

## On the history of surgical treatment of peptic ulcer disease

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**Abstract.** Despite significant changes in the conservative treatment of peptic ulcer, occurred over the past 35–40 years, it continues to maintain a leading position in the structure of gastrointestinal disorders. Development and implementation of eradication therapy have not brought the expected reduction in the number of severe ulcer complications, which have been observed in 1.5–2 times more often in Russia over the past 15–20 years. Using planned organ-sparing procedures has resulted in reducing the incidence of complicated peptic ulcers in the 1970–80s years. At the same time, rejection of their performance in the 1990s affected by 1.5–2.5-fold increase in the frequency of perforation and bleeding ulcers. It has been established that certain kinds of gastroduodenal ulcers are incurable, i.e. for a full solution to the problem a number of cases still require surgery, which means that the classical indications for surgical treatment of peptic ulcer should remain in force.

Development and implementation of organ-sparing and minimally invasive procedures on the stomach and duodenum is a progressive trend associated with the desire to radically cure ulcer patient and thus inflict the least possible damage. We can assume that prospects for the surgical treatment of peptic ulcer in the 21st century will be largely related to the improvement and introduction of progressive and the most physiologic minimally invasive technologies.

**Keywords:** peptic ulcer disease, surgical treatment, indications for surgery

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### Introduction

In the last 35–40 years there have been considerable changes in the conservative treatment of peptic ulcers (PU), largely related to the discovery of histamine and parietal cell muscarinic receptor blockers as well as proton-pump inhibitors in the 1970s, and the spiral-shaped microbe *Helicobacter pylori* (*H. pylori*) in the mucous membrane of the stomach and the duodenum<sup>1</sup> in the 1980s. This brought about the development and widespread

adoption of methods and schema of antisecretory and anti-*Helicobacter* (so-called eradication) therapies, for which there were great hopes. Despite this, PU continues to maintain a leading position in the distribution of diseases of the organs of the gastrointestinal tract [1–3]. Chronic PU afflicts up to 10–12% of the adult population all over the world [4–7]. At the same time, the increase of the average human lifespan in developing nations has resulted in a rising incidence of PU among the elderly [8–12]. The introduction of eradication therapy has not resulted in the long-awaited reduction of complicated forms of PU. Rather, complications such as perforation and hemorrhaging have been observed from 1.5–2 times more often in the last 15–20 years [13–16].

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<sup>1</sup> Further, according to the Russian tradition, we use an acronym the DPK (dvenadtsatiperstnaya kishka).

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At the beginning of the 21st century, proponents of the Helicobacter theory were inclined to present the problem of PU as principally solved, but an observed rise in the quantity of patients with complicated ulcers against the background of the unfavorable modern socio-economic situation allowed a few scientists to talk about the development of “an uncontrolled peptic ulcer epidemic” in the Russian Federation and CIS countries.

It became clear to many doctors that the “sunset” of the Helicobacter epoch began in the second decade of the 20th century. Scientists are beginning to talk with increasing frequency about the pathogenic inconsistency, ineffectiveness, and even hazardousness of eradication therapy. It is evidently impossible in all cases to cure an ulcer of the stomach or duodenum by therapeutic methods, and the inclination of these chronic, recurrent illnesses<sup>2</sup> (with which only surgeons are concerned) to develop severe complications compels us to once again consider evidence from radical operations for PU. In connection to this, it is worthwhile to elucidate the history of the formation of the founding principles for the surgical treatment of PU as well as the history of the development and introduction into practice of surgical intervention.

The authors hope that the presence of historical information in this article will help to more clearly define the current state of problems in the surgical treatment of PU as well as the perspectives of its further development in our country.

#### **Peptic Ulcers in the 20th Century: different approaches to the solution**

In 1955, S.S. Yudin wrote, “The persistent intractability of peptic ulcers in respect to any applied methods of conservative, medicinal, dietetic, and physiotherapeutic treatments, as well as the almost immutable failures of consistently emerging operational methods, have long shown that either the preconditions for treatment planning were incorrect, or the main factor responsible for the chronic existence of an emerging ulcer has not been found. These failures

<sup>2</sup> It is beneficial to discuss ulcers of the stomach and the DPK as two different illnesses on account of the large differences in etiology, pathogenesis, and variety of complications and methods of conservative and surgical treatment. A similar differentiation was first made by Moynihan in 1925.

compel us to reject earlier conceptions of the pathogenesis of peptic ulcers, and to also devise new ones”<sup>3</sup> [18, p. 22].

Among the many theories on the origin of PU (which superseded each other with some frequency), the most prominently disseminated was the theory of disruption of the equilibrium between “defensive” and “aggressive” factors that operate in the mucous membrane of the stomach and the DPK. Defensive factors include the mucous-bicarbonate barrier, the endogenous prostaglandin system, the active regeneration mechanisms of the covering epithelium, the intensive blood circulation in the mucous membrane, and the antroduodenal “acid inhibitor”. The acid peptic factor, gastroduodenal dysmotility, trauma of the mucous membrane, and the heightened activity of processes of free-radical acidification of lipids in the mucous membrane of the stomach and the DPK have all been identified as aggressive factors [19–22]. Despite the fact that this rather mechanistic theory was principally focused on local pathophysiological changes and did not altogether explain the diversity of stomach and duodenal ulcers, it left doctors with a realistic approach to the pathogenic treatment of PU, increasingly founded on the old principal “no acid, no ulcers”.

In the 1970s and 1980s the introduction of histamine and parietal cell muscarinic receptor blockers and proton pump inhibitors into clinical practice was called “a revolution in gastroenterology” by general practitioners. But accumulated experience showed that such a “revolutionary” treatment still did not lead to full recovery and turned out to be unable to change, including the length of the remission of PU [23]. At the same time, the wide adaptation of H<sub>2</sub>-receptor antagonists and proton pump inhibitors quickly made the operation which reduces gastric secretions – selective proximal vagotomy (SPV) – less sought after [24]. This process was especially intense abroad, and as a result the first significant changes to the surgical treatment of PU had already taken place by the end of the 1980s.

According to data from R. Haaverstad et al, in one of the regions in Norway the number of planned surgeries relating to peptic ulcers sank by 72% over 15 years (from 1975 to 1989), mainly on

<sup>3</sup> From this point onward the particularities of the original are preserved in citations.

account of DPK ulcers. At that time the number of surgeries relating to perforated ulcers remained at prior levels [25].

According to data from J. Jibril et al, in Scotland the total number of surgeries per year relating to duodenal peptic ulcers declined by 80% in 15 years (from 1975 to 1990); at the same time a significant increase (93%) was noted in the frequency of perforation of duodenal ulcers in women over 65 years of age [26].

According to data from C. Chen et al, from 1986 to 1996 the total number of surgeries at Taiwan University Hospital relating to PU declined by an average factor of 4 in comparison to the previous three decades, but the fraction of surgeries relating to perforated ulcers increased from 36.1% to 89.2% [27].

Similar tendencies became discernable in large cities within the CIS. In the majority of Saint Petersburg emergency surgical clinics, an increase was noted in the total and relative quantities of patients with peptic ulcer bleeding [1].

The following (second) “revolution” in gastroenterology began in the 1980s and 1990s after the development of the Helicobacter theory of PU and implementation of methods which cleansed the stomach and the DPK of *H. pylori* with the help of antibacterial medications, including peroral antibiotics. Taken as a whole with gastric secretion blockers and bismuth medications, such an ethiopathogenetic treatment should have been able to guarantee an optimal effect. Unfortunately, this once again did not occur. Long-term conservative treatment of PU at that time did not only fail to provide a guarantee of recovery, but also became relatively harmful [28].

At the beginning of the 21st century, around 6,000 people in the Russian Federation died annually from severe PU complications [23]. In Europe there were more than 20,000 annual deaths [29], and around 6,000 in the USA [30].

Underlying such grave statistical data was yet another fact which caused sizable alarm: the swift and sudden “neglect” by Helicobacter proponents of one of the fundamental principles of antibacterial therapy – the impermissibility of the wide and thoughtless prescription of antibiotics. Due to an absence of hard data, it was impossible to say with certainty how many of the patients who had undergone courses of eradication therapy had also developed dysbacteriosis – an illness which

can be accompanied by even more burdensome and intractable symptoms than uncomplicated PU. An even more unpleasant result was the fact that the mass utilization of eradication therapy led to the emergence of *H. pylori* strains that were resistant to a wider array of administered antibacterial medications (tetracycline, amoxicillin, furazolidone, metronidazole) [5, 31].

Spiral-shaped microbes were found in the human stomach even at the end of the 19th century, but this fact was not initially linked to any particular illness [32]. According to J.W. Konturek, the first to suggest such a link was W. Jaworski from Jagiellonian University, Krakow, in 1899: in the dregs of wash water he identified bacteria with a spiral shape, which he named *Vibrio rugula* [33]. L.I. Aruin and his colleagues pointed out that in the 1930s and 1970s, spiral-shaped microbes were not only found in the stomach, but described similarly [32]. However, the capacity for cultivating these bacteria had not yet been developed, and it was most likely for this reason that the results of the indicated studies did not receive due attention. In 1983 and 1984, Australian scientists B.J. Marshall and J.R. Warren managed to extract *H. pylori* from the mucous membrane of the stomach and grow the microorganism in an artificial nutrient medium [34].

However, since that time it has not been adequately proven that helicobacteriosis is the main etiologic factor for the development of PU in the stomach or the DPK. In any case, this theory did not receive clear experimental validation inasmuch as animals do not suffer from peptic ulcers or human helicobacteriosis, which in turn did not allow for the creation of a representative experimental model of *Hp*-dependent PU. Without going into particulars, we must remember that the lack of new infectious theory for PU had already come to light while the theory was under initial examination from classical positions formulated at the end of the 19th century by R. Koch<sup>4</sup>. His four principles, which characterize microorganisms as causative agents for both infections and conditions for the substantiation of infectious etiology for any sort of disease, claim

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<sup>4</sup> The old infectious (streptococcal) theory of the occurrence of PU, proposed by Rosenow in 1913, was quickly abandoned and now only constitutes historical interest.

that: 1) a microorganism should be encountered constantly in the body of sick persons (or animals), and be absent in healthy ones; 2) a microorganism should be extracted from a sick person (or animal) to a pure culture; 3) in the case of infection from a pure culture with an extracted microorganism, a healthy person (or animal) will become ill; 4) a microorganism should be repeatedly extracted from the infected pure culture of a human (or animal). It should be noted that R. Koch himself did away with the second part of the first principle (the absence of microorganisms in healthy persons) upon finding asymptomatic carriers of cholera and latent typhoid fever. At the same time, the second principle does not always demonstrate the pathogenicity of a microorganism, given that viruses and some bacteria (for example, the causative agent of leprosy) cannot be extracted to a pure culture. The third principle is not always relevant with tuberculosis and cholera, and in some people there exists a congenital immunity to pox, the plague, and even infectious HIV. Nevertheless it is clear that not one of R. Koch's principles corresponds to the Helicobacter theory in any way.

Despite this, Helicobacter proponents began to affirm shortly after that the infection of a person with *Hp* occurs through the fecal-oral route (i.e. *H. pylori* infections are related to "diseases of dirty hands"), oral-oral route (through kisses, as well as the use of shared dishware and silverware, among others), and also through oral-genital contact, so it turns out that *H. pylori* is an extremely contagious microbe (!). Moreover, with the onset of the 21st century, and not without good reason, the heightened infection rate of *H. pylori* among populations of developing countries (and Russia) began to be discussed; helicobacteriosis was at a much lower prevalence in highly developed countries, in which, as is commonly believed, *H. pylori* appears at considerable scale only among the "culturally lacking" and the economically underprivileged areas of the population [35].

We would remind the reader that the role of *H. pylori* as the single or even principal etiological factor for the development of PU was from the very beginning subject to much doubt from the leading gastroenterologists of our country [32, 36, 37]. It is also remarkable that it was general practitioners who conducted special studies that not only did not corroborate the roll of *H. pylori* in ulceration,

but directly indicated that in the presence of *H. pylori*, the scarring of gastroduodenal ulcers quickens [38]. At the same time, it has been long known to surgeons that organ-preserving surgeries guarantee long-term peptic ulcer treatment in the DPK through the adequate reduction of gastric secretions, without influencing the levels of *H. pylori* in the mucous membrane. It is also known that the wide utilization of planned organ-preserving surgeries in the 1970s and 1980s was instrumental in reducing the incidence of complicated types of PU in Russia, Ukraine, and Belarus. By contrast, the renouncement in the 1990s of the implementation of SPV for related reasons was directly or implicitly mirrored by the 1.5-2.5 figure increase in the frequency of the development of perforations and peptic ulcer bleeding [3, 5].

Metronidazole, which is widely taken today for the eradication of *H. pylori*, entered the array of medicamental treatments for peptic ulcers in the 1970s, but many patients poorly tolerated the drug, as it caused nausea. There is nothing principally new in the utilization of bismuth medications in Russia as a cure for PU, but one must take into account that bismuth medications for internal use are illegal (permitted only for external use) in the USA, Italy, Greece, France, Sweden, Turkey, Australia, India, and Cuba.

Over the course of the 20th century PU was given many definitions, but for the most correct understanding of this disease it is prudent to examine it as a chronic pluricausal disease with intrinsic components and a cyclical course, the development of which is caused by many additional factors, including neurohumoral, psychosomatic, and psychosocial ones<sup>5</sup>. The quantity of PU patients and frequency of their severe complications sharply rises during times of war as well as political, economic, and social upheaval; it was not for nothing that in due time PU was called "the disease of the meager and poor" [5, 18, 39–44]. As S.S. Yudin wrote, "...the increase in the quantity of patients with peptic ulcers in the stomach and duodenum in periods of great wars and national poverty is a commonly known fact" [43, p. 222].

<sup>5</sup> It is interesting that more often than not primary care doctors like this defined PU before the beginning of the "Helicobacter epoch".

The results of multi-year observations show that the incidence of PU and frequency of its complications are subject to significant and repetitive fluctuations. In the manual “The Experience of Soviet Medicine in the Great Patriotic War 1941-1945” (vol. 23-24) data about the incidence of PU in Russia, the RSFSR, and the USSR from the second half of the 19th century to the end of 1945 are discussed. Analysis of this data allows us to corroborate the influence that natural cycles as well as social factors had on the incidence of PU [41].

For example, in the period of the First World War (1914–1918) and the years immediately following, the increase in the number of PU patients was so significant that people began to talk about a PU “epidemic” which enveloped all of the European countries that took part in military operations [41, 43, 44].

At the beginning of the Great Patriotic War (GPW) there were a number of peculiarities in the progression of peptic and duodenal ulcers. Among them was a significant growth of common incidences of PU (principally due to patients with duodenal ulcers, whose numbers peaked in the fourth year of the war), as well as asymptomatic (areactive) progressions of PU in patients who suffered from alimentary dystrophy, which caused profuse bleeding and perforations to emerge more frequently in ulcers. Nonetheless, a typical cycle of recrudescence of PU and its complications remained on front and center, the fundamental reasons for which were considered to be alimentary and neuropsychic factors. This was mirrored even in implemented treatments: PU flare-ups were treated in servicemen through bed rest, regular nourishment, and medicated sleep, which showed a positive effect in 84% of observations [41].

Foreign scientists also took notice of the significant increase in the number of patients with peptic ulcers in Europe and America at the beginning of the 20th century with two peaks, related to the First World War and the Great Economic Depression of 1929-1939. At the same time, a rise of the incidence of DPK ulcers occurred during the period of the Second World War and the years of post-war ruin [10, 45, 46].

Similar results from the works of English surgeons were reported by S.S. Yudin, concerning the sharp rise in the number of ruptured ulcers

in London during the period of highest violence from air raids, from September 1940 through May 1941 [18, p. 179]. Also, according to his data, at the height of the GPW the appearance of gigantic stomach and DPK ulcers, which in peacetime were encountered very rarely, became commonplace in Moscow. To this effect, S.S. Yudin wrote, “the first peculiarity of “wartime” ulcers is the uncommon quantity of severe, destructive, progressively penetrating ulcers of a colossal diameter” [43, p. 226].

With the achievement of economic prosperity and social stability in the countries of Western Europe in the 1960s and 1970s, a decline in the incidence of PU was noted. This tendency held firm until the end of the 20th century, and, apparently, without any connection to the passing of the Maastricht Treaty (1996) or the introduction of new medical doctrine [10, 41, 45, 46].

In the meantime, academician V.Kh. Vasilenko formulated a number of important questions as early as 1970, which touched on the peculiarities in the progression of PU [47]: why is it that, with PU, a singular helicoid defect as a rule; what is the reason for the “placebo effect”, from which an ulcer can heal despite maintaining a state of hypersecretion; what explains the spontaneous cycling of relapses and flare-ups of PU? The Helicobacter theory did not give and was, in all likelihood, unable to give clear answers to all of these questions.

Consequently, although the etiology and pathogenesis of PU at the end of the 20th century were not fully ascertained, the fact that PU appeared to be chronically pluricausal and possibly genetically determined illness, possessing a continuous inclination for relapsing [32, 39, 47] produced very little doubt among the majority of general practitioners and surgeons.

In the face of this understanding, the intentions of gastroenterologists to utilize eradication therapy as a panacea seemed odd. Meanwhile, at the end of the 20th century, there was the ubiquitous implementation of outpatient courses for the conservative treatment of exacerbated PU, which seems fundamentally wrong: a serious chronic disease should never be treated in that way, as it is severely dangerous and not uncommonly causes life-threatening complications. That which the luminaries of Russian medicine wrote about many decades ago should be clear

to any clinician: the exacerbation of PU should only be treated in a medical hospital capable of guaranteeing the patient a protective regimen, the constant observation of an experienced doctor, regular nourishment, and a curative diet at the very least. Ideally, there should also be a network of variegated therapeutic interventions for all known elements of the pathogenesis of PU which take into account the individual peculiarities of the specific patient.

**Complicated forms of PU:  
Are they a hidden problem?**

At the beginning of the 21st century many scientists began to notice that *Hp*-infections are encountered less often in complicated ulcers than in uncomplicated ones [3, 5, 31, 48]. According to data by C.S. Callicutt and S.W. Berhman, patients over the age of 60 have a tendency to develop *Hp*-negative ulcers in particular [49]. At the same time, the intrahospital case fatality rate of perforated and hemorrhagic ulcers of the stomach and the DPK remains high, and specialists who have studied surgical treatments for PU and its complications are forced to take on this challenge [50, 51]. Ulcer perforation is observed in roughly 10% of patients who were hospitalized for PU [29], and the proportion of surgeries on hemorrhagic ulcers is increasing [52–56]. In this regard, bleeding is the first sign of illness in 15–30% of the patients who suffer from PU [57]. The especially unfavorable combination of perforations in ulcers of the DPK with profuse bleeding, pyloroduodenal stenosis, and penetration is observed with a frequency of 6–28% [9, 53, 58]. It is remarkable that in the central region of the Russian Federation the case mortality rate of perforated ulcers of the stomach and the DPK not only failed to decline, but increased from 11 to 12% over a 50-year period (1961–2012) [59]. According to data collected by Moscow's head surgeon A.S. Ermolova, the mortality rate of perforated ulcers reached 18–23% in 2008 in large city hospitals, and the postoperative case mortality rate of gastrointestinal ulcer bleeding reached 30–33%. In 2010, these figures were 13–22% and 20–40%, respectively [60].

Thus, it is fair to ask if the problem of PU has been fundamentally resolved, then where are these patients coming from? And is it not these patients that physicians were treating until their

complications demanded emergency surgery to preserve the patient's life.

Another very important question concerns the malignization of chronic stomach ulcers. According to data from I.V. Kliminsky et al, 4% of patients with long-term stomach ulcers developed stomach cancer after repeated courses of conservative treatment [61]. According to data from Ya.V. Sikorskaya et al, the frequency of stomach cancer development in non-operated PU patients recorded in the dispensary of disease is 7%. More often than not, cancer concomitant with stomach ulcer developed over a timeframe of up to 10 years from the beginning of the illness (43% of observations). Furthermore, the tumorous transformation can occur in the ulcer itself as well as the area of scarring [62, 63]. It is understood that cancer is an entirely different illness with an entirely different prognosis, which is why long-term treatment of chronic stomach ulcers with conservative measures is dangerous, and its localization on the greater curvature is impossible, insofar as such ulcers are typically malignant in the absolute majority of observations [44, 63].

The uncritical decision made by a number of scientists in regards to the indicated peculiarities of PU cannot be explained rationally. Unfortunately, *Helicobacter* proponents prefer to remain quiet about these PU peculiarities.

However, a number of facts compel us to perform further analysis. These facts include the unusual range of evidence of eradication therapy for PU in the stomach and the DPK, recurrent ulcers after an excision or the stomach or vagotomy, non-ulcer dyspepsia, long-term use of non-steroidal anti-inflammatories, atrophic gastritis, peptic esophagitis, MALT lymphoma, the patient's condition after an excision of the stomach in connection to cancer, family history of stomach cancer, and the carrying of *H. pylori* with carcinophobia ("the individual desire of the patient"). At present the cost of one course of eradication therapy is valued at anywhere from 150–200 USD; a treatment course using gastric secretion blockers (depending on the schema employed) can reach 450–600 USD a year. This cost is considerably lower than those of radical surgical operations (roughly 2500 USD), but only in the case that the course of conservative treatment leads to recovery afterward. In

practice such a thing is uncommon, as courses of anti-secretory and eradication therapy must be repeated, and many patients are forced to undergo treatment for the entire remainder of their lives. It should be noted that the cost of surgery is approximately equivalent to the cost of a three-year course of conservative treatment, which means that its economic effectiveness after three years boils down to nothing, and with that we can avoid referencing discussions of the advantages of medicamental therapy in comparison to surgical operations. Next, it is known that in May of 2014 there were 7.25 billion people on the Earth, and according to data from Helicobacter proponents, 60% of them (that is, 4.35 billion people) were infected with *H. pylori*. Calculating the cost of eradication therapy, its potential market worth is valued between 870 billion and 3.18 trillion USD a year. In light of this, international meetings in Maastricht in 1996, 2000, 2005 and 2011 practically imposed a veto over planned radical operations on PU, but increased the results of eradication therapy (“at the will of the patients” with carcinophobia and “for members of the patient’s family”). A similarly strange position becomes more or less understood if we take into consideration that the profits of global pharmaceutical companies from the sales of PU eradication therapy medication are smaller only than those from the sales of cancer treatment drugs and antidepressants [41]. All of this allows us to regard the Helicobacter theory of PU together with eradication therapy as an exceptionally successful business project that spanned from the end of the 20th century to the beginning of the 21st, and in whose implementation, unfortunately, many doctors actively participated.

Underlying this, at the end of the 20th century there was an emerging downward trend in the number of planned PU surgeries, which almost resulted in their full discontinuation at the beginning of the 21st century. According to data from J. Cuttat et al, from 1976 to 1987 the total number of annual surgeries relating to PU declined by 30%. Conversely, the number of surgeries relating to duodenal ulcers that were chronic, recurrent, or resistant to conservative therapy increased by a factor of 10; the same trend can be seen for perforated and hemorrhagic ulcers [54]. According to data by G.A. Jr. Sarosi et al,

in the Veteran’s Administration Medical Center in Northern Texas (USA), surgeries relating to PU amounted to 33% of all surgeries of the stomach and the DPK, but the majority of them were emergency surgeries that were performed out of necessity on high-risk patients [6]. Consequently, A.E. Borisov and his colleagues as well as V.M. Lobankov wrote with concern about the infringement of well-known and clearly defined criteria for the selection of PU patients for planned, timely surgical treatment.

Thus, PU surgery toward the beginning of the 21st century was once again confined to only severe complications (bleeding, perforation, stenosis, malignization), which calls to mind the situation at the end of the 19th century [24, 46]. For example, for the original operation on perforated ulcers it is suggested to perform a simple sealing (although the shortcomings of this operation are well known), and for long-term treatment the patient was assigned to a primary care physician [3]. These tendencies were echoed even in the directives of administrative health care agencies directed by practicing surgeons. According to directive No. 541 of the General Health Directorate of Moscow, issued on August 8, 1987, “On the universal tactics of the diagnostics and treatment of acute surgical diseases of the abdominal region in medical facilities of Moscow” it was rightfully declared that SPV on complicated ulcers of the DPK should only be performed in the conditions of a specialized surgical in-patient facility having considerable positive experience with such surgeries. In the following directive from the Moscow City Health Department (No. 181), issued on April 22, 2005, an indication appeared that the present availability of antiulcer medications allow for the consideration of a simple sealing as a surgical option in the majority of cases of perforated ulcers in the DPK. In the last directive of the Moscow City Health Department (No. 320), issued on April 13, 2011, it is mentioned that the most typically performed surgeries on perforated ulcers were sealings, but they do not result in treatment of PU. Consequently, patients who underwent surgery are strongly directed to carry out full antiulcer treatment, including the eradication of *H. pylori* (!).

Thus, recent years have once again seen the propagation of the well-known but erroneous

thesis that surgical operations are only a phase in the lifelong treatment of PU. This approach was mirrored in the implementation of new endovideosurgical technologies in surgeries of the stomach and the DPK: for ulcer perforations, laparoscopic sealing is suggested as the leading method in the hopes of having an effect on long-term conservative treatment of PU [64]. But there are other opinions of this account. V.K. Gostischev et al indicated that among 65 patients, PU relapse occurred in 51 (that is, in 78.4% of cases) within the course of one year after the sealing of a perforated ulcer and subsequent eradication of *H. pylori* [14].

**Evidence for surgical treatment of PU:  
what changed?**

Despite the fact that considerable success has been noted in conservative treatments of PU, with the development of severe complications a surgical operation more often than not becomes unavoidable [5, 58, 65]. It is understood that persistent and expensive conservative treatment can bring about improvement, even with complicated ulcers. But the effects of such treatment are generally short-lived, and it is then necessary to resort to surgery all the same, but in worse conditions. It is important to take into account that under the influence of conservative treatment [ulcers] can diminish in size, and sometimes even malignant stomach ulcers can heal, which would naturally lead a doctor to error [18, 63].

Thus, we can consider it established that defined varieties of chronic gastroduodenal ulcers are incurable, that is, for the full resolution of the problem of PU surgical intervention is in some cases still necessary, which means that classical evidence for surgical treatments of PU [66] should remain valid. To this we must add that the so-called social evidence of radical surgeries for PU proposed by American surgeons in the 1940s and 1950s is also necessary to take into account, insofar as lack of capability on the part of the patient to conservatively recover in the long-term and observe a suitable diet in no way promotes the treatment of PU or prevention of its complication [43, 63]. However, one must not forget that the unsubstantiated expanse of evidence for surgical PU treatments is also impermissible, given that a good surgery not performed by necessity can bring great harm to the patient.

It is understood that the low mortality rate is observed only in planned surgeries, and for that reason it is desirable to once again examine the question of planned surgical treatment of PU. According to estimated totals by V.M. Lobankov, in the Russian Federation the demand for surgical treatment in PU patients was about 20-30% in 2005 [5].

Let us remember that in the 1970s a general practitioner who agreed with declarations from the USSR Ministry of Health had the right to discharge a patient with PU from an in-patient facility after the completion of a course of conservative treatment only after consultation with a surgeon who happened to be qualified to answer the question of the possible presence of indications for surgery in the specific patient. In the 1990s this law was abolished, and furthermore gastroenterologists then started having the audacity to give the irresponsible recommendation to PU patients to not undergo planned radical surgery, as if it were related to a great number of diverse complications. In regard to this, it is pertinent to note that if any general practitioner had tried to cure at least one of their patients with a chronic stomach or DPK ulcer that developed profound gastroduodenal bleeding, his opinion on the efficacy and safety of medicinal PU therapy would change immediately and drastically.

At the same time, the fact that the perceptions of the majority of general practitioners on surgical PU treatments and its aftereffects are extremely dull and considerably outdated evokes surprise. Present day stomach surgery is not what it was 40–50 years ago. Thanks to the efforts of several generations of doctors and scientists, PU surgery became not only more effective, but also entirely safe. It seems that the most shining example of surgeons' intentions to make PU surgeries more physiological is offered by the history of the development of organ-preserving operations.

**Organ-preserving operations with PU**

Until the end of the 20th century, two fundamental types of surgeries were established in the surgical history of PU: excision of the stomach and organ-preserving operations, on whose foundation various types of vagotomy now stand. It is significant that, after gastroenterostomy and excision of the stomach, vagotomy was acknowledged as the third major

step in the solution of the problems of surgical treatment for PU. Nonetheless, longstanding experience showed that excision of the stomach cannot be excluded from the surgical arsenal: it has been unconditionally verified on long-term, existing gastric ulcers as well as complicated, chronic gastric ulcers. The unquestionable fact remains that a refractory chronic stomach ulcer must be erased in all cases as a substrate upon which cancer can develop. At the same time it is known, that chronic DPK ulcers never become malignant, but instead are capable of quickly and permanently healing under consistent reduction of gastric secretions to defined healthy levels. It is exactly for this reason that within the conceptual limits of physiological surgeries, organ-preserving operations serve to create the most beneficial local conditions for the swift and dependable regeneration of DPK ulcers without removal of some part of the stomach, give the entire gastrointestinal system the capability to function in optimal physiological conditions, and at the same time guarantee the patient a full recovery and quick medical, social, and occupational rehabilitation, as well as a higher quality of life [67].

The fact that a subdiaphragmatic truncal vagotomy reduces gastric secretion was first presented by English surgeon B.C. Brodie in 1814 in experiments on dogs [67, 68], but the use of a vagotomy as a remedial surgery was first suggested by the eminent Russian physiologist I.P. Pavlov [67]. Based on R. Heidenhain's idea on the cyclical activity of the stomach and concepts by C. Bernard and K. Ludwig on the uniformity of the internal environment and self-regulation of an organism's functions, I.P. Pavlov created a new theory on the physiology of digestion, in which one of the important points was the discovery of the role of the vagus nerves in the regulation of the secretory functions of the stomach. From 1889 to 1894, I.P. Pavlov created the "imaginary nourishment" method and the "tiny stomach" method. Inventively using both methods in a long-term experiment, I.P. Pavlov determined exactly how gastric digestion occurs in the first (cephalic) phase. It is very important that these labors by I.P. Pavlov, which earned a Nobel Prize in 1904, are weighed in to the creation of the so-called "physiological surgery". According to the definition of

I.P. Pavlov, a physical surgery is "the execution... of more or less complicated surgeries, with the goal of ... opening access to physiological phenomena which are happening in the depths of the body, eradicating this or another existing affinity between organs or, on the other hand, establishing a new one, etc., and thereafter skillfully treat and recover how much this may indeed be the case for the essence of surgery, the general condition of a beast to the norm" [67, p. 85]. In relation to this arises the necessity for correcting the pathophysiological mechanism of illnesses with the help of surgical operations. This progressive idea seemed atypical against the background of the tsar's logic of surgical intervention at the end of the 19th century and into the beginning of the 20th – locate and excise the anatomical substrate that is defined as an illness by clinical findings. Developing his own theory, I.P. Pavlov offered truncal vagotomy (TV) to the attention of clinicians, which was introduced into clinical practice by A. Exner in 1911, and became systemically performed by H. Bircher in 1912. In 1920, H. Bircher reported on twenty cases of TV, and in 1931 already had experience in 150 similar operations, in which 75% of observations received a positive result [67, 69]. In 1922 and 1923, A. Latarjet and P. Wertheimer developed and employed a method for duodenal ulcers that brings to mind present day selective vagotomy. A. Latarjet later revealed the irregularities of gastric evacuation after a vagotomy and was the first to implement it for the elimination of gastroenterostomy. Roughly the same was submitted by N.A. Podkaminsky in Russia in 1925, who added TV to gastroenterostomy [67, 69, 70].

Vagotomies in Russia are very much "out of luck". Scientific discussions were held in the USSR in the 1940s and 1950s where public speaking was widely practiced, saturated with demagogic slogans and ideological accusations in the address of scientific opponents (this not infrequently bought about not only the swift removal of these opponents from the scientific arena, but was able to altogether bring about their arrest and physical annihilation). During the unhappy period of the "cold war", "iron curtain" and "fight against rootless cosmopolitanism", proponents of "Marxist-Leninist" studies and "Soviet" surgery began to sharply critique the

vagotomy which “arrived from the West” with an attitude of the “singularly true” materialistic doctrine of I.P. Pavlov. In point of fact, in the first post-war years the vagotomy arrived (or, more accurately, returned) to the USSR from the USA and the publication of the work of L. Dragstedt (1943-1946). TV in these years was even called “the Dragstedt operation”. But Soviet specialists, unfortunately, “forgot” about the labors of distinguished Russian scientists many years before the research of prominent foreign surgeons in this area, although to critique the vagotomy from the stance of I.P. Pavlov’s reflex theory – the creator of the concept of the utilization of a vagotomy on PU, was strange to say the least [67].

Nonetheless, in the 1960s and 1970s, thanks to the labors of D.A. Arapov, V.S. Mayat, Y.M. Pantsyrev, A.S. Greenberg, M.I. Kuzin, and other scientists, the vagotomy gradually strengthened its position and began to be considered as a valuable surgical method in the arsenal of the surgical treatment of PU.

Until the 1990s, SPV received the greatest recognition as the most physiological method of operation on duodenal ulcers of all of the types of organ-preserving operations insofar as it selectively denervated only the acidogenic area of the stomach (the proximal area), while fully preserving the innervation of the pylorus, that is, its secretory and motor functions [56, 70]. The transition from classical stomach excision to organ-preserving surgeries allowed for significant improvements in the results of surgical treatments for ulcers of the DPK [5, 71]. In comparison to stomach excisions, the average period of patient incapacity after SPV was reduced by a factor of 2, and the rate of disablement was reduced by a factor of 6.5 [72].

In the last years of the 20th century, there was great development in minimally invasive technology for abdominal surgeries, including those in the stomach and the DPK. It is mentioned that endovideosurgical technologies provide a number of advantages in terms of the reduction in the frequency of complications and mortality level as well as a shortening of the hospitalization period and duration of post-operative patient rehabilitation. Numerous reports have appeared on the laparoscopic sealing of perforated ulcers [52, 64, 73], as well

as the combination of laparoscopic sealing of perforated ulcers of the DPK with SPV [74], and the laparoscopic and video-assisted excision of the stomach [75, 78]. Some surgeons began to perform stomach excisions on patients with complicated ulcers with minilaparotomic ingress, using high-precision techniques [79, 80]. It was exactly in the development and implementation of endovideosurgical technology that the persistent hopes of surgeons were mirrored for the minimization of surgical trauma as one of the most efficient resources for the improvement of post-operative results.

### Results of the surgical treatment of PU

In his own time, S.S. Yudin suggested the creation of a system of dispensary observation, in which one could trace the fate of an ulcer patient from the first moment of illness until their very death, and thereby define the immediate and long-term results of conservative and surgical treatment [43]. Unfortunately, such a system so far does not exist, and for that reason we are forced to operate with limited statistical data. These data give evidence to the fact that the frequency of PU relapse without prophylactic therapy is 70-80%, but after a singular course of *H. pylori* eradication – 10-20% (!), and after the implementation of other types of conservative treatment – from 5-12.5%. At the same time, after a stomach excision the frequency of recurrent (peptic) ulcers amounts to 1.5-2%, and after organ-preserving surgery – 0-5% [41].

Thus, the development of organ-preserving and later minimally invasive surgeries on the stomach and the DPK reflects an extremely progressive tendency associated with the installation of radical treatment of an ulcer patient and the application of less harm to the patient. Ideally, the surgeon should aspire to return the vital activity of separate organs and systems, as well as the organism as a whole, to the physiological norm [67]. To that end, the old assertion that “if you already have ulcers, you have them forever” has long ceased to satisfy surgeons. The fundamental principle of the surgical treatment of PU should sound like this: “Before the operation, an ulcer patient; after the operation, an effectively healthy person”. This concept was formulated at the end of the 20th century [70], and remains relevant today.

In the 21st century, surgery gradually became at once much less traumatic and much more precise, painless, reliable, and safe. On this basis we can suggest with a high degree of certainty that the perspectives of radical surgical PU treatment will to a large extent be associated with the refinement and broad implementation of physiological and minimally invasive surgeries that are easily bearable for patients.

### Conclusion

The study of the history of the application of fundamental medical treatment methods for PU shows that not a single one of them became a panacea, primarily because the etiology of PU has not been fully ascertained. The creation of the Helicobacter theory of PU and wide expansion of eradication therapy did not bring about a solution to the problem. The question of how we need to treat PU – conservatively or surgically, it appears, has little point. It is clear that the defined types of chronic gastroduodenal ulcers appear consistently under any type of conservative treatment, and for that reason should be considered as testimony for radical surgical operations. Surgeries are also becoming practically unavoidable with

the development of severe PU complications (perforation, bleeding, stenosis, malignization). Obviously, it is necessary to once again call to mind that the establishment of evidence for the surgical treatment of PU is the absolute prerogative of the surgeon – the gastroenterologist has entirely different responsibilities. It is understood that surgeons without primary care doctors, hygienists, or healthcare organizers are unable to exactly ascertain the infection rate of PU or the true frequency of its complication. Nevertheless, specialists who study the surgical treatment of PU can give an account of their own experience, compiled for many years to come, and vocalize their own observations in this regard. The development of organ-preserving and endovideosurgical surgeries for PU should be considered an outstanding achievement of the last quarter of the 20th century. In the 21st century, the perspectives of the surgical treatment of PU, in all likelihood, will be associated with the refinement and wide utilization of minimally invasive technology. The larger the volume of scientific research on this subject, the faster the problem of PU treatment in our country will begin to be properly resolved.

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