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SURGICAL TREATMENT OF GASTROINTESTINAL STROMAL TUMORS – A SINGLE CENTRE RETROSPECTIVE STUDY

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ABSTRACT

Background: Gastrointestinal stromal tumors (GIST) account for 1-3% of all malignant tumors of the gastrointestinal tract, with an annual incidence of 1.5 per 100,000 inhabitants. GISTs are the most common symptomatic tumors of the small intestine while the most common site of is the stomach followed by the small intestine and colon.

Material and methods: A retrospective, single centre study was conducted and it encompassed all patients who underwent surgical treatment of GIST in a period 2010-2020 at General Hospital Karlovac. Data were obtained from medical records using institutional digital system. Data on demographic, tumor and operative characteristics as well as outcomes were collected and analysed.

Results: A total of 12 patients with pathological diagnosis of GIST were treated in the study period. There were four men and eight women with mean age of xx (ranged 49 - 79 years).

The tumor was located in stomach in seven cases (58.3%), three were arising in small intestine, one in omentum, and one in mesenteric root. The most common clinical presentation was bleeding in seven patients followed by obstruction in three and palpable tumor mass with pain in two patients. All patients underwent surgery under general anaesthesia. They were monitored over a period of minimally 5 years and 10 patients had no recurrence, while one patient died within the first year due to cardiovascular incident. Only one patient died as a result of disseminated GIST.

Conclusion: GISTs are uncommon tumors, but in most cases have favorable prognosis mainly due to sucesful surgical resection and availaility of potent targeted therapy. Abdominal surgeons should be familiar with etiology and pathophysiology of GISTs and diagnostic and therpetuc approaches in GIST management.

Keywords: Gastrointestinal stromal tumour, GIST, Surgical treatment

INTRODUCTION

Gastrointestinal stromal tumors (GIST) are the most common symptomatic tumors of the small intestine and account for 1-3% of all malignant tumors of the gastrointestinal tract, with an annual incidence of 1.5 per 100,000 inhabitants [1,3]. In the USA, there are 10-20 cases per million inhabitants, and in Europe, 6-14.5 cases per million [4]. They arise from interstitial cells of Cajal (ICC) by mutation of the KIT or PDGFR-alpha gene [5]. The most common localization of the GIST is the stomach (50%) followed by small intestine (25%) and less often the colon (10%), oesophagus (5), rectum, omentum, and mesentery (7%).

Stomach GISTs are usually less aggressive than GISTs arising in other sites.

These tumors may grow intraluminally or extraluminally and can be exulcerated and cause bleeding within the digestive system. In addition, GISTs may cause obstruction, intussusception or hollow organ perforation [2-6]. Large tumors may be necrotic in the centre, which is caused by a disproportion between the growth of the tumor and its blood supply.

GIST tumors are made of spindle (70%) and epithelioid cells (30%), and benign GIST tumors are three to four times more common than the malignant form of GIST. The majority (90%) of GISTs have the expression of CD117, a kit proto-oncogene protein that is a transmembrane receptor for stem cell growth factor, and 70-80% expression of CD34 antigen of human progenitor cells, and is less often positive for actin and desmin. The incidence is equal in men and women and occurs more often in the fifth decade of life [3,7].

Predictive factors for aggressive tumor behaviour and an increased risk of local tumor recurrence are mitotic rates greater than 5 per 10 HPF, tumor sizes greater than 5 cm and 10 cm, and mitotic activity greater than 2 per 50 high power fields. The diagnosis is based on the clinical presentation (bleeding from the digestive tract, obstruction, perforation, palpable tumor mass, and undefined abdominal pain), radiological evaluation (X-ray of the abdomen), CT and MRI of the abdomen, endoscopic examinations, pathohistological verification, and immunohistochemical methods.

The gold standard in the treatment of non-metastatic GIST tumors is surgical treatment with negative excision

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margins (2–3 cm). Adjuvant treatment with tirosine kinase inhibitors such as imatinib can significantly reduce tumor recurrence and positively affect the survival especially in high-risk cases.

MATERIALS AND METHODS

A retrospective, single-center study was conducted, and it encompassed all patients who underwent surgical treatment of GIST in a period 2010-2020 at General Hospital Karlovac. Patients aged >18 with pathohistologically confirmed GIST were included. Data were obtained from medical records using an institutional digital system. Data on demographic, tumor, and operative characteristics, as well as outcomes, were collected. Descriptive analysis was performed, with results presented in corresponding tables. All surgical procedures were performed by experienced abdominal surgeons, and the patients were thoroughly informed about the therapeutic procedure, possible intraoperative and postoperative complications, and the prognosis of the disease. All patients underwent preoperative preparation, which included complete laboratory tests, X-rays of the heart and lungs, an ECG-electrocardiogram, and preoperative examination by the anesthesiologist. Patients were monitored over a period of minimally 5 years.

RESULTS

A total of 12 patients with pathological diagnosis of GIST were treated in the study period. There were four men and eight women with mean age of 63.5 years (ranged 49 - 79 years). The tumor was located in stomach in seven cases (58.3%) (Fig.1), three were arising in small intestine (Fig. 2), one in omentum, and one in mesenteric root (Fig.4). The most common clinical presentation was bleeding in seven patients followed by obstruction in three and palpable tumor mass with pain in two patients. All patients underwent surgery under general anaesthesia. Baseline data and clinical presentations are shown in Table 1. Most common presentation was intraluminal bleeding. In all cases CT scan was performed and in 8 patientscan additional endoscopic evaluation was done.

In three patients with a location of GIST in the stomach, 2/3 resection of the stomach was performed according to the Billroth II method (Fig. 5). In other 4 patients a resection of the tumor with the wall of the stomach was performed with margin more than 3 cm from the tumor. In patients with small intestinal GISTs, partial resection of the small intestine with similar resection margins was performed. All patients underwent primary anastomosis. In a patient with omental GIST, a complete resection of the greater omentum was performed, and in a patient with a tumor in the area of the radix of the mesentery, a radical tumor resection with preservation of small bowel was performed.

The mean size of the tumor was 4.7cm and ranged between 3 and 8 cm. Mitotic activity ranged 2-8 per 10 HPF. Immunohistochemically, all tumors were CD117 and CD34 positive, and in 4 patients, Ki 67 was positive as well. Pathohistological findings showed in all cases polymorphic, polygonal spindle cells, hyperchromatic nuclei, vacuolated with part of bright cytoplasm. The macroscopic appearance showed a solid, partly cystic, encapsulated tumor, and in four cases it had necrosis and bleeding in the central part of the mucous membrane with ulceration. ere were no distant metastases and no infiltration of local lymph nodes.

Postoperative outcomes are shown in Table 2. The patients were monitored for minimally 5 years and had clinical and CT follow up every 6-12 months. When indicated, patients underwent repeated endoscopic evaluation. One patient had intraabdominal abscess treated by percutaneous drainage and no other complications were noted. The five-year survival rate was 83.3% (10/12), and 9 patients had no disease recurrence at 5 years' follow-up. One patient died within the first year due to a heart failure. In one patient, disease recurrence occurred after 3 years with dissemination of the tumor along the radix of the mesentery. It was treated with imatinib, but after 5 years form the diagnosis the patient died.

DISCUSSION

The surgical treatment of gastrointestinal stromal tumors (GISTs) is a cornerstone of managing this unique subset of tumors. GISTs often arise in the stomach and small intestine and can vary significantly in size and malignancy potential. The primary goal of surgical intervention is complete resection, which has been shown to correlate with improved outcomes and reduced recurrence rates. Studies indicate that achieving clear margins during surgery is crucial, as even microscopic residual disease can lead to tumor recurrence and metastasis [2,8]. However, metastases in the lymph nodes are rare and routine lymphadenectomy is not necessary [9,10]. In cases where GISTs are diagnosed at an advanced stage or exhibit metastatic behavior, the role of surgery becomes more complex. While surgical resection may still be indicated for isolated metastases, it is often combined with targeted therapies such as imatinib, which has revolutionized GIST management. These therapies can shrink tumors preoperatively, making surgical removal more feasible and effective [11-12]. The role of minimally invasive techniques, such as laparoscopic surgery, has gained traction, providing patients with quicker recovery times and less postoperative discomfort. Postoperative monitoring is also essential, as GISTs can recur despite initial successful resection. Regular follow-ups, including imaging studies and serum markers, are recommended to detect any signs of

recurrence early. Overall, a multidisciplinary approach involving surgical oncologists, medical oncologists, and radiologists is critical to optimize treatment outcomes for patients with GISTs. Continued research into the molecular characteristics of GISTs may further enhance surgical strategies and adjuvant therapies, leading to better patient prognoses. Our results are in line with outcomes reported in the literature and generally the clinical course was favorable which is mainly a result of successful radical surgical tumor resection.

CONCLUSION

Surgical management of gastrointestinal stromal tumors (GISTs) remains the primary treatment modality, particularly for localized disease. Complete surgical resection is essential for optimal outcomes, as it significantly reduces the risk of recurrence and offers the best chance for long-term survival. For advanced GISTs or those with metastasis, surgery may be complemented by targeted therapies like imatinib to improve prognosis.

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CONFLICT OF INTEREST:

The authors declare that there is no conflict of interest.

FIGURES

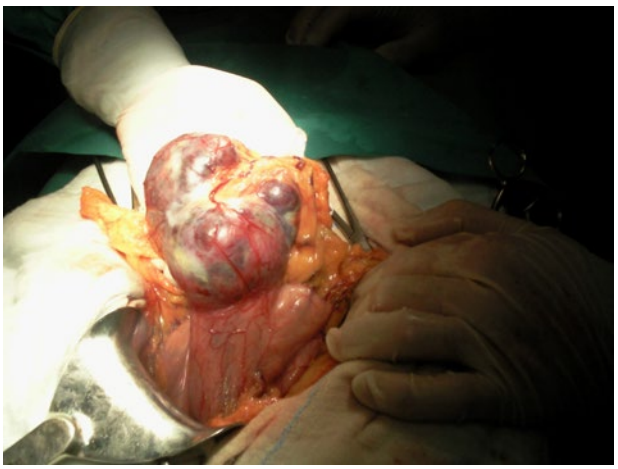

Figure 1. Stomach GIST

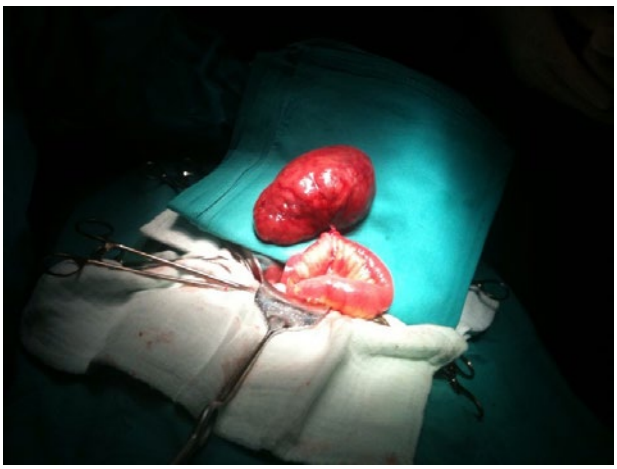

Figure 2. Small intestine GIST

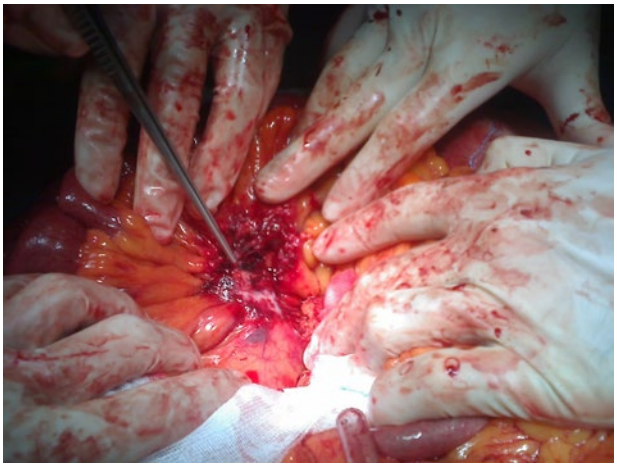

Figure 3. Mesentery GIST

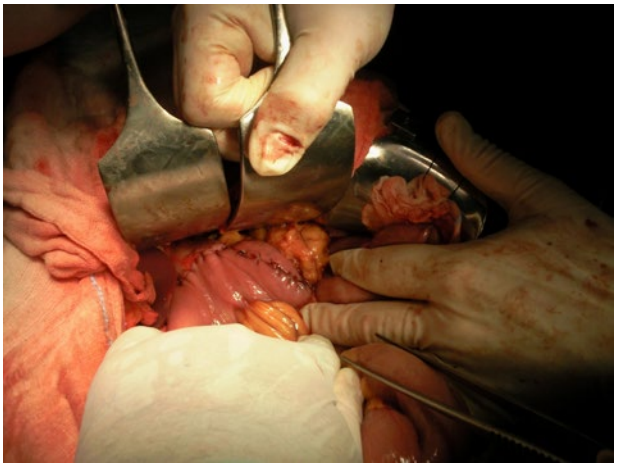

Figure 4. Gastric resection according to the Billroth II procedure

TABLES

Category	
Number of patients	12
Age (mean ± SD)	63.5 ± 14
Male/Female	4/8
BMI, kg/m2 (mean ± SD)	24.1 ± 4.2
ASA score ≥ 3, n (%)	2 (16.6)
Previous abdominal surgery, n (%)	4 (33.3)
Tumor location	
- Stomach	7 (58.3)
- Small intestine	3 (25.0)
- Omentum	1 (8.3)
- Mesentery	1 (8.3)
Clinical presentation	
- Bleeding	7 (58.3)
- Obstruction	3 (25%)
- Palpable tumor mass	2 (16.6%)
Tumor characteristics	
- Tumor size mean (range) cm	4.7 (3-8)
- Mitotic activity, mean (range)	5 (2-8)

Table 1. Baseline and operative characteristics

Category	
- Hospital stay, days (mean, range)	8.2 (5-18)
- Severe morbidity (≥IIIa)*	1 (8.3)
- 1-year survival, n(%)	12/12 (100%)
- 5-years survival, n(%)	10/12 (83.3)
- 5-years recurence free survival, n(%)	9/12 (75.0)
- Adjuvant chemotherapy used	4/12 (33.3)

*According to Clavien-Dindo

Table 2. Postoperative outcomes