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CASE STUDY

PATIENT MANAGEMENT TACTICS AT DIFFERENT STAGES OF GASTROINTESTINAL STROMAL TUMORS (GIST)

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Yevhen S. Hotko, Svyatoslav V. Zhero, Layosh L. Varga, Myroslav V. Rosul
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ABSTRACT

The aim: To analyze the results of treatment even in limited groups of patients.

Materials and methods: Clinical cases of GIST based on the materials of the surgical clinic of the Central Municipal Hospital in Uzhgorod (Transcarpathian region) were discussed. Clinical, ultrasound and CT monitoring was provided. CT dynamics were assessed according to RECIST 1.1.

Conclusions: Only surgery resection is enough in case of the "small" tumor originated from the stomach. Otherwise, in case of locally-widespread GIST it is expedient to refrain from radical surgical intervention. High-grade GIST was verified by the IHC examination with mutation of the KIT gene in exon 11. Imatinib mesylate 400 mg PO daily was prescribed. More than 1-year follow-up result: firstly more than 50% reduction of the tumor size with subsequent stabilization of the disease.

Minimally invasive processes allow surgical interventions and do not require aggressive adjuvant therapy. The presence of a giant GIST is a serious diagnostic and treatment challenge. Only management of the patient by a multidisciplinary team allows to resolve diagnostic and treatment contradictions, to create the prospect of achieving complete or partial remission and long-term survival.

KEY WORDS: Gastrointestinal stromal tumors (GIST), surgical care, immunohistochemical (IHC) study, targeted therapy, imatinib mesylate

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INTRODUCTION

Gastrointestinal stromal tumors (GIST) are a heterogeneous group of c-KIT positive mesenchymal tumors that have specific morphological, immunohistochemical and molecular characteristics. In routine morphological diagnosis, GIST is often mistakenly described as "mesenchymal tumor", "neuroendocrine tumor", "carcinoid". An IHC study allows to verify GIST by CD 117 and DOG1 markers [1, 2]. Proliferative potential is determined by mitotic activity (counting the number of mitoses in 50 fields of view of the micropreparation), as well as by Ki 67 marker, which predicts the aggressiveness of the disease course. It is also advisable to conduct a molecular study on the presence and nature of mutations in KIT (wild type or mutation in exons 9, 11, 12), which allows predicting the response to target therapy. The topography of GIST in the gastrointestinal tract is as follows: the majority (up to 70%) affects the stomach, 30% – other parts of the gastrointestinal tract, mainly the small intestine.

The majority of patients are 50+. The incidence rate of GIST does not exceed 0.8 – 1.5 cases per 100,000 population, prevalence rate – up to 13 patients per 100,000 population [3]. Intensive prevalence rates (less than 50 patients per 100,000 population) allow GIST to be classified as an "orphan" disease with ORPHACode 44890 [4, 5]. Given the low incidence and prevalence rate, it is reasonable to analyze the results of treatment even in limited groups of patients.

In routine clinical practice, GISTs are often diagnosed at locally disseminated and metastatic stages. Operative treatment is indicated for local processes originating from the organs of the upper gastrointestinal tract (stomach, small intestine). Preliminary information about the morphology of the tumor allows to reduce the standard volumes of intervention (for the stomach – subtotal and wedge-shaped resections instead of gastrectomy and D2 lymphodissection). The requirements for radicalism of handing (R0) remain unchanged. Locally disseminated tumors, the resectability of which is often doubtful, also require surgical revision. According to the literature data, cytoreductive interventions in such cases are not the optimal solution [6]. GISTs are resistant to "standard" polychemotherapy regimens. The introduction into clinical practice in 2000 of targeted drugs, in particular, tyrosine kinase inhibitors (imatinib mesylate, sunitinib, regorafenib), significantly improved the prognosis of patients with GIST [7].

THE AIM

To evaluate the results of a multimodal approach to the treatment of GIST.

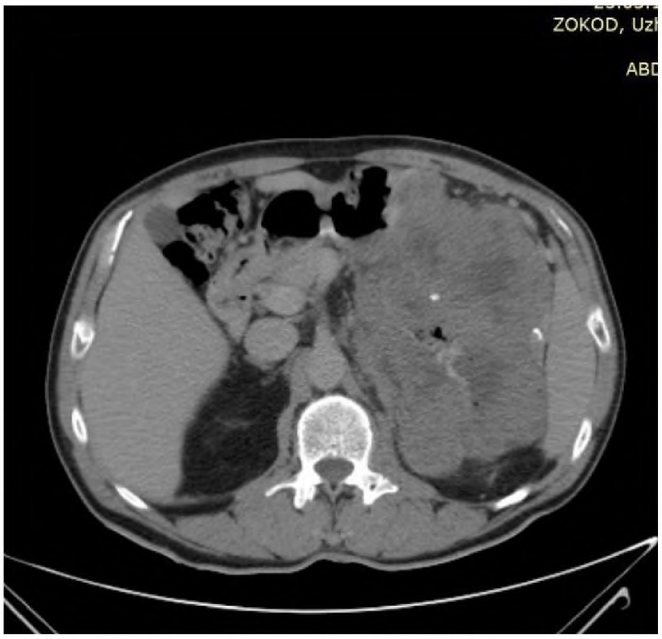

Fig. 1. CT data 24.09.2021, tumor 213x141x118 mm.

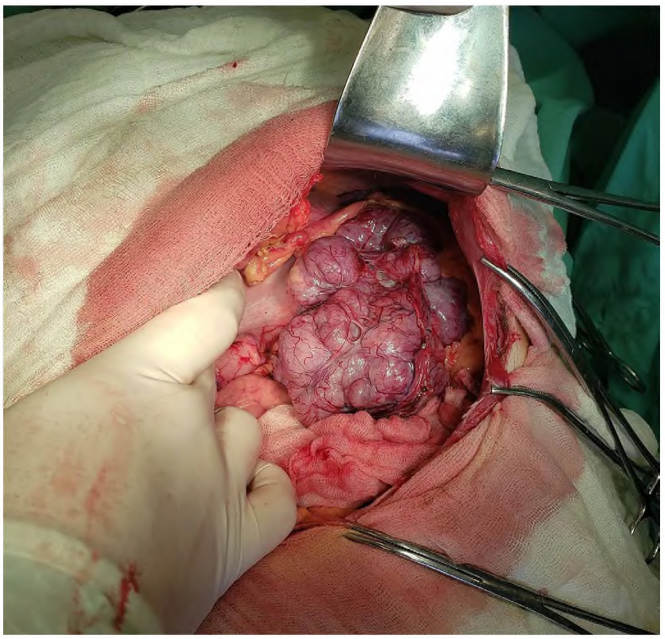

Fig. 2. Laparotomy 27.10.2021, surgical revision of the abdominal cavity

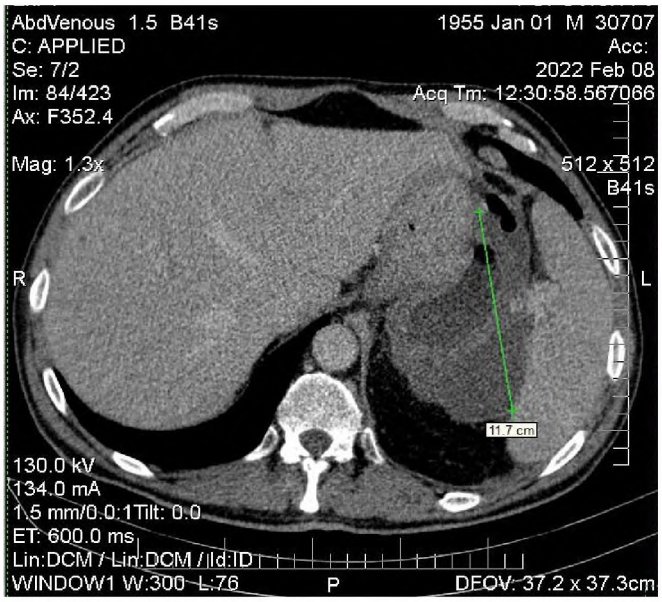

Fig. 3. CT data 08.02.2022, tumor 112x93x90 mm

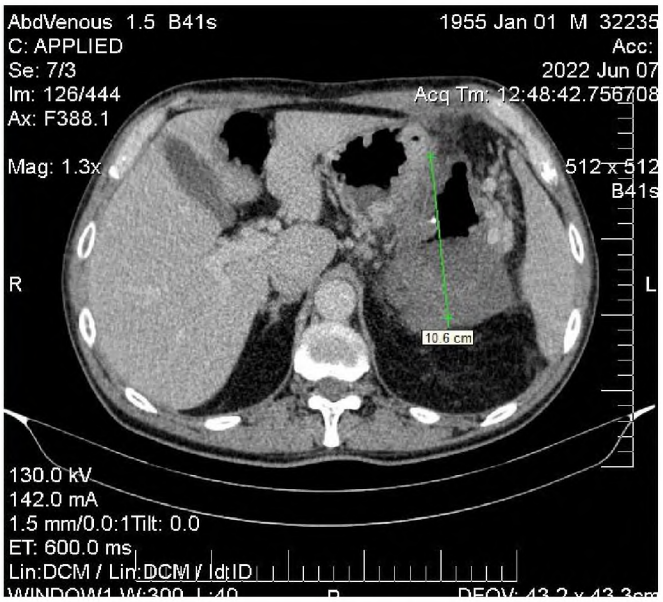

Fig. 4. CT data 07.06.2022, tumor 104x93x84 mm

MATERIALS AND METHODS

We considered clinical cases of GIST based on the materials of the surgical clinic of the Central Municipal Hospital in Uzhgorod (Transcarpathian region). Given the low incidence rate, we have only 3 GIST cases for analysis in the last 3 years (2021 – 2023).

CASE STUDY

Patient N., 68 years old, was operated on in the scope of a wedge-shaped resection of the stomach (R0), since the morphology of the process was previously verified on the material of the gastrobiopsy. She categorically refused adjuvant targeted therapy. As of January 2023, ECOG = 0, there are no data for prolongation of the process, the patient is working.

Patient K., 64 years old, was urgently operated in November 2022 at the height of bleeding in the amount of subtotal resection of the stomach with anastomosis according to B-II. General morphology – carcinoid, IHC (CSD morphological laboratory, Kyiv) – GIST (G1). A low proliferative index for Ki-67 allowed the observed tactics to be applied.

Locally disseminated and metastatic processes require alternative tactics. Patient P., 65 years old, was hospitalized with intense pain in the epigastrium,

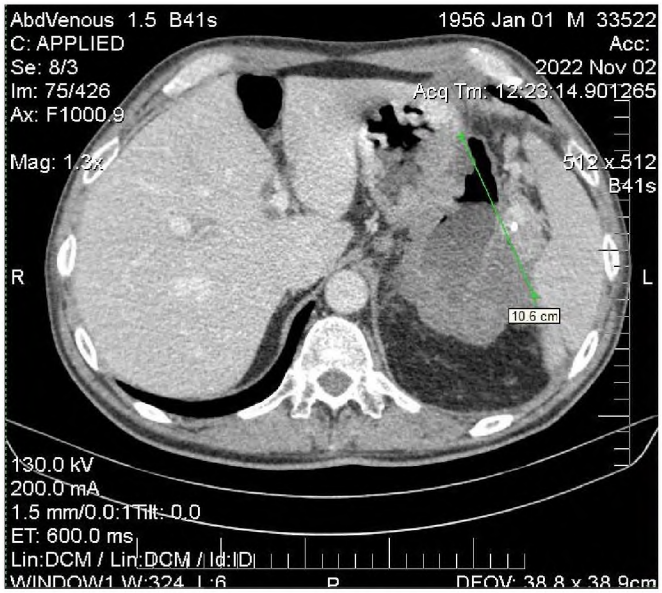

Fig. 5. CT data 02.11.2022, tumor 106x95x86 mm

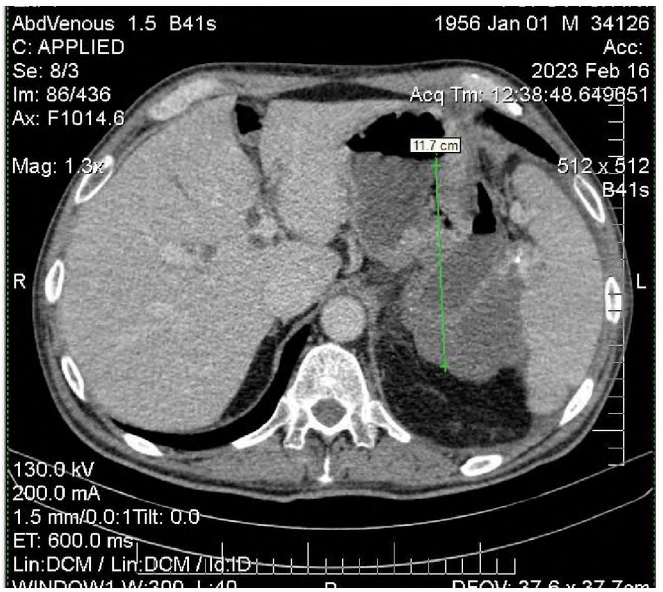

Fig. 6. CT data 16.02.23, tumor 115x86x72 mm

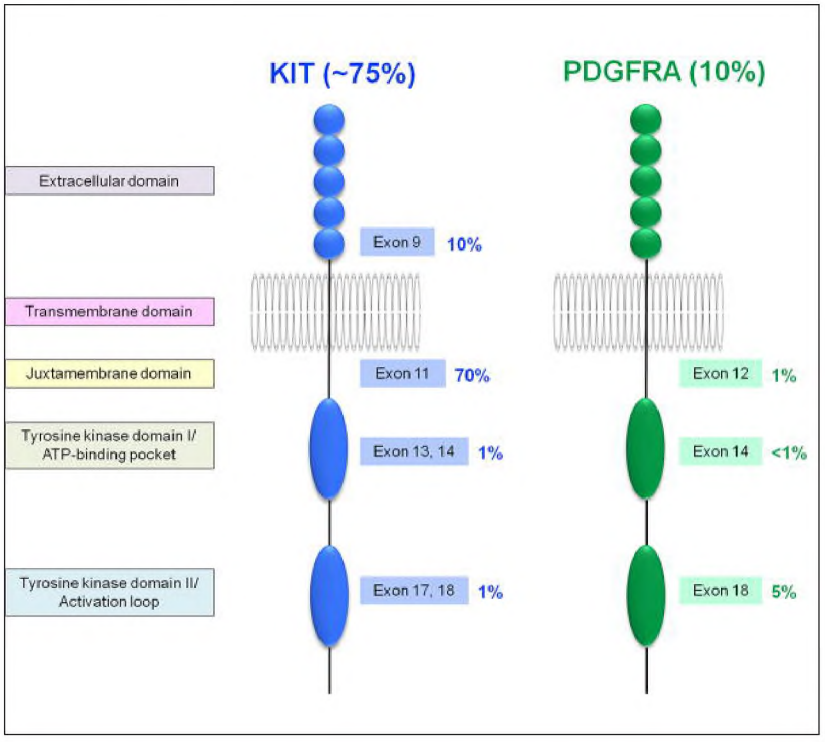

Fig. 7. Tyrosine kinase mutations in GIST: distribution of KIT and PDGFRA
(by I-M. Schaefer, A. Mariño-Enríquez, J. A. Fletcher, 2017)

pronounced general weakness, severe anemia, and hypoproteinemia. He has been experiencing these complaints for more than 5 months, and has lost more than 20 kg of body weight. During the examination, the skin and mucous membranes were pale, in the abdominal cavity, a tumor is contoured through the anterior abdominal wall and palpable, occupying the epi- and mesogastric area, mostly to the left of the midline. CT scan on September 24, 2021 – signs of a tumor measuring 213x141x118 mm (Fig. 1).

CT dynamics were assessed according to RECIST 1.1. The commission decided to start with an attempt at operative treatment. Intensive preoperative preparation (hemo-plasma transfusion) was carried out. Intraoperative findings: the tumor originated from the stomach with the formation of an ulcer defect in the cardiac part, intimately surrounds the aorta with spread to the posterior mediastinum, grows into the spleen, pancreas, the upper pole of the left kidney and the retroperitoneal space on the left (Fig. 2).

Intraoperatively, the case was consulted by an oncologist and a vascular surgeon. Taking into account the results of the revision, it was decided to refrain from radical surgical intervention An excisional biopsy of the tumor

was performed. The postoperative period was not complicated. Pathohistological conclusion – neuroendocrine tumor. GIST was verified by the CD 117 and DOG-1 markers [8], and a high-grade tumor (G2) by the number of mitotic figures was verified by the IHC examination in the certified laboratory CSD (Kyiv). Molecular research revealed a mutation of the KIT gene in exon 11 – a variant that is present in 67% of GIST cases [9]. Start of treatment – after 1 month after the laparotomy. Imatinib mesylate 400 mg PO daily was prescribed. Clinical and ultrasound evaluation was performed every month. CT control after 3 months from the start of treatment. February 8, 2022 – reduction of tumor size to 112 x 93 x 90 mm, June 7, 2022 – 104 x 93 x 84 mm (according to RECIST 1.1 criteria – regression by 47.4% and 51.2% respectively, partial response). (Fig. 3, 4).

CT 02.11.2022 – no dynamics, stabilization of the process (Fig. 5).

The general condition of the patient is satisfactory, as of January 2023, ECOG = 1, weight gain of 11 kg, no hematological changes, disturbances in the indicators of liver and kidney function. Side effects of treatment are moderate and do not significantly affect the quality of life. Objectively: on the CT scan from February 16, 2023, there is a slight increase in the mass to 115 x 86 x 72 mm, which can be considered as stabilization of the process (+9.6%), since according to RECIST 1.1 it does not exceed 20% of the previous data (Fig. 6).

DISCUSSION

Our results on surgical treatment of low-grade local GISTs at the height of gastric bleeding correlate with publications on successful surgical treatment in similar cases of gastrointestinal bleeding. [9]. In this case, the low-grade tumor did not require adjuvant targeted therapy. Tactics for the treatment of GIST with a high level of aggressiveness "high grade" require either surgical eradication (R0) followed by adjuvant target therapy, or conservative tactics with the use of tyrosine kinase inhibitors in inoperable cases. The overall mutation frequency of GIST reaches 85-90%, mainly in KIT and PDGFRA. Most of them demonstrated a high sensitivity to imatinib mesylate with KIT mutation in exon 11 (67.5%) [10]. The mutation frequency of KIT reaches 75-80% [11], (Fig.7).

On the other hand, the latest data on the molecular profile of GIST require a more precise stratification. For example, patients with rare KIT exon 11 homozygous mutations and KIT intron 10/exon 11 junction deletions demonstrated the highest recurrence rate and are associated with poor prognosis of patients with gastrointestinal stromal tumors [12].

Development of secondary tumor resistance to imatinib is possible in the future. According to the ESMO clinical recommendations, further tactics include switching to the 2nd line of targeted therapy (sorafenib) [14]. And other possible choice – the next, 3rd line of target therapy– regorafenib. [13]. Mutational profile of our patient tumor (mutation of the KIT gene in exon 11) does not predict a response to an increase in the daily dose of imatinib to 800 mg in our case [14].

CONCLUSIONS

The analysis of literature data and the above clinical cases show the following. Minimally invasive processes allow surgical interventions in smaller volumes than in other gastrointestinal tumors (adenocarcinomas) under the condition of radicalism (R0) and do not require aggressive neoadjuvant or adjuvant therapy. The presence of a giant GIST in a patient is a serious diagnostic and treatment challenge. Only a comprehensive examination of the patient, the use of modern intrascopic technologies followed by an adequate intraoperative assessment of resectability and a justified refusal of "over-radicalism" protect such patients from unjustified intra- and postoperative risks. Morphological, IHC and molecular verification of GIST, management of the patient by a multidisciplinary team allows to resolve diagnostic and treatment contradictions, to create the prospect of achieving complete or partial remission and long-term survival with a satisfactory quality of life.

REFERENCES

1. Rubin B.P., Blanke C.D., Demetri G.D. et al. Protocol for the examination of specimens from patients with gastrointestinal stromal tumor. Arch Pathol Lab Med. 2010;134(2):165-170.
2. Novelli M., Rossi S., Rodriguez-Justo M. et al. DOG1 and CD117 are the antibodies of choice in the diagnosis of gastrointestinal stromal tumours. Histopathology. 2010;57(2):259-270.
3. Søreide K., Sandvik O.M., Søreide J.A. et al. Global epidemiology of gastrointestinal stromal tumours (GIST): a systematic review of population-based cohort studies. Cancer Epidemiol. 2016;40:39-46.
4. Orphanet Report Series. Prevalence of rare diseases: Bibliographic data. 2015; 2.
5. Orphanet Report Series. Prevalence of rare diseases. Bibliographic data. 2022; 1. http://www.orpha.net/orphacom/cahiers/docs/GB/Prevalence_of_rare_diseases_by_diseases.pdf. [date access 03.12.2022]

6. Gronchi A., Bonvalot S., Poveda Velasco A. et al. Quality of surgery and outcome in localized gastrointestinal stromal tumors treated within an international intergroup randomized clinical trial of adjuvant imatinib. JAMA Surg. 2020;155(6):e200397.
7. Blanke C.D., Rankin C., Demetri G.D. et al. Phase III randomized, intergroup trial assessing imatinib mesylate at two dose levels in patients with unresectable or metastatic gastrointestinal stromal tumors expressing the kit receptor tyrosine kinase: S0033. J. Clin Oncol. 2008;26(4):626-632.
8. Sözütek D., Yanık S., Neslin Akkoca A. et al. Diagnostic and prognostic roles of DOG1 and Ki-67 in GIST patients with localized or advanced/metastatic disease. Int J Clin Exp Med. 2014;7(7):1914-1922.
9. Kelly C.M., Gutierrez Sainz L., Chi1 P. The management of metastatic GIST: current standard and investigational therapeutic. J Hematol Oncol. 2021; 14:2. doi:10.1186/s13045-020-01026-6.
10. Casali P. G., Blay J. Y., Abecassis N. et al. Gastrointestinal stromal tumours: ESMO-EURACAN-GENTURIS Clinical Practice Guidelines for diagnosis, treatment and follow-up. Annals of oncology. 2022;33 (1):20-33.
11. Schaefer I-M., Mariño-Enríquez A., Fletcher J.A. What is New in Gastrointestinal Stromal Tumor? Adv Anat Pathol. 2017; 24(5): 259–267. doi:10.1097/PAP.0000000000000158.
12. Shen Y-Y. et al. Exon 11 homozygous mutations and intron 10/exon 11 junction deletions in the KIT gene are associated with poor prognosis of patients with gastrointestinal stromal tumors. Cancer Medicine. 2020;9:6485–6496.
13. Kelly C.M., Sainz L.G., Chi1 P. The management of metastatic GIST: current standard and investigational therapeutic. J Hematol Oncol. 2021;14:2. doi:10.1186/s13045-020-01026-6.
14. Casali P. G., Blay J. Y., Abecassis N. et al. Gastrointestinal stromal tumours: Esmo-Euracan-Genturis. Clinical Practice Guidelines for diagnosis, treatment and follow-up. Annals of oncology. 2022;33 (1):20-33.

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