

## 1. Introduction

Gastric malignant tumors remain the most common form of malignancy in many countries in Europe, Asia and South America. The highest incidence is observed in Japan – 91.4 per 100 thousand population per year, and the lowest is registered in the United States – 6.9 per 100 thousand population per year [1]. Ukraine is one of the countries with an average incidence of gastric cancer – 30.8 per 100 thousand population per year [2, 3]. Despite advances in the diagnosis of malignant tumors, the number of patients with stage III–IV gastric cancer is detected in 75 % of cases [4–6]. Among the number of patients with newly diagnosed gastric cancer, 62.6 % did not live for 1 year [2, 7, 8]. Surgical treatment covers about 45.0–50.0 % of patients with a mortality of 15–20 %, with low rates of operability and resectability – 40.5 % and 62.1 %, respectively, explain the dissatisfaction with the results of surgical treatment of patients in this group of patients and the relevance this topic [3, 9, 10].

Gastrointestinal bleedings are one of the most serious and most common acute complications of gastric cancer and their number and severity is progressively increasing every year [4, 5, 8–9].

The statement that the complication of gastric tumor by bleeding is a sign of neglect and inoperability of the process – is false and with recent studies has undergone a radical revision [8–10]. Progress in this direction is early diagnosis, successful minimally invasive endoluminal endoscopic hemostasis, clarification of the stage of the tumor process, performing in a significant number of patients both radical and palliative surgical interventions after comprehensive training and examination [1, 6, 8–10]. Operations at the height of bleeding are rarely performed, only for vital indications, because they are accompanied by a high frequency of postoperative complications and mortality [1, 6]. In the surgery of gastric cancer complicated by bleeding, the attention of surgeons is focused not only on the possibility of radical removal of the tumor, but also on the use of new methods of gastrectomy and subtotal gastrectomy, reconstructive esophagojejunoplasty with the formation of small bowel reservoirs, quality of life of such patients [6].

**The aim of the work.** The main purpose of this study is improving the results of surgical treatment of patients with malig-

## WAYS OF IMPROVING THE RESULTS OF SURGICAL TREATMENT OF GASTRIC MALIGNANT TUMORS, COMPLICATED BY GASTROINTESTINAL BLEEDING IN THE CONDITIONS OF EMERGENCY CARE

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**Abstract:** The aim is to improve the results of surgical treatment of patients with gastric malignant tumors, complicated by gastrointestinal bleeding, by developing and implementing in clinical practice a new treatment tactic.

**Materials and methods.** The study was conducted on the basis of the Kyiv City Center for Emergency Care of Patients with Gastrointestinal Bleedings and at the Kyiv City Clinical Ambulance Hospital (Ukraine) for the period from 2010 to 2020. A comprehensive examination and analysis of treatment's results of 140 patients with malignant gastric tumors complicated by acute gastrointestinal bleeding, which amounted to 2.2 % of all treated patients with gastrointestinal bleeding during this period.

**Results.** Radical operations were performed in 97 (69.3 %) patients, palliative and symptomatic – in 43 (30.7 %). Comparing the frequency of complications in the two periods of treatment of patients, a decrease in the second period, compared with the first period, the frequency of complications from 27.2 % to 11.4 % due to a decrease of 1.8 times (from 68.8 % to 37.5 %) complications after emergencies and related fatalities from 36.4 % to 0 and 2.2 times (from 20.8 % to 9.6 %) the incidence of complications after early delayed operations with a decrease in frequency fatalities from 20.9 % to 18.2 %.

**Conclusions.** Operations at the height of acute bleeding in patients with gastric cancer are too dangerous due to the high postoperative mortality. The optimal standard is the use of a set of minimally invasive methods of endosurgical hemostasis to stop active bleeding and prevent its recurrence and operate on patients in the early delayed period. Adherence to such tactics is expedient from the point of view of reduction of risk for a life of the patient and possibility of carrying out radical operations.

**Keywords:** malignant tumors of the stomach, gastrointestinal bleeding, surgical tactics, endoscopic hemostasis, radical surgery, postoperative complications, postoperative mortality.

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## 2. Materials and methods

The study was conducted on the basis of the Kyiv City Center for Emergency Care of Patients with Gastrointestinal Bleeding and in the Kyiv City Clinical Ambulance Hospital for the period from 2010 to 2020. Criteria for inclusion in the study were patients who were urgently hospitalized and operated on in an urgent or delayed period for acute gastrointestinal bleeding, the source of which is a malignant tumor of the stomach. The exclusion criteria were patients operated on for gastrointestinal bleedings of other etiologies. The study was agreed and approved at a meeting of bioethics commission of O. Bogomolets National medical university (expert opinion No. 121 dated 24.04.19). The study materials contain "Informed patient consent", the study does not involve an increased risk for study subjects and is performed in accordance with existing bioethical norms and scientific standards for conducting clinical trials involving patients. And the study was conducted according to basic bioethical standards Helsinki Declaration of the World Medical Association on Ethics principles of scientific and medical research as amended (2008), Universal Declaration of Bioethics and Human Rights (1977), Convention Council of Europe for Human Rights and Biomedicine (1997). During the study, we used the methods of statist observation, the method of compilation and

grouping of primary statistical material and determining generalized summary indicators. All data, obtained during the study, were statistically processed using packages of software statistical analysis MedStat, IBM SPSS Statistics Base v.22. and EZR (R-statistics) by used rank correlation method – Spearman coefficient (p), pairwise group comparisons were performed using the non-parametric Wilcoxon method, methods of variational statistics, the standard deviation S, the mean error m, the difference at  $p < 0.05$  was considered statistically significant.

A comprehensive examination and retrospective analysis of the results of treatment of 140 patients in which gastric malignant tumors were complicated by gastrointestinal bleeding and which amounted to 2.2 % of all patients treated for gastro-

intestinal bleeding during this period. The age of 92 (65.7 %) men and 48 (34.3 %) women was from 19 to 90 years, and the largest number of patients was observed in the age groups 61–70 years – 43 (30.7 %), and 71–80 years – 34 (24.3 %) patients, the average age of patients was 61.5±13.1 years. The ratio of men to women was 2:1. The study of treatment results was performed in two groups of patients treated for two periods, which correspond to the stages of improvement and implementation in clinical practice of minimally invasive methods of endosurgical interventions aimed at stopping active bleeding and preventing its recurrence, as well as revising the principles of approach and criteria tactics. The I period – patients who were treated in our clinic from 2010 to 2016 and II period – patients who were treated in our clinic from 2017 to 2020.

In the first period, the analysis of the results of treatment of patients with malignant tumors of the stomach complicated by gastrointestinal bleeding. Based on the analysis, the criteria for selecting the algorithm of surgical tactics are developed. The developed algorithm of medical tactics is introduced in the II period of treatment of patients, after which the comparative analysis of results of patients treatment in two periods is carried out.

The structure of gastric malignancies in the two periods of patients treatment are presented in **Table 1**.

**Table 1**  
The structure of gastric malignancies in the two periods of patients treatment

Type of malignant tumor complicated by bleeding	I period 2010–2016	II period 2017–2020	Total
Malignant tumors of the stomach	76	64	140
Stomach cancer	60	53	113
Gastric sarcoma	16	11	27

According to the classification adopted in our clinic (Bratus V. 1988), in 68 (48.6 %) patients gastrointestinal bleeding was moderate, in 41 (29.3 %) – moderate and 31 (22.1 %) patients had severe bleeding, of which 9 (29.0 %) patients were delivered in a state of severe hemorrhagic shock.

The presence of gastrointestinal bleeding was established on the basis of clinical symptoms, as well as according to endoscopic examination with verification of the corresponding stigmata of bleeding activity according to Forrest J.A.H.: (1974). Thus, 27 (19.3 %) patients were hospitalized with endoscopic signs of ongoing bleeding (FIA, FIB), 82 (58.6 %) patients with unstable hemostasis (28 (34.1 %) patients with FIIB and 54 (65.9 %) patients with FIIC) and 31 (22.1 %) patients were hospitalized with endoscopic signs of stable hemostasis (FIII, defect under fibrin).

According to the International Classification of TNM of the eighth revision (2016), all patients were hospitalized at different stages of cancer, among them the largest group were patients with stage III (47 patients) and IV (43 patients), with stage II were 32 and the smallest group was patients with initial I and Cr in situ stages of the oncological process (9 patients, respectively). Among patients with newly diagnosed gastric cancer (51), operative activity was 50.7 % (71 of 140 patients).

Treatment tactics were determined depending on the prevalence of tumor lesions and the stage of the process, the presence of concomitant pathology, the severity of blood loss, the state of hemostasis. Thus, in the presence of active tumor bleeding, patients underwent minimally invasive endosurgical interven-

tions aimed at stopping it, and in the presence of stigma of recent bleeding, endosurgical hemostasis measures are indicated to prevent recurrence of tumor bleeding. In total, endoscopic hemostasis was performed in 56 (40 %) patients with signs of active, including recurrent, bleeding and unstable hemostasis after spontaneous cessation of tumor bleeding, with a high risk of recurrence of bleeding.

### 3. Results

Radical operations were performed in 97 (69.3 %) patients, palliative and symptomatic – in 43 (30.7 %). Radical operations were performed in the following stages of the tumor process: stage I and Cr in situ – 19 (13.6 %), II – 48 (34.3 %), III – 45 (32.1 %), IV – 28 (20.0 %).

As a matter of urgency, 19 (13.6 %) patients were operated on at the height of ongoing bleeding and at the height of its recurrence, with a mortality of 5.3 % (1 patient): 17 radically (89.5 %), including standard radical gastrectomy performed 12 (70.6 %) patients, gastrectomy – 5 (29.4 %), non-radical surgery – 2 (10.5 %) patients who performed stitching of bleeding vessels of the stomach. 121 (86.4 %) patients underwent surgery for acute gastric malignancy in the early delayed period, after adequate preoperative preparation and comprehensive follow-up, of which 80 patients managed to undergo radical surgery. Among them – 55 (68.8 %) standard radical resections of the stomach, 25 (68.8 %) – radical gastrectomies, among which 5 (20 %) – advanced radical gastrectomies with splenectomy and resection of the tail of the pancreas (as a consequence of tumor growth in neighboring organs and tissues) and 12 (48 %) patients underwent surgery aimed at improving the quality of life of patients in the postoperative period – gastrectomy in combination with gastroenteroplasty.

In the early delayed period, palliative and symptomatic operations were performed in 41 (29.3 %) patients: palliative gastrectomy – 32 (78.0 %); imposition of gastroenteroanastomosis – 5 (12.2 %): posterior anterolateral on a short loop – 2 (4.9 %), anterior anterolateral on a long loop with Brownian conjunctiva – 2 (4.9 %). Palliative surgery was supplemented by alcoholization of liver metastases in 9 (22 %) patients and peritoneal fenestration – in 2 (4.9 %).

The total postoperative mortality was 7.1 % (10 patients), 6 (4.3 %) patients died after radical surgery, and 4 (2.9 %) after palliative and symptomatic surgery (for all types of operations, statistically significant differences in the distribution of indicators did not differ from normal at the level of significance ( $p \geq 0.1$ )).

Five-year survival after radical surgery was 44.5 % and 10-year survival was 8.9 %, with a median life of 29 months.

After 97 radical surgical interventions, the development of 57 complications was noted in 20 (20.6 %) patients. Surgical complications (42) occurred in 16 (64.5 %) patients, non-surgical complications (15) were noted in 4 (4.1 %) patients.

In 43 patients who underwent non-radical operations, 17 complications were noted, which developed in 12 (27.9 %) patients. The surgical group of complications (11) was identified in 5 (11.6 %) cases, the non-surgical group (6) in 7 (16.3 %) cases.

### 4. Discussion

When comparing the frequency of complications, it was found that after radical operations, surgical complications were 4 times more common than non-surgical complications, ( $p < 0.05$ ). In the group of patients who underwent non-radical operations in the vast majority of cases there were complications not related to surgery – 7 (16.3 %), and complications whose development is associated with surgical treatment were noted in 5 (11.6 %) cases ( $p < 0.05$ ).

Complications after radical surgery caused 6 (4.3 %) deaths, after non-radical operations complications led to 4 (2.9 %) deaths.

Analysis of the types of complications that caused fatal consequences, found that after radical surgery, 2.8 times more common complications associated with surgical treatment, in contrast to patients who underwent non-radical surgery, where among the complications that caused death, in 2.7 times are those that are not associated with surgical treatment ( $p < 0.05$ ).

Comparing the frequency of complications in the two periods of treatment patients, a decrease in the second period, compared with the first period, the frequency of complications from 27.2 % to 11.4 % due to a decrease of 1.8 times 37.5 %) complications after emergencies and related fatalities from 36.4 % to 0 and 2.2 times (from 20.8 % to 9.6 %) the incidence of complications after early delayed operations with a decrease the frequency of fatalities from 20.9 % to 18.2 %, the obtained differences are statistically significant at the level of significance,  $p \leq 0.05$ .

The mortality rate after complications that developed after emergency operations was consistently high and was 100 % in two periods of treatment, due to the conduct of patients in the IV clinical group “despair operations” to stop profuse tumor bleeding on the background of generalization of malignant tumors and multiorgan insufficiency due to cancer intoxication, this is also confirmed by the study of Skierucha M et al., where 100 % mortality was obtained after complications that developed after emergency surgery too [7].

Mortality after complications that developed after early-delayed operations decreased from 53.8 % in the first period to 40.0 % in the second period ( $p < 0.05$ ). The mortality rate obtained in the second period of our study is 1.5 times lower than the mortality rate obtained in the study by Lazyrsky V. (60 %) and 1.7 times lower than the mortality shown by Linhua Yao et al (68 %), [4, 9].

**Study limitations** were the lack of documented histopathological findings in urgently operated patients who had been previously diagnosed with cancer and who died without autopsy and patients who did not require a complete package of laboratory tests.

**Prospects for further research** on this issue are the development of new treatment and tactical approaches to improve the treatment of patients with acute complications of gastric malignancies, based on minimally invasive endoscopic measures of hemostasis, clinical and endoscopic monitoring to prevent recurrence of bleeding, surgical intervention, the choice of method and timing of its implementation.

## 5. Conclusions

Mortality after emergency operations at the height of ongoing and recurrent bleeding is 4.6 times higher than after operations performed in the early delayed period, performed after adequate preparation and comprehensive follow-up of patients, with the proportion of deaths after radical surgery is 2.1 times less in comparison with palliative and symptomatic operations. Therefore, we consider operations at the height of bleeding in patients with acute gastric cancer to be too dangerous, which is associated with high postoperative mortality.

The optimal standard is the use of a set of minimally invasive methods of endosurgical hemostasis to stop active bleeding and prevent its recurrence and operate on patients in the early delayed period. Adherence to this tactic is appropriate in terms of reducing the risk to the patient's life and the possibility of radical surgery with lymph dissection in the volume of D2.

## Conflicts of interest

The authors declare that they have no conflicts of interest.

## References

1. Japanese gastric cancer treatment guidelines 2014 (ver. 4) (2017). *Gastric Cancer*, 20 (1), 1–19. doi: <http://doi.org/10.1007/s10120-016-0622-4>
2. Akhmetzyanov, F. Sh., Akhmetzyanova, F. F. (2015). The principles of surgical treatment of locally advanced gastric cancer spread. *Oncology Bulletin of the Volga Region*, 2, 26–41.
3. Borbashev, T. T., Kharitonov, M. Yu. (2016). Advanced combined operations in complicated gastric cancer (review). *Journal “Vestnik KRSU”*, 16 (11), 102–105.
4. Yao, L., Yu, F., Mao, Y., Wang, T., Qi, Q., Ding, H. et. al. (2018). Gastric cancer may share genetic predisposition with esophageal squamous cell carcinoma in Chinese populations. *Journal of Human Genetics*, 63 (11), 1159–1168. doi: <http://doi.org/10.1038/s10038-018-0501-4>
5. Yamaoka, Y. (2018). How to eliminate gastric cancer-related death worldwide? *Nature Reviews Clinical Oncology*, 15 (7), 407–408. doi: <http://doi.org/10.1038/s41571-018-0029-8>
6. Yarema, R. R., de Manzoni, D., Fetsych, T. H., Ohorchak, M. A. (2015). D2 lymph node dissection: on the way to implementation in European population of patients with gastric cancer (review). *Clinical oncology*, 1 (17), 24–29.
7. Skierucha, M., Milne, A. N., Offerhaus, G. J. A., Polkowski, W. P., Maciejewski, R., Sitarz, R. (2016). Molecular alterations in gastric cancer with special reference to the early-onset subtype. *World Journal of Gastroenterology*, 22 (8), 2460–2474. doi: <http://doi.org/10.3748/wjg.v22.i8.2460>
8. Beeharry, M. K., Liu, W. T., Yan, M., Zhu, Z. G. (2016). New blood markers detection technology: A leap in the diagnosis of gastric cancer. *World Journal of Gastroenterology*, 22 (3), 1202–1212. doi: <http://doi.org/10.3748/wjg.v22.i3.1202>
9. Lazyrskiy, V. O. (2017). Results of operative treatment in patients, suffering complicated locally-spread gastric cancer. *Klinicheskaiia Khirurgiia*, 9, 24–27. doi: <http://doi.org/10.26779/2522-1396.2017.09.24>
10. Torre, L. A., Bray, F., Siegel, R. L., Ferlay, J., Lortet-Tieulent, J., Jemal, A. (2015). Global cancer statistics, 2012. *CA: A Cancer Journal for Clinicians*, 65 (2), 87–108. doi: <http://doi.org/10.3322/caac.21262>

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