming the preferred method for treating uncomplicated duodenal ulcers. However, the problem of surgically treating "hypersecretors" (patients with very high acid production) remained debatable. Should vagotomy be completed with antrum-resection? Was there any point in employing SPV on a duodenal ulcer with hyperchlorhydria? How did vagotomy with and without a stomach-draining operation influence the secretion of acid and the frequency of ulcer recrudescence?

Sh.G. Verdieva[9] answered these questions. She determined that the decline of acid production (maximum and basic) after SPV occurred in the "hormosecretor" and "hypersecretor" groups (more than 75% and 90%, respectively) and did not differ significantly. A stomach-draining operation following the SPV did not substantially influence the results in a period from one to ten years after the operation. After extensive SPV, ulcer recrudescence was observed in 4.4% of the patients with hypersecretion. Those who underwent normal SPV experienced recrudescence in 10.7% of the cases [22].

O. Arileshere[10] studied the long-term results of SPV and showed that it is advantageous in influencing the stomach's secretory and evacuation functions and results in an insignificant frequency of post-vagotomy syndromes, which remain for a period of 13 years after the intervention.

Although the mid-1980s indicated that the older age category needed organ-saving operations in cases of duodenal ulcers, the attitude towards young duodenal ulcer patients (15-30 years of age) was ambiguous. Should prophylactic treatment be renounced because of the relative indication of this category of patients? Was it possible to employ SPV or was it more reliable to perform an antrectomy on them? What was the probability of ulcer recrudescence in this case? These questions were particularly prominent, especially because the proportion of young patients had reached 10-16% of all ulcer patients in the USSR.

A.V. Egorov[11] described the clinical particularities of duodenal ulcer cases in young individuals, including the likelihood of early complications (bleeding, perforation and stenosis) – up to 66% in the group observed (25 being the average age). He proved that although BV combined with EGR guarantees the healing of ulcers (in a period of up to 20 years the recrudescence frequency was 0%) 2–3 times more frequently than SPV, it leads to the development of post-resection syndromes (PGD), which are more severe than post-vagotomy syndromes, and it results in invalidity 6 times more frequently than SVP. However, after SPV, the development of ulcer recrudescence is more common than after antrectomy combined with BV; moreover, it occurs with identical frequency in both young patients and older patients (7.9% and 8.3% respectively).

Nevertheless, a calculation of economic effectiveness helped affirm that preventive surgical treatment (before the advance of ulcer complications) with the use of SPV is half as expensive as long-term annual drug therapy. The indications for an operation would be the same as in the older age categories [23, 24].

Various types of vagotomies (SV, BV, SPV) intervene in different degrees and different ways in the complex regulation mechanisms

[9] In 1988, Sh.G. Verdieva defended a dissertation on the subject of "The surgical treatment of duodenal ulcers in patients with extremely high stomach contractile activity."

[10] In 1989, O. Arileshere defended a Candidate of Medical Sciences dissertation on the subject of "Long-term results of selective proximal vagotomy in the surgical treatment of the duodenal ulcer."

[11] In 1990, A.V. Egorov defended a Candidate of Medical Sciences dissertation on the subject of "The surgical treatment of duodenal ulcers in young individuals."

of the stomach's motor-evacuation functions. The problem of using organ-saving operations with vagotomy for treating duodenal ulcers, which is complicated by duodenal stenosis that leads to the progressive disturbance of the food evacuation from the stomach, was successively solved by N.N. Krylov,[12] A.N. Alimov[13] and M.N. Okoyemov.[14]

N.N. Krylov examined 509 patients with duodenal stenosis before and after various operations: isolated SPV; SPV with duodenoplasty, with dilatation of the cicatricial stenosis area and with stomach-draining operations; and BV and SV with EGR and stomach-draining operations. For a quantitative evaluation of the speed and character of food evacuation from the stomach before and after the operation, Krylov and co-author I.A. Uskov proposed the method of radionuclide diagnosis of pyloric stenosis in duodenal ulcer cases,[15] which helped provide the opportunity to employ pyloro-saving operations (isolated SPV without stomach-draining operations and SPV with duodenoplasty in the initial level of disturbance of stomach emptying), as well as a stomach-draining method after SPV or BV. For the first time in surgical practice there was a convincingly substantiated refusal to use duodeno-dilatation in the younger age category of patients due to the high risk of intraoperative complications and restenosis in the long-term period. Yet, duodenoplasty was recommend for broad practice. BV combined with EGR for irreversible severe forms of stenosis was preserved. For the first time radionuclide gastric scintigraphy data were used to develop a systematic individual approach to the choice of surgical treatment based on the localization of the stenosis area and the level of manifestation of cicatricial changes, as well as the explicitness of motor-evacuation disorders [25–27].

For his observation A.N. Alimov selected 118 post-SPV patients with various types of stomach-draining operations and determined the advantages of pyloro-saving duodenoplasty over gastro-duodenostomy that shunts the pylorus, provoking a duodenogastric reflux [28].

Okoyemov analyzed the results of 1,107 pylorostenosis with stomach ulcer and duodenal bulb ulcer patients who underwent resection and organ-saving operations and concluded that these patients experienced the most ulcer complications. The study helped him create an algorithm for treating patients with pyloroduodenal stenosis [29].

Noting the obvious merits of organ-saving operations with vagotomy when treating duodenal ulcers (minor traumas, insignificant quantity of intraoperative and post-operation complications and post-vagotomy disorders and the absence of long-term invalidity after the operation), M.I. Kuzin decided to try to extrapolate these advantages to treating stomach ulcers.

The first step was to study the results of treatments of a special form of ulcer: the combined stomach and duodenal ulcer. At the time there was contradictory information on the development sequence of ulcerous lesions on these organs, on the clinical tendency of combined ulcers and on the frequency and character of the complications; the reasons for their pathogenesis remained practically unstudied. It was not clear if these patients belonged to the duodenal ulcer or stomach ulcer categories, or if a special independent category should be dedicated to this relatively rare form of ulcer (affecting 4–6% of all ulcer patients). How should these patients be treated? The same way as duodenal ulcer patients, with the help of SPV, or as stomach ulcer patients, with extensive gastric resection?

A.V. Samokhvalov[16] determined the aggressive tendency of combined ulcers and their high probability of developing complications (72% of the patients studied), although malignancy

[12] In 1985, N.N. Krylov defended a Candidate of Medical Sciences dissertation on the subject of "Vagotomy in treating duodenal stenosis of ulcer etiology."

[13] In 1992, A.N. Alimov defended a Candidate of Medical Sciences dissertation on the subject of "The results of selective proximal vagotomy with duodenoplasty in treating duodenal stenosis in patients with duodenal ulcers."

[14] In 1985, M.N. Okoyemov defended a Ph.D. in Medical Sciences dissertation on the subject of "The surgical treatment of ulcer pyloroduodenal stenosis."

[15] "The method of radionuclide diagnosis of pyloric stenosis in duodenal ulcer cases." Patent SU No. 1057013 a.

[16] In 1985, A.V. Samokhvalov defended a Candidate of Medical Sciences dissertation on the subject of "The combination of stomach and duodenal ulcers. The main field of practical and scientific activity: abdominal surgery, oncology."

was encountered just over half as often as in the isolated stomach ulcer. He proved that Type II (combined) ulcers drip as a result of relative hypersecretion in comparison with Type I (medio-gastric) ulcers. They are characterized by a stable gastrostasis with food evacuation from the stomach at half the normal rate, according to dynamic gastric scintigraphy, even when the cicatricial-ulcerative duodenal stenosis is absent. In these cases the general quantity of bile that enters the stomach as a result of duodenal-gastric reflux, according to radionuclide hepatic scintigraphy, is 20% higher than in patients with only a stomach ulcer.

In cases of combined stomach and duodenal ulcers Samokhvalov discovered the same reverse diffusion of hydrogen ions in the stomach wall as in the medio-gastric ulcer and significantly higher intensity than the duodenal ulcer. For the first time it was established that the concentration of bile in the refluctant influences the discharge of reverse diffusion of hydrogen cations. The author established the theory of secondary genesis of ulceration in the stomach (on average in 12 years) as a result of the primary duodenal ulcer.

A comparative analysis of the effectiveness of treating combined ulcers showed that extensive gastric resection rarely (3.8%) ends in recrudescence of the disease but leads to death and an unsatisfactory functional result more often than other operations. Therefore, it should only be performed on malignant ulcers. Branch vagotomy with EGR (antrectomy), although it will heal the patient (0% recrudescence), is characterized by limits such as those inherent in extensive gastric resection, with fewer manifestations of diseases resulting from a stomach operation. BV with a stomach-draining operation is less traumatic and yields good immediate (0% mortality rate) and long-term (4.7% recrudescence) results. SPV in these cases leads to a high risk of ulcer recrudescence (14.3%) [25, 30, 31].

The next step was to analyze the results of treatments of the most frequent form of stomach ulcer in the stomach body along the lesser curvature. K.V. Lyadov[17] studied the results of classic gastric resection with the help of BV and a stomach-draining operation on medio-gastric ulcer patients. It seemed that the obvious limit of extensive resection (the removal of a significant part of the gastric reservoir) in such patients could be an implicit advantage since in this case the surgeon removes both the ulcer and the periulcerous chronic hepatitis. But under the guise of a stomach ulcer there could be a primary ulcerous form of cancer. Thus extensive gastric resection on the Type I ulcer at first seems preferable to organ-saving operations.

In this regard, in order to avoid a diagnostic and tactical error, Lyadov described the principles of the differential-diagnostic search, which foresee a repeated ulcer (or post-ulcer scar) biopsy at the time of the pre-operation gastroscopy and a mandatory ulcer (or post-ulcer scar) excision with urgent histological study during the BV with a stomach-draining operation. In such a condition all the merits of the organ-saving and radical stomach ulcer treatment are preserved. Since the main pathogenetic link in the development of this form of ulcer is the acidic-peptic factor, branch vagotomy with pyloroplasty radically heals these patients [32].

N.M. Kuzin[18] summarized the results of the clinic's work on treating all three stomach ulcer forms, which was based on the study of 387 patients' case histories 15–17 years after their operations. It was important to understand the specific value of separate factors of pathogenesis in the development of various types of ulcers. Kuzin methodically proved that in Type I ulcer cases primary significance is assigned to the reserve diffusion of hydrogen cations into the stomach wall through an ulcerous defect. Besides the acidic-peptic factor, gastroasis dominates in Type II ulcer cases, and Type III cases also involve duodeno-gastric reflux.

Thus, all the various tendencies of stomach ulcers are conditioned by an explicit or implicit hypersecretion. Implicit hypersecretion occurs when the summation of acid aspirated from the gastric lumen with a volume of acid production lost in reverse diffusion in the ulcer area (the "leaking roof" concept) results in high indicators

[17] In 1987, K.V. Lyadov defended a Candidate of Medical Sciences dissertation on the subject of "Long-term results of vagotomy in the surgical treatment of stomach ulcer."

[18] In 1988, N.M. Kuzin defended a Ph.D. in Medical Sciences dissertation on the subject of "Choosing the method of surgical treatment of stomach ulcer."

of hydrochloric acid and pepsin discharge, as in duodenal ulcer patients. If so, vagotomy is pathogenically substantiated not only for a duodenal ulcer but also for a stomach ulcer. At the same time, reliable differentiated diagnostics between ulcer and cancer can be produced with the addition of the morphological study of biopsy material with the help of "optical biopsy," a laser fluorescent spectroscopy developed by FSC together with the Russian Academy of Sciences Institute of General Physics [1].

Contrary to hopes and expectations, SPV produced the worst results in treating stomach ulcers. The frequency of recrudescence was 29.6%, which was explained by the devascularization of the stomach's lesser curvature during the operation and the growth of initial ischemia in the mucosa. For this reason N.M. Kuzin suggested a BV with a stomach-draining operation for a Type I ulcer and a BV with EGR as the most radical intervention for Types II and III [32–34].

In the end, the 30-year use of various vagotomies helped the FSC reduce the mortality rate of ulcer patients by 90% and their invalidity by 87.5% [1]. In 1987 collaborators of the Department of Faculty Surgery P.M. Postolov and N.M. Kuzin were awarded the USSR State Prize for "the development and introduction in clinical practice of new methods of treating stomach and duodenal ulcer".

N.N. Krylov[19] summarized the 30-year experience in treating duodenal ulcers. By that time it was obvious that quantitative biomedical indicators and special analytical scales (Visick and Johnston) could not objectively determine the effectiveness of surgical methods for treating duodenal ulcers. The obvious merits of certain types of operations according to certain criteria equal the obvious limits if judged by other parameters. Moreover, these indicators do not take into consideration the quantity of health preservation. The problem of assessing the effectiveness of the treatment can be solved by using completely different criteria, such as life quality factors (LQ) in the post-operation period, and comparing them to the initial data received before the patient begins treatment.

For the first time in clinical practice Krylov created a precise method for measuring the LQ level and its separate indicators in duodenal ulcer patients before and after surgical treatment. The proposed assessment method – the LQ Index (FSC LQI) – was simple and inexpensive. It was characterized by the reliability of the results obtained, validity and sensitivity, which helped specialists use it in scientific and practical activities for monitoring the severity of the patient's condition, clarifying indications for surgical treatment and assessing its effectiveness.

The FSC LQI showed the highest levels in patients after anti-reflux operations: SPV and BV+ERA according to Roux and SPV with duodenoplasty. The intermediate quantities of LQI were observed in patients after minimally invasive operations with the removal or destruction of pylorus: Bv+Dr,[20] SPV+Dr and BV+EGR. The lowest LQ levels were registered in patients after the "classic" resection of 2/3 of the stomach.

It is important to note that if the duodenal ulcer had an aggressive tendency, the quantity of LQ growth after surgical treatment increased by 3.2 times after drug therapy.

It was proven that the highest life quality level is obtained by patients who were operated on because of relative indications in connection with the ineffectiveness of drug therapy after SPV; duodenostenosis patients after BV and ERA, according to Roux; and ulcerous bleeding and ulcer perforation patients after BV and a stomach-draining operation [35, 36].

The 30-year experience in performing organ-saving operationsrequired a dialectical revision of the results. It was obvious that any forced manipulation of the pylorus – removal (with economical and extensive gastric resection), destruction (pyloroplasty) and shunting (gastro-duodenostomy) – inevitably intervenes in the complex mechanism of regulating the stomach's motor-evacuation functions and with fatal certainty provokes the development of post-gastrectomy diseases of various degrees – dumping syndrome, diarrhea and especially reflux-gastritis. At the same time patients with duodenal ulcers (sub- and decompensated stenosis) and stomach ulcers preserved indications for stomach-draining operations (with possible duodenoplasty) or

[19] In 1996, N.N. Krylov defended a Ph.D. in Medical Sciences dissertation on the subject of "The life quality of duodenal ulcer patients after surgical treatment."

[20] Dr – stomach-draining operation

for the removal of the pylorus with a part of the stomach. A question was posed: how can the duodeno-gastric reflux and the reverse diffusion of hydrogen cations it induces, a diffusion that damages the protective mucosal barrier and leads to ulcer recrudescence, be avoided?

The study of various vagotomies and gastrointestinal anastomoses after gastric resection helped to determine that gastric resection is effective if combined with branch vagotomy in treating the duodenal ulcer, and extensive gastric resection is effective for Types I and II ulcers with gastroenteroanastomosis on the jejunum isolated through the Roux loop that has a length of at least 40-45 cm. It guarantees the avoidance of biliary reflux in the gastric stump. Also, the condition of the protective mucosal barrier of the gastric stump after assessing the transmural difference in potentials is similar to that of healthy people.

It was understood that the influence of gastric resection with Roux-en-Y-anastomosis on the secretory and evacuation functions of the stomach in immediate and long-term clinical results,[21] as well as the condition of several functions of the liver, gallbladder and pancreas,[22] are comparable to the consequences of branch and selective proximal vagotomies combined with stomach-draining operations. For selecting the resection volume the authors suggested removing 1/3–1/2 of the stomach (antrectomy) and completing it with branch vagotomy.

The history of developing organ-saving operations with vagotomy is only one part of the Faculty Surgery Clinic's multifaceted activity. In 2000, after the sudden death of M.I. Kuzin's student, the associate member of the Russian Medical Sciences Academy and director of the Department of Faculty Surgery S.A. Dadbani, "the link of epochs fell apart." The department staff changed and reduced, the number of beds in the FSC in 2016 decreased by more than 50% and priorities of scientific research radically changed. The achievements of the clinic's previous generation of collaborators are now being reassessed. We can repeat the words of Trojan priest Pandion, who, when seeing Troy burning, said, "We were Trojans, this was Illium..."

In the 20th century, the N.N. Burdenko Faculty Surgery Clinic played a strategic role in the development of gastric and duodenal surgery in Russia. The FSC's great achievements in the surgical treatment of ulcerous diseases are unquestionable. They give hope that the important results obtained by several generations of FSC surgeons will continue to be respected and emulated, despite the reevaluation of several positions on treating ulcers and their complications that has taken place in surgical gastroenterology recent years.

[21] In 1996, Yu.B. Maiorova defended a Candidate of Medical Sciences dissertation on the subject of "The functional results of gastric resection with Roux-en-Y anastomosis in the surgical treatment of stomach and duodenal ulcers that are complicated by stenosis."

[22] In 2000, O.V. Kanadashvili defended a Candidate of Medical Sciences dissertation on the subject of "The functional condition of the liver, gallbladder and pancreas after gastric resection with Roux-en-Y anastomosis in ulcer cases."

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